

Coping with Gutenberg: The Information Explosion in Early Modern Europe

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Both Gutenberg and printing have long been celebrated. From the sixteenth century onwards the printing-press has been described as literally epoch-making. It has been viewed as the symbol of a new age, often coupled with gunpowder (another invention attributed to the Germans) and sometimes with the compass as well. Francis Bacon linked print to the progress of knowledge (the 'Advancement of Learning', as he called it), to the ideal of pansophia and to the utopian vision of undoing the consequences of the Fall.

The idea of commemorating centenaries with festivals was extremely rare before 1617, when the German Protestant world celebrated the centenary of Martin Luther's posting of his famous theses at Wittenberg. All the same, one of the next commemorations of this kind took place in 1640, on what was believed at the time to be the bicentenary of Gutenberg's invention. This festival, the *Jubilaeum typographicum*, which held at Leipzig, coincided with two histories of printing, one by Mark Boxhorn and the other by Bernhard von Mallinkrot, celebrating the new invention. Many later accounts of printing have adopted the same tone.¹

In this article, however, my approach will be less triumphalist. It is customary to view printing with moveable type as the solution to a problem, as a way of adjusting the supply of texts to meet the increasing demand for them in the late Middle Ages, a time when the numbers of literate laymen and women were increasing. However, this is not the only possible perspective. In what follows - without any intention of denying the achievement of Gutenberg, or indeed that of the Chinese or the Koreans who had also invented forms of printing - I should like to examine some of the unintended consequences of the invention, its side-effects, the problems to which it gave rise.

^{*} This article is a revised version of a lecture given at Mainz in June 2000. It draws on material discussed in more detail and with more ample footnotes in the forthcoming book, *A Social History of Knowledge from Gutenberg to Diderot* (Cambridge, 2001). See also A. Briggs and P. Burke, *A Social History of the Media* (Cambridge, 2001). The Portuguese version of this text was published in *Revista Estudos Avançados*, no.44, Jan-April, 2002.

¹ Among the most important, L. Febvre and H.-J. Martin, *L'apparition du livre* (Paris, 1958), and E. Eisenstein, *The Printing Press as an Agent of Change* (2 vols, Cambridge, 1979).

It seems to be inevitable in human affairs that every solution to a problem sooner or later generates more problems of its own. As the Swedish geographer Torsten Hägerstrand has suggested, the process of innovation always has a negative as well as a positive aspect, a 'destructive side' as well as a creative side. He calls this destructive side 'denovation' as opposed to 'innovation'.² In the case of the Industrial Revolution, for example, one thinks of the handloom-weavers who were unable to compete with the new technology, as well as of the child workers in the new factories.

The 'triumphalist' accounts of the new invention with which I began this article were balanced from the beginning by what we might call 'catastrophist' narratives. Print was described by the French humanist Guillaume Fichet - who introduced the printing-press to Paris - as that 'Trojan horse'.³ Different social groups had different criticisms of the new medium. For example, scribes and 'stationers' (who sold manuscript books) and professional singers and storytellers all feared - like the handloom-weavers in the Industrial Revolution - that the press would take away their living.

For their part, churchmen feared that print would encourage ordinary lay people to study religious texts for themselves rather than to rely on what the authorities told them.⁴ They were right. In the sixteenth century, in Italy for example, shoemakers, dyers, masons and housewives were all claiming the right to interpret scripture.⁵ The Catholic Index of Prohibited Books, launched after the Council of Trent, was one attempt to deal with this problem. Another possibility was of course for the churches to embrace the new medium and to attempt to use it for their own purposes. In Protestant Sweden, for example, in the seventeenth century, the Church mounted a literacy campaign - perhaps the first such campaign in modern history - directed towards the encouragement of bible reading.⁶ However, this solution raised new problems in its turn. The publication, from the late seventeenth century onwards, of Swedish chap-books such as Fortunatus and Ulspegel shows that once they learned to read, ordinary people did not confine themselves to the Bible, as the clergy might have wished.

² T. Hägerstrand, 'Some Unexplored Problems in the Modeling of Culture Transfer and Transformation', in P. J. Hugill and D. B. Dickson (eds) *The Transfer and Transformation of Ideas and Material Culture* (College Station, Texas, 1988), 217-32, at p. 231.

