# (Eisenstein 1980) (Eisenstein 1980)

“…image making was stimulated by printed among Protestants as well as Catholics” (99)

“The enthusiasts overestimate the initial changes wrought by print and forget that preliterate folk were not much affected. They know little about the evolution of the manuscript book and need to be warned against taking the claims made in prefaces by early printers and editors too literally. The skeptics, while having wellgrounded fears of exaggerating the break, do not appreciate the danger that comes from underestimating its true dimensions. The tendency to underestimate the new powers of the press is especially likely to occur when printing is placed in the framework provided by the history of the book. By Gutenberg’s time, the book had been in circulation for a thousand years or more, depending on whether we start with the codex or go back to the earlier scroll. What is new in the fifteenth century in Western Europe is not “the coming of the book” but rather the coming of a new process for duplicating books.’ (100)

“Three major movements affected by the development of this new process deserve special attention: the Renaissance, the Reformation, and modern science.” (101)

Two Renaissances (Carolingian revival and twelfth-century Renaissance) before show how this Renaissance was affected: preservative powers avoided “highly perishable resources of scribal culture” whereas now it involved a “permanent process of recovery. Greek studies, for example, could be pursued independently of the survival of enclaves of Greek emigres in the Mediterranean world. The difficulty of persuading tutors to visit cold Northern regions no longer blocked the progress of classical studies in transalpine Europe. It became possible to carry on Greek studies in Northern Europe, across the Alps, across the channel, and even overseas.

Assigning special significance to the preservative powers of print and to the permanent process of recovery it launched also explains how the fall of Constantinople got coupled with a revival of learning. Before printing, the destruction of a major center of manuscript records had always been associated with the onset of a “dark” age. The dispersal of Greek scholars and Greek manuscripts after the Ottoman takeover in 1453, however, was associated not with the beginning of a “dark” age but rather with a prelude to a “golden” age. This reversal becomes less puzzling when one considers the new impetus given to Greek studies by master printers such as Aldus Manutius in Venice.” (101)

“…new issues posed by printing had begun to divide Western Christendom and had begun to force churchmen to adopt new positions even before Luther’s 95 theses…” (101-2)

“By insisting on Bible-reading as a way of experiencing the Presence and achieving true faith, Luther also linked spiritual aspirations to an expanding urban enterprise.” (102-3)

“Protestant doctrines harnessed an evangelical religion to a new capitalistic industry aimed at expanding markets and increased booksales. The new combination of evangelism and capitalism made for an irreversible movement which threatened the priestly perogatives in an unprecedented way. “ (103)

“Providing breviaries for priests, manuals for confessors, and textbooks for seminarians kept certain privileged Catholic firms prosperous; but the censorship regulations issued by Counter-Reformation churches curtailed the open-ended expansion of lay book markets and diversification of output that was occurring in Protestant regions, to the disadvantage of Catholic printers.” (103)

“Some printers helped to fan the flames of religious warfare by mounting propaganda campaigns and promoting religious causes. But others also contributed to the clandestine circulation of more tolerant creeds. Such firms represented a ‘third force’ in early modern Europe and pointed the way to Enlightenment thought.” (103-4)

“Extending far-flung trade networks from small principalities and city states, some of the more celebrated publishers of the sixteenth century observed outward conformity to established churches and officials while secretely adhering to heterodox sects. Independent of secular dynastic interests and of religious orthodoxy alike, these firms served as sanctuaries for refugees of diverse faiths in the sixteenth century. They also provided wandering scholars with facilities extended by modern institutes of advanced studies. The heads of the new firms not only cultivated princely patrons. They, themselves, dispensed patronage, providing part-time jobs and room and board to impecunious students and clerks who had previously been more dependent on finding careers within the church.” (104)

“By providing support to editors, translators, and other literati, sixteenth-century printers contributed to the secularization of European culture…news and entertainment were increasingly handled outside the church.” (104)

“Too much emphasis on the issue of vernacular versus Latin distracts attention from other important changes wrought by print…decreasing reliance on ambiguous words. The duplication of visual aids reduced time spent on slavish copying of diagrams, tables, charts, and maps. It also provided a new basis for agreement about precisely observed natural phenomena and eliminated previous confusion engendered by translation from one language to another. Corrupted texts and drifting records could be discarded, and fresh ventures in collaborate data collection launched.