³ Discussed in M. Giesecke, *Der Buchdruck in der frühen Neuzeit* (1991, second ed. Frankfurt 1998) 168ff.

⁴ M. Lowry, *The World of Aldus Manutius* (Oxford, 1979), 24-41; B. Richardson (1998) 'The Debates on Printing in Renaissance Italy', *La Bibliofilia* 100, 135-55.

⁵ L. Davidico quoted in G. Fragnito, *La Bibbia al rogo: La censura ecclesiastica e i volgarizzamenti della Scrittura (1471-1605)* (Bologna, 1997), 73.

⁶ E. Johansson, 'The History of Literacy in Sweden' (1977: rpr in H. J. Graff, ed., *Literacy and Social Development in the West*, Cambridge 1981, 151-82.

By the 1620s, political anxieties were joining religious ones, with one Italian writer, Ludovico Zuccolo, evoking the image of barber's shops full of ordinary people discussing and criticising the actions of governments. These anxieties were in part a reaction to the rise of printed newspapers at this time, leading to a debate summarised in Johann Peter von Ludewig's treatise Vom Gebrauch und Missbrauch der Zeitungen (1700). Authoritarian governments which were criticised in print faced a dilemma much like that of the churches. If they did not reply to criticism, they might give the impression that they had no arguments to put forward. If, on the other hand, they did reply, in so doing they encouraged the very freedom of political judgement of which they disapproved. No wonder then that the Englishman Sir Roger L'Estrange, the chief censor of the press after the restoration of Charles II, wondered 'whether more mischief than advantage were not occasion'd to the christian world by the invention of typography'.⁷

Scholars, or more generally anyone in search of knowledge, also faced problems. Let us look from this point of view at the so-called information 'explosion' - a metaphor uncomfortably reminiscent of gunpowder - which followed the invention of printing. Information spread 'in unprecedented amounts and at unprecedented speed'.⁸ Some scholars were quick to note the disadvantages of the new system. The humanist astronomer Johann Regiomontanus noted in 1464 or thereabouts that careless printers would multiply errors, and another humanist, Niccolò Perotti, put forward a project for scholarly censorship in 1470. Even more serious was the problem of information retrieval and, linked to this, the selection and criticism of books and authors. In other words, the new invention produced a need for new methods of information management.

In the early Middle Ages the problem had been the lack of books, their paucity. By the sixteenth century the problem was that of superfluity. An Italian writer, Antonfrancesco Doni, was already complaining in 1550 that there were 'so many books that we do not even have time to read the titles'. Books were a 'forest' in which readers could lose themselves, according to Jean Calvin.⁹ They were an 'ocean' through which readers had to havigate, or a 'flood' of printed matter in which it was hard to escape

⁷ G. Kitchin, Sir Roger L'Estrange (London, 1913).

⁸ E. C. Tennant, 'The Protection of Invention: Printing Privileges in Early Modern Germany', in Knowledge, Science and Literature in Early Modern Germany, ed. G. S. Williams and S. K. Schindler (Chapel Hill, 1996) pp. 7-48, at p. 9.

⁹ Quoted in G. Cavallo and R. Chartier (eds) A History of Reading in the West (Cambridge, 1999), 234.

drowning.¹⁰ The metaphors of forests and oceans were topoi, of course, but as topoi usually are they were also expressions of experience. The French librarian Adrien Baillet feared that the multiplication of books would bring with it a new age of barbarism. ‘On a sujet d’appréhender que la multitude des livres qui augmentent tous les jours d’une manière prodigieuse, ne fasse tomber les siècles suivans dans une état aussi facheux qui estoit celuy ou les barbares avoit jeté les precedens’.¹¹

Even Conrad Gesner, the Swiss humanist who coined the phrase ‘the order of books’ (*ordo librorum*), recently adopted by Roger Chartier as the title of one of his works, also complained of ‘that confused and irritating multitude of books’ (*confusa et noxia illa librorum multitudo*). Rather than an order of books, what some contemporaries perceived was a ‘disorder of books’ which needed to be brought under control. This is of course a problem with which we too are struggling, especially now, in the early days of electronic media. For this reason the German scholar Michael Giesecke described his study of fifteenth- and sixteenth-century German printing as a ‘Fallstudie über die Durchsetzung neuer Informations- und Kommunikationstechnologien’. Giesecke gives a system-oriented account of what he calls, ‘Das Typographeum als Informationssystem’. In this article, on the other hand, I should like to offer a more agent-oriented account in terms of a sequence of problems and solutions, while admitting that these solutions often become institutionalised, human actions solidifying into social structures.

A few well-known statistics are worth repeating as a reminder of the scale of the changes taking place in early modern communications. By the year 1500, presses had been established in more than 250 centres in Europe and had produced about 27, 000 editions by that time. At a conservative estimate of 500 copies per edition, there would have been something like 13 million books circulating by the year 1500 in a Europe of 100 million people (but not in the Orthodox world, which wrote in Greek or Russian or Old Church Slavonic). As for the years between 1500 and 1750, so many books were published in Europe that scholars in book history are unable or unwilling to calculate the totals (at the fifteenth-century rate of production the total would have been around 130 million books, but in fact the rate of production increased dramatically).

One group for whom this multiplication of books created instant problems was that of librarians, although it obviously made them all the more indispensable.

¹⁰ Basnage quoted in H. H. M. van Lieshout, ‘Dictionnaires et diffusion de savoir’, *Commercium Litterarium*, ed. H. Bots and F. Waquet (Amsterdam and Maarssen, 1994), 134.

¹¹ A. Baillet, *Jugements des Savants sur les principaux ouvrages des anciens* (4 vols, Paris, 1685-6), preface.

In 1475, a major European library, that of the Vatican, contained only 2, 500 volumes. In the early seventeenth century, the Bodleian Library at Oxford had 8,700 titles, and the imperial library in Vienna, 10,000. By mid-century, the library at Wolfenbüttel contained 28,000 volumes, while the Ambrosiana in Milan had 46,000 volumes (not counting manuscripts). In the middle of the eighteenth century, a private individual living in London, Sir Hans Sloane, had accumulated fifty thousand volumes (which were to form the nucleus of what is now the British Library). Large new buildings had to be constructed to contain all these books (Fischer von Erlach's Hofbibliothek in Vienna, for example), and these buildings had in turn to be financed.

The existence of printed books made many items of information easier to find than before - on the condition that one first found the right book. Catalogues therefore had to be compiled for large public and private libraries. Baillet compiled a catalogue in 32 volumes for his employer the magistrate Lamoignon, a labour which helps explain his outburst, quoted above, about the coming age of barbarism. The compilation of these catalogues raised the problem of how to arrange them, whether by subject or in an alphabetical list of authors. If by subject, whether according to the traditional university curriculum or in a new way more appropriate to new discoveries (a problem which preoccupied Leibniz among others).

Then there was the problem of access. How could readers discover what books were available in a given library? How in particular could readers from other cities or countries know that it was worth making a journey to a particular library in search of a particular book? Some catalogues were printed, like the catalogue of the Bodleian Library at Oxford in the early seventeenth century. An alternative to the catalogue of a specific library was the printed bibliography, the catalogue of the ideal library or the 'library without walls' (as Chartier calls it, adapting a phrase from André Malraux).¹²

For example, the Swiss humanist Conrad Gesner (1516-65), a true polyhistor, who wrote on zoology, botany, chemistry, geology and linguistics, was also the author of the enormous Bibliotheca Universalis (1545-55), an attempt at a complete bibliography of scholarly works organised by author and by subject.¹³ It is worth taking a moment to reflect on the practical problems of such an enterprise. Imagine Gesner travelling to visit

¹² R. Chartier, *L'ordre des livres* (Aix-en-Provence, 1992).

¹³ A. Serrai, *Conrad Gessner*, ed. M. Cochetti (Rome, 1990); H. Zedelmaier, *Bibliotheca Universalis und Bibliotheca Selecta: Das problem der Ordnung des gelehrten Wissens in der frühen Neuzeit* (Cologne, 1992), 3-153.

libraries in Italy and elsewhere and making his voluminous notes, writing with innumerable quill pens, in constant need of resharpening, and needing to keep his notes in order (perhaps, like later scholars, on slips of paper, or on the backs of playing cards).