“…whereas polyglot editions of the Bible made scripture (‘the *words* of God’) seem more *multi*form, repeatable visual aids like maps and equations made nature (the *works* of God) seem more *uni*form.” (105)

“Thus I think it can be argued that printing played a significant part in weakeneing confidence in scriptural revelation while strengthening trust in mathematical reasoning and man-made maps.” (105)

“…the use of early presses by Western Europeans was determined by many different forces which had been incubating in the age of scribes. In a different context, the same technology might have been used for different ends (as was the case in Asia) or it might have been unwelcome and not been used at all (as was the case in many regions outside Europe where Western missionary presses were the first to be installed).” (105)

“The effects of printing seem to have been exerted always unevenly but always continuously and cumulatively from the late fifteenth century on. There appears to be no point at which they began to diminish. Much evidence suggests that they have persisted with ever-augmented force right down to the present…. [though] others disagree. As yet, however, so few scholars have been heard from that any final verdict is impossible and—in more ways than one—premature.” (Eisenstein 1980, 106)

# (Elverskog 2016) (Elverskog 2016)

“…it is vital to recognize that modernity did not simply flow out of a fifteenth century Germany workshop….consciously or not, simply by making printing the topic of our research we are all by default operating in the shadow of Gutenberg and the larger narrative of European modernity.” (22)

“…it was only…in the sixteenth century, that the value of printing was beginning to be recognized, whereby it then became a foundational part of the teleological narrative of modernity. Before that, however, it is important to recognize that no one in Europe apparently thought that printing was anything as monumentally important as people like McLuhan have claimed it to be. Rather, it was just a technique. One, moreover, that no one bothered to even document since it was of such little relevance…” (23)

“…through most of Chinese history, it would seem that Chinese didn’t celebrate printing as a major technical achievement of their civilization” (Furth 2009, 2 quoted in Elverskog)

“…for most peoples around the world printing was not anything of importance, much less a revolutionary technology. Rather, more often than not, printing was recognized simply as a rather a low level craft that was considered of very little cultural, social, or technological importance. Printing was therefore not considered to be a harbinger of radical change…” (25)

“As with most things that the Mongols did their involvement with printing was precociously early and on a massive scale. Indeed, only a few short decades after developing a written script we already have an outpouring of printing works ranging from Buddhist ones…to Chinese works…as well as imperially-sanctioned printed calendars.” (25)

“…we have evidence of both multi-volume and multi-lingual printed works from the Ming period [1368-1644]…and then…reaching its crescendo during the Qing period (1644-1911) there was a veritable tsunami of printed works.” (25)

“…nowhere…is there any claim by the Mongols that printing by itself is either a revolutionary innovation, or in anyway socially transformative, or even anything to be noted. Printing is simply a method of mass production. Moreover, nowhere in any of the Mongol printed material—be it from the Yuan, Ming, or Qing period—is printing, by itself, held up…as something of note. Rather, printing was something that was simply done more often than not for Buddhist merit, or to project state power, or much later, to make money by printing what sold to the small community of literate Mongols.” (26)

“…even though the printing of Mongolian material came to be on a monumental scale, it apparently had very little impact in Mongolian culture more broadly. Indeed, in complete contradiction to the whole narrative of printing as ushering in modernity—or printing as fundamentally changing human consciousness and society—there is seemingly no evidence for this in the case of Mongolian printing….the Mongols continued to be by and large a manuscript culture.” (28)

“…the prestige carried by both Tibetan and Chinese on account of the Dharma and literati culture clearly played a role in not only diminishing the power of Mongolian print culture, but also to a certain extent even hindered the very development of an autochthonous Mongolian literary culture.” (30)

“Moreover, and even more tragically, most of these works could not even be read; and thus, if anything, they simply signified what they were: vehicles of merit production and monuments of state power. As such, even if voluminous, the Mongolian printed material was simply not enough by itself to generate what one can call a print culture and its consequences as explored in the work of Benedict Anderson.” (Elverskog 2016, 30-31)