From the reader's point of view, it was not always easy to find bibliographical information in such an enormous repository as that of Gesner. So general bibliographies were followed by more manageable specialised ones, including national bibliographies like La Croix du Maine's Bibliothèque Française (1584) and subject bibliographies in theology, law, medicine, history and so on, like the Bibliotheca Historica of Boldanus (1620). Some bibliographies tried to be comprehensive, others were deliberately selective. A long series of Bibliothecae Selectae or Bibliothèques Choiesies (from the sixteenth-century Jesuit Possevino to the eighteenth-century Protestant Formey), sometimes in the form of advice for someone wishing to form a library, helped readers to choose between competing books.¹⁴ The Polyhistor of Daniel Morhof (sometime librarian at Kiel), and similar accounts of historia litteraria offered not so much a history of literature in the modern sense as a guide to the world of books and its institutions – in other words, information about information.

Like the rise of bibliographies in the mid-sixteenth century, the rise of book reviews a hundred years later was a response to a problem which had become increasingly acute, the problem of discernement as Baillet called it, in other words discriminating between good and bad books. These reviews appeared in the learned journals, journals which were founded partly for this reason: the Philosophical Transactions of the Royal Society of London and the Journal des Savants in Paris in the 1660s, the Acta Eruditorum of Leipzig and the Nouvelles de la République des Lettres in Amsterdam in the 1680s, and so on. The title 'news of the republic of letters' explains the purpose of these journals very well. They appeared every month or two and carried information about new books, including summaries and sometimes criticisms. Like bibliographies, some of these journals were specialised, like the Dänische, Pölnische and Schwedische Bibliothek.

In its turn, this solution generated the problem of finding the reviews, or indeed of finding the journals, which were published in so many different European cities and sometimes lasted for only a few years. For this reason the 1747 edition of Morhof's Polyhistor (a guide which was regularly revised and enlarged), began with an alphabetical list of journals of this kind.

¹⁴ E. Canone, Bibliothecae Selectae da Cusano a Leopardi (Florence, 1993); Zedelmaier (1992).

Bibliographies were soon joined by shelves of other reference books. They had titles such as ‘castle’, ‘compendium’, ‘corpus’, ‘directory’, ‘forest’, ‘garden’, ‘inventory’, ‘library’, ‘mirror’, ‘repertory’, ‘theatre’ or ‘treasury’, and they offered information about words (dictionaries), people (biographical dictionaries), places (gazetteers and atlases), dates (chronologies) and things (encyclopaedias). There were also multi-volume collections of texts on particular topics – laws, treaties, chronicles, decisions by councils of the church, descriptions of exotic places by travellers and so on. By 1758 there was even a dictionary of dictionaries, published in Paris and mocked by the emigré man of letters Melchior Grimm but all the same responding to a real need; Durey de Noinville’s Table alphabétique des dictionnaires.

These books were intended not only for scholars and special-interest groups such as preachers but also for people who read the newspaper (hence the terms ‘gazetteer’ and Zeitungslexikon) or who wanted to shine in conversation (hence Konversationslexikon). The rise of such books was fuelled not only by the increase in information but also by competition. The commercialisation of knowledge is already visible in the age of Gutenberg, witness the broadsides advertising libri venales (books for sale). However, this commercialisation took a great step forward in the eighteenth century, forming part of the rise of ‘consumer society’ in England, France, Germany and elsewhere in the years around 1750.¹⁵

All these solutions to problems created further problems and led to major changes in styles of reading, writing and organising information.

Writing in 1819, an English man of letters, Francis Jeffrey, expressed the fear that ‘if we continue to write and rhyme at the present rate for 200 years longer, there must be some new art of short-hand reading invented - or all reading will be given up in despair’.¹⁶ In an informal way, this was what had already been happening for centuries. There was a shift from ‘intensive’ to ‘extensive’ reading (or in Francis Bacon’s famous metaphor, from ‘swallowing’ to ‘tasting’ books). The later eighteenth century has been presented as a turning-point in this respect (though it should not be forgotten that early modern people, like ourselves, were capable of changing gear and shifting from one mode of reading to

¹⁵ N. McKendrick, J. Brewer and J. H. Plumb, *The Birth of a Consumer Society* (London, 1982); R. Sandgruber, *Die Anfänge der Konsumgesellschaft* (Vienna, 1982); J. Brewer and R. Porter (eds), *Consumption and the World of Goods* (London, 1993); D. Roche, *Histoire des choses banales* (Paris, 1997).