“In short, Mongolian print culture never developed a life of its own. Squeezed between the omnipresent and prestige-filled corpora of Chinese and Tibetan material the corpus of Mongolian printed material never had a chance.” (31)

“[In the Qing dynasty] Mongols were excluded from the imperial examination system….Thus being denied access to the standard means of producing status…clearly had an impact on the Mongols…” (31)

“…printing in the Islamic world, where printing was also famously not adopted even though they had the technology…aesthetics actually played a large role; namely, printed Arabic could never compete with the artistry of calligraphy.... Which is an argument that no doubt also resonates in the Sinoscript.” (32)

“...many reasons for why a Mongolian print culture did not fully develop…language prestige, religious valuations, political policies, and aesthetics may have played a role in this phenomenon…” (33)

# (Evon 2009) (Evon 2009)

“Korea had the technology for movable metal type some two centuries before Gutenberg, and by 1445 also had its own alphabet. Korea was thus in a position in East Asia inasmuch as it had, at approximately the same time as Gutenberg, the two technologies (movable type and an alphabet) that he successfully integrated. Yet it was not until much later that Koreans recognized the possibility of alphabetic print—that is, organizing movable type around individual letters…and when they did, they did so under the influence of printing techniques pioneered by Gutenberg.” (1)

Korean letters wouldn’t require 24 letters, but 2000 characters.

“In historical terms…the cause of alphabetic print in Korea has great significance. It arose due to a push for widespread literacy through vernacularisation of the written language, something increasingly seen as necessary for modernization and hence national preservation after Korea’s situation grew more parlous during the second half of the nineteenth century” (2-3)

The “memory-intensive characteristic of Literary Sinitic put a premium on the stability of knowledge and the written language through which that knowledge was to be expressed. Innovation could thus been seen as a threat to the continuation of knowledge, and in this respect, the conservatism of elite culture in Choson Korea…” (3)

In addition “…the Choson ruling elite’s commitment to a narrowly defined version of Neo-Confucianism, and the use of Literary Sinitic was central to this conception of orthodoxy.” (3)

“...the Chinese script…is only loosely connected to sound and Literary Sinitic existed only as a written language…although the students were learning a foreign language, there was no formal explanation of grammar per se. Instead, as the traditional saying went, ‘grammar dawns onn the mind’, and this occurred through repeated exposure to written sentences….The entire process was intensely oral-driven and was built on the rote memorization of texts that were chanted aloud…..acquisition of Literary Sinitic was of necessity supported by oral explication, since what was being learned existed outside the students’ oral/aural linguistic resources. Yet neither the youngsters nor the teachers had the sense that they were learning a foreign language that was sayable in the sense of a spoken vernacular.” (4)

“…profound differences in attitudes toward the written and vernacular in [East Asia]…Literary Sinitic’s socio-political function mitigated against full vernacularisation prior to the twentieth century, and Korean ‘full vernacularisation’ (as in China and Vietnam) was a belated event through a ‘derivitive modernity’.” (4)

“…radical disjunction between speech and writing…” (4)

“…spoken word among those educated in Literary Sinitic was subordinated to the written word of an unsayable language. Such subordination was a consequence of education and thus central to their conscious experience of language, with their spoken vernacular supporting acquisition of Literary Sinitic.” (10)

“…both sides were intensely concerned with tradition, the quality of Neo-Confucian education in Choson [Korea] and [its] standing vis-à-vis Ming China. But the anti-script f action was conservative with respect to form, whereas the pro-script faction was intent on correctness in pronunciation…” (13)

“…texts produced with movable type, vernacular print was chiefly used together with Sinographs in educational materials and didactic books illustrating Confucian morality—that is, as a supplement to extend the reach of the culture embodied in Literary Sinitic....And apart from the vexing questions of legal constraints, the government effectively monopolized movable-type printing due to cost….By comparison, xylography and manuscripts were much less technologically intensive, and therefore remained the principal means of the dissemination of written matter during Choson.” (17)