¹⁶ Quoted in M. Phillips, *Society and Sentiment: Genres of Historical Writing in Britain, 1740-1820* (Princeton, 2000), 294.

another when this was necessary).¹⁷ A new vocabulary came into use in the early modern period to describe this ‘reading revolution’, including words such as ‘referring’, ‘consulting’, ‘skimming’ and ‘skipping’. As Jonathan Swift commented with his usual pessimistic wit, ‘to enter the palace of learning at the great gate, requires an expense of time and forms; men of much haste and little ceremony are content to get in by the back-door’. These were the literary equivalents of ‘surfing the net’.

This ‘extensive’ mode of reading encouraged and was in turn encouraged by changes in the format and layout of books, such as the division of text into chapters, the provision of tables of contents, indexes (including indexes of maxims as well as subjects or the names of people and places), and marginal notes pointing out changes of topic. There was considerable competition between publishers in these respects, and title-pages often referred to the number and the accuracy of indexes, glossaries and so on as reasons for buying a particular edition of a classic text.¹⁸

This was the case, for example, in the hundred or so editions of Baldassare Castiglione’s famous Courtier (first published in Italian in 1528). Successive editions provided the text with a division into chapters, a table of contents, an index, and marginal annotations. One printer plagiarised the index of a rival, forgetting that the page numbers of his own edition were no longer appropriate. More serious in its consequences was the way in which this apparatus or ‘paratext’ changed the message of the book, turning it from an open dialogue which questions rules of conduct into a how-to-do-it book. The paratext became a self-referential system, with the index, for example, based on the marginalia rather than the text and including instructions such as ‘The courtier should know how to dance’.¹⁹ We should not underestimate the power of format in shaping perceptions and expectations, the Erwartungshorizont of the readers.

There were also changes in the manner of writing, notably the rise of the ‘footnote’, an essentially seventeenth- and eighteenth-century phenomenon discussed in a recent learned and elegant essay by Anthony Grafton.²⁰ The term ‘footnote’ should not be taken too literally. What was important was the spread of the scholarly practice of giving some kind of guide to the reader of a particular text where to go for evidence and for further

¹⁷ R. Witmann, ‘Was there a Reading Revolution at the End of the Eighteenth Century?’ in Cavallo and Chartier, 284-312.

¹⁸ B. Richardson, *Print Culture in Renaissance Italy: the Editor and the Vernacular Text, 1470-1600* (Cambridge, 1994).

¹⁹ P. Burke, *The Fortunes of the Courtier* (Cambridge, 1995), 42-4, 73-5.

²⁰ A. Grafton, *The Footnote: a Curious History* (London, 1997).

information, whether this information was given in the text itself, in the margin ('sidenote'), at the foot ('bottom notes'), at the back, or in special appendices containing documents. The main point of these new practices was to facilitate a return to the 'sources', on the principle that information, like water, was purer the closer it came to the fountainhead. The historical note, like the detailed description of an experiment, was designed to allow the reader to repeat the author's experience if he or she wanted.

The return to the sources (ad fontes) was a slogan of Renaissance humanists and Protestant reformers alike, and some sixteenth-century historians were careful to refer to the manuscripts on which they based their accounts of the past. As a common practice, however, footnoting goes back to the seventeenth century. By the eighteenth century some readers had come to expect it, witness Horace Walpole's complaint to David Hume in 1758 about the lack of 'references on the margin' in his History of England. Hume admitted in his reply that the practice of giving references 'having been once introduc'd, ought to be follow'd by every writer'. A new code of scholarly conduct had been established. Today, we surely need a similar code of conduct for the Internet.