# (Hippe 2015) (Hippe 2015)

“As a crucial intermediary between the West and East Asia, the Muslim world had a long history of adopting major technologies from other regions, as shown by the adoption of paper for the sake of knowledge production.” (3)

“…there was a very close connection between the introduction of the written word and literacy to Arabia and the rise of the Arab and Muslim culture…..The effects of the Korean were so fundamental that the oral traditions were to some extent replaced by new literate, written tradition.” (13-4)

“…the willingness to use [paper] probably facilitated the spread of literacy and the Islamic faith.” (14)

“Printing may have be seen to desacralize the Arabic word and thus the word of Allah in the Koran…an alternative political economy hypothesis focusing on government legitimacy….legitimacy is made up of…force where military authorities have a comparative advantage….loyalty which can be particularly used by religious authorities (but also secular authorities such as the nobility). Educators in general and books in particular can serve to create loyalty. In this way religious authorities are supposed to have been a major source of loyalty and thus of legitimacy for governments throughout history. In the view of the authors greater legitimacy brings greater revenues to the rulers. New innovations such as the printing press can sifnicantly influence the sources of legitimacy and increase or decrease revenues.

In consequence…Ottoman rulers were still more dependent on the loyalty of religious authorities in the 15th century than their European counterparts on the legitimacy of the Catholic Church….Islamic religious authorities traditionally derived their power through the oral transmission of knowledge. Therefore the printing press might have threatened the legitimacy of religious authorities in the Ottoman Empire as it had done in Europe. This would have given an incentive to the rulers not to allow the introduction of the technology in order to protect this crucial source of legitimacy and their revnues. The vested interests of particular societal stakeholders and the rent seeking of the rulers would have then prevented the use of this new technology.”

In any case the printing of Arabic scripture was forbidden in 1485 in the Ottoman Empire. It appears to have even been punishable by death. The centralized structure of the empire assured a strict enforcement of such orders.” (15-6)

1728 allowed Arabic press in Istanbul, closed again in 1742 due to religious concerns (16)

Secular authorities becoming more important for legitimacy = not derive power from knowledge transmission so printing press not direct threat. (16)

“…the handwritten book (in the form of the Koran) seems to have been perceived to be holy but the printed book to be unholy by contemporary Muslims. In consequence Muslim beliefs, being influenced by the legitimacy of religious authorities, were possibly a fundamental driver of literacy and progress until the printing press when it reversed its stance on the dissemination of the word (in its printed form).” (16)

“…[s]ince a society oriented toward Confucianism did not favour the commercialization of book printing, the selling of books was disapproved’”(Sohn 1959, p. 101)(19)

“Reflecting the importance of Neo-Confucianism, elite education was not aiming at particular commercial skills in Korea. Instead, elite education focused on mastering Literary Sinitic. “ (19)

“Given the important influence of China, the demand for Chinese writings and especially Confucian teachings, increased over time. Furthermore the Chinese system of civil service sxaminations was adopted and used in Korea from the 10th century. Thus the interest in Confucianism gained further ground. Another consequence of the examination system was the creation of new educational facilities, in particular the National Institutes of Higher Education and many new private schools. Clearly the creation of these different types of educational facilities, their relevance for the civil service and the competition brought about an increasing demand for books. This increased demand, in turn made it necessary to print books. In consequence the government began to print books with woodblocks. Furthermore the rise of Buddhism in the region also led to an increase in printing. Accordinly the government printed a range of Buddhist works. Therefore demand grew in Korea for both Buddhist and Confucian materials.”20

Imported lots of books from China, China stopped exporting “it was pointed out that China might lose competitiveness to Korea. Books may have been seen as a means of power…a more powerful Korea might endanger Chinese security…1127…Chinese book supplies to korea were severely limited and only because the Chinese (Sung) government had to flee to Southern China.” Bunch of books were destroyed in power struggle, increasing demand. (21)

Wood was scarce, may have led to use of metal, probably before Mongol invasion.Also military drive to use to learn technical skills of metallurgy, Buddhist drive to publish Buddhist works. (21)

New alphabet used by Buddhists, but not Neo-Confucians (22)

Made alphabet to be better leader / fairer hearings for his people, as per Confucianism (22)

Korean script composed of syllables = 2350 individual syllables syllables

China: “The switching costs from moving from one technology (woodblock printing) to another (metal movable type printing) might have been very high. Path dependency might, thus, be an important issue in this context of technology adoption. These switching costs were much lower in Europe because Europe was a late-comer that could direct use the new technology without incurring significant sunk costs. Korea might also have had higher sunk costs in the older technologies. In this sense we may suggest that Europe was perhaps leap-frogging at that time.” (26-7)

Mainz, a city which was part of the Rhine valley. This valley was an important ‘industrialised’ region particularly specialized in metallurgy. Thus it could be seen as a ‘Silicon Valley of metallurgy’ of the 15th century [Guellec 2004].” (27)

“Guttenberg’s incentive was to have commercial success with his invention…In fact manuscript production had been continuously increasing for almost a century in Germany. This evolution generated a demand pull for a new technology. The actions of Gutenberg could thus be seen as a consequence and culmination of a larger trend, and not the arbitrary inventiveness of one single person. Interestingly the case of Korea offers a similar story. Korean metal movable type printing was probably also invented as a response to a significant demand pull—although apparently neither for commercial incentive nor was it invented by a commercial entrepreneur. Instead it was probably invented in a religious or military setting.” (27-8)

Startup costs in both Korea and China were too high for individual printers, so it was monopolized easily by the state. (28)

“…the Catholic Church actively demanded printed books from private printers once the printing press was invented. Thus it represented a large and potentially reliable customer for businessmen. (28)

“Thus this paper emphasizes the role of the governments which may have led to the different impact of the printing press in these three cases. Every case had its own socio-political structure based on specific legitimacies and in particular religious or philosophical beliefs (Christianity in Western Europe, Islam in the Ottoman Empire, Neo-Confucianism and Buddhism in Korea).

“…future transformative innovations may possibly occur when there is a significant demand pull for them, coming from commerce, religion, the military or other areas. For example the threats of climate change may potentially generate a demand piulll for cleaner technologies in the future.” (31)

“Even if the Church had reacted earlier and would have wanted to supporess the printing press it would not havehad sufficient power. Seeing its legitimacy and powerbase declining it reacted through censorship and control. However, the plurality of European power relations and the self-interests of secular governments did not allow strict enforcement. Indeed European governments saw the potential to increase their own economic rents and were already sufficiently independent of the Church as a source of legitimacy. They attempted to control the printing business themselves but only with often temporary and incomplete success due to international competition and piracy.”” (31-2)

**(Kriwaczek 2005)** (Kriwaczek 2005)

“Jews took to the art of printing early. At the very same time as Gutenberg, in 1444, a Jewish dyer of Avignon, Davin of Caderousse, was experimenting with ‘the art and science of writing’ using Hebrew letters ‘well cut in iron’. The first printed Hebrew books appeared in Italy from the 1470s…. Soon Hebrew presses were set up in distant eastern Europe…. This had a devastating effect on the Yiddish intellectual tradition, which had until then been an entirely oral affair that had passed its wisdom down the generations by word of mouth.

The old ways were unable to compete with the flood of printed books that surged through the Yiddish arena.” (183)

“Since the late 1400s Yiddish-speaking scholars in Eastern Europe had been quietly occupying themselves with the study of rationalist philosophy and its offshoot which we today call science.” (184)

“For more than two centuries Jewish thinkers, despairing of Christendom’s crude and ignorant uncivility, put away philosophical investigation and clove to ancient certainties for comfort

But the Reformation of Christianity had made everyone, Catholic, Protestant and Jew, think again. Now, in the sixteenth century, a new Jewish renaissance was breathing life on to the still smouldering ashes of the old. Rabbis began once more to take an interest in matters outside of their narrow remit…geometrical propositions…philosophy, linguistics, mathematics, astronomy and the natural science…” (187)

“This time, however, the Jewish renaissance would arise not from Spain, southern France or even the Holy Land, but from Prague in Bohemia and Cracow in the Polish-Lithuanian commonwealth…” (187)

**(Lupton 2010)** (Lupton 2010)

“Movable type, invented by Johannes Gutenberg in Germany in the early fifteenth century, revolutionized writing in the West. Whereas scribes had previously manufactured books and documents by hand, printing with type allowed for mass production: large quantities of letters could be cast from a mold and assembled into ‘forms.’ After the pages were proofed, corrected, and printed, the letters were put away in gridded cases for reuse.

Movable type had been employed earlier in China but had proven less useful there. Whereas the Chinese writing system contains tens of thousands of distinct characters, the Latin alphabet translates the sounds of speech into a small set of marks, making it well-suited to mechanization. Gutenberg’s famous Bible took the handmade manuscript as its model.” (13)

**(McLuhan 2011)** (McLuhan 2011)

Albert Einstein’s “Short history of music” (p 20) quoted “The music being purely vocal, the notation dispense with indications of rhythm; but it possessed an immediate intelligibility that was lacking in the Greek system, since it actually gave a visual representation of the rise and fall of melody. It became the sure foundation on which modern notation was to be built;…” (69)

“This international influence was made possible by the invention of music-printing about 1500. This produced as great a revolution in the history of music as book-printing had done in the history of general European culture. A quarter of a century after Gutenberg’s first attempts, German and Italian printers produced printed missals. The decisive step—the printing of the notation of measured music from type—was taken…at Venice…Venice…remained the principal centre for the printing and publishing of polyphonic music.” (69-70)

“…the Greeks made so much less of literacy than the Romans with their high organization of paper in production and the book trade. The decline of papyrus supplies in the later Roman Empire is a regularly assigned cause for the ‘collapse’ of that Empire and its road system. For the Roman road was a paper route in every sense…the major mode of Greek expression was not of the sculptor but the *celator* or engraver.” (70)

“Just as music written for a small group of instruments has a different tone and tempo from music designed for large halls, so with books. Printing has enlarged the ‘hall’ for the author;’s performance until all aspects of style have been altered.” (97)

“The story of writing as oral training helps to explain the early age of entry to the medieval university. For the proper study of the development of writing we must consider that the students began their course at the university at the age of twelve or fourteen….We have to keep in mind that there was no organized system of education outside the universities.... Specialism in our sense was unknown and all levels of instruction tended to be inclusive rather than exclusive.” (108)

“This stress on oral fidelity was to the medieval man the equivalent of our own visual idea of scholarship as involving exact quotation and proofreading.” (108)

“By the middle of the thirteenth century the…. Presumably, the growing volume of available books had made it possible for many teachers to forego the method of the *dictamen* or dictation, and to move at a fast pace. But the slow method of dictation was also still in vogue.” (109)

Students wanted dictation because slowed lectures, and give complementary texts, dictation in examinations for evidence of having read texts (109)

Dictation because texts too expensive (109)

Students could sell their books, teachers would have many students (109)

Texts were necessary for both courses and future careers, (109-110)

Candidates for degrees had to show books they owned to get posts (110)

Students were to learn through writing down dictations (111)

Teachers dictated personal insights from texts (111)

“With the availability of quantities of manufactured paper, especially after the twelfth century, the growth of bureaucratic and centralist organization of distant areas got under way again.” (132)

“It was the new middle-class wealth and skill that translated the chivalric dream into the visual panorama. Surely we have here an early phase of ‘know-how’ and practical *applied* knowledge such as in centuries to come was to create complex markets, price-systems, and commercial empires unconceivable to oral and even to manuscript cultures.” (136)

“The same sensibility that led the Dukes of Burgundy and Berry to their *tres riches heures* led the Italian merchant princes to restore ancient Rome.” (136)

“As we move into the Renaissance it is needful to understand that the new *age of applied knowledge* is an age of translation not only of languages but of centuries of accumulated audile-tactile experience into visual terms.” (138)

“The invention of typography confirmed and extended the new visual stress of applied knowledge, providing the first uniformly repeat able COMMODITY, the first assembly-line, and the first mass-production.” (142)

“The mechanization of the scribal art was probably the first reduction of any handicraft to mechanical terms. That is, it was the first translation of movement into a series of static shots or frames. Typography bears much resemblance to cinema, just as the reading of print puts the reader in the role of the movie projector. The reader moves the series of imprinted letters before him at a speed consistent with apprehending the motions of the author’s mind.” (143)

“The Chinese in printing from blocks in the eighth century, has been mainly impressed by the repetitive character of print as ‘magical’ and had used it as an alternative form to the prayer wheel.” (143)

“As might be expected, the printed book was a long time in being recognized as anything but a typescript, a more accessible and portable kind of manuscript. It is this kind of transitional awareness that in our own century is recorded in words and phrases such as ‘horseless carriage,’ ‘wireless,’ or ‘moving-pictures.’” (148)

“…even if literacy were universal, under manuscript conditions an author would still have no public. An advanced scientist today has no public. He has a few friends and colleagues with whom he talks about his work. What we need to have in mind is that the manuscript book was slow to read and slow to move or be circulated.” (151)

“…the rise of the universities brought masters and students into the field of book production in class time, and these books found their way back to the monastic libraries when students returned after completing their studies.” (153)

“It was, above all, the concept of homogeneity, which typography fosters in every phase of human sensibility, that began to invade the arts, the sciences, industry, and politics from the sixteenth century forward.” (154)

“…with print Europe experienced its first consumer phase, for not only is print a consumer medium and commodity, but it taught men how to organize all other activities on a systematic lineal basis.” (158)

“The largest public by far was for the medieval romances of chivalry, almanacs (shepherds’ calendars) and, above all, illustrated books of hours.” (163)

“The printed book was a new visual aid available to all students and it rendered the older education obsolete. The book was literally a teaching machine where the manuscript was a crude teaching tool only.” (165)

“Had any of our current testers of media and various educational aids been available to the harassed sixteenth century administrator they would have been asked to find out whether the new teaching machine, the printed book, could do the full educational job. Could a portable, private instrument like the new book take the place of the book one made by hand and memorized as one made it? Could a book which could be read quickly and even silently take the place of a book read slowly aloud? Could students trained by such printed books measure up to the skilled orators and disputants produced by manuscript means? Using the methods the testers now use for radio, film, and TV, our testers would have reported in due course: ‘Yes, strange and repugnant as it may sound to you, the new teaching machines enable students to learn as much as before. Moreover, they seem to have more confidence in the new method as giving them the means of acquiring many new kinds of knowledge.

“The testers, that is to say, would have entirely missed the character of the new machine. They would have offered not one clue to its effects. There is no need to speculate about this situation. There is a recent work which attempts to assess these effects: *Television in the lives of our* children by Wilbur Schramm, Jack Lyle, and Edwin B. Parker. When we see the reason for the total failure of this book to get in touch with its announced theme, we can understand why in the sixteenth century men had no clue to the nature and effects of the printed word. Schramm and his colleagues make no analysis of the TV image. They assume that apart from the ‘program’ or ‘content’ TV is a ‘neutral’ medium like any other. To know otherwise, these men would have to have a thorough knowledge of the various art forms and scientific models of the past century. In the same way nobody could discover anything about the nature or effect of print without a careful study of Renaissance painting and the new scientific models.” (165)

“Applied knowledge from the press led eventually to comfort as much as to learning.” (167)

“Although the main work was done by Cromwell and Napoleon, ‘ordnance’ (or cannon) and gunpowder had at least begun the leveling of castles, classes, and feudal distinctions. So print, says Rabelais, has begun the homogenizing of individuals and of talents.” (168)

“’All the world is full of knowing men, of most learned Schoolmasters, and vast Libraries: and it appears to me as a truth, that neither in Plato’s time nor Cicero’s, nor Papinian’s, there was ever such conveniency for studying, as we see at this day there is…. I see robbers, hangmen, freebooters, tapsters, ostlers, and such like, of the very rubbish of the people, more learned now, than the doctors and the preachers were in my time…. What shall I say? The very women and children have aspired to this praise and celestial Manna of good learning.’” (168) *The works of Mr. Francis Rabelais,* translated by Sir Thomas Urquhart, p