Finally, there were changes in the organisation of information, especially the rise of alphabetical order in the place of arrangement by subject. The idea of alphabetical order was not new (it was already employed in the eleventh-century Byzantine encyclopaedia known as 'Suidas'). What was new at this time was the extension of this mode of organisation and the way in which it came to over-ride more hierarchical classifications. As late as the end of the seventeenth century, alphabetical organization was still unusual enough for the editor of a reference book to the Muslim world, d'Herbelot's Bibliothèque orientale (1697), to find it necessary to apologize in advance, declaring that the method 'does not produce as much confusion as one might imagine'. All the same, there was a shift over the long term from sixteenth-century encyclopaedias such as Gregor Reisch's Margarita philosophica, which was arranged like the university curriculum and could be read from cover to cover, to the eighteenth-century encyclopaedia arranged in alphabetical order for ease of consultation, and in consequence virtually unreadable.

These new modes of reading, writing and organising information had in their turn their own unintended consequences, both social and intellectual.

One social consequence of the organisation of information retrieval was the rise of new occupations. Print brought with it not only the new social group of printers, but allied occupations such as proof-reader and librarian. They were joined in the seventeenth and

eighteenth centuries in the task of managing printed matter by professional or semi-professional cataloguers, editors, indexers and by the compilers of encyclopaedias. It was still just about possible for one individual to compile an encyclopaedia, as Pierre Bayle did at the end of the seventeenth century, or Ephraim Chambers in the early eighteenth. However, the new trend was to work in teams, as in the famous case of the *Encyclopédie*, or a little earlier, the German enterprise of the publisher Johann Heinrich Zedler of Leipzig. Zedler's Grosses Vollständiges Universal-Lexicon aller Künste und Wissenschaften was published in 64 folio volumes (two columns to the page) between 1732 and 1754, the result of the efforts of nine scholarly collaborators and (from volume 19 onwards) a full-time editor, Carl Günther Ludovici, concerned with technical problems such as cross-referencing.²¹ In other words, the new enlarged encyclopaedias rested on a greater social and intellectual division of labour than their predecessors.

The division of intellectual labour was not confined to encyclopaedias. There was a general trend towards specialisation and fragmentation at the expense of the old ideal of general knowledge. The rise of historia literaria suggests that there was a displacement of aims: the world of books was becoming an object of study in itself rather than a means to understand the wider world. Bacon, as we have seen, had associated print with pansophia. The tragic irony was that the rise of print made this ideal increasingly unrealistic.

The religious writer Richard Baxter already noted with regret the growing fragmentation of knowledge in his Holy Commonwealth (1659). 'We parcel arts and sciences into fragments, according to the straitness of our capacities, and are not so pansophical as uno intuitu to see the whole'. There may have been an advancement of learning at the collective level in the sense that new discoveries had been made and that more information was available in print, but at the individual level there was a serious loss.

It is hard to say who was the last polyhistor, but by the later seventeenth century it was becoming clear that they were an endangered species. The English scholar Meric Casaubon (son of the more famous Isaac Casaubon) wrote a defence of what he called 'general learning' in the middle of the seventeenth century, but the treatise was not published until the end of the twentieth.²² Leibniz was still able to make original contributions in fields as diverse as mathematics and history, not to mention librarianship. However some of the most famous of his seventeenth-century colleagues such as Jan

²¹ P. E. Carels and D. Flory, 'J. H. Zedler's Universal Lexicon', in F. A. Kafker, ed., *Notable Encyclopaedias* (Oxford, 1981), pp. 165-95.

²² M. Casaubon, *General Learning*, ed. R. Serjeantson (London, 1999).

Amos Comenius, Athanasius Kircher and Olaus Rudbeck were on the margin of eccentricity, if not over the edge, as if only obsessive scholars could pursue the pansophic ideal at a time when the practical obstacles were becoming both greater and more obvious than before.

The author of the article on ‘gens de lettres’ in the Encyclopédie was more resigned, declaring that ‘Universal knowledge is no longer within the reach of man’ (la science universelle n’est plus à la portée de l’homme). All that could be done in the new circumstances was to attempt to avoid narrowness by encouraging a ‘philosophical spirit’, making connections and drawing out the wider implications of specialised studies. That advice remains extremely relevant to us today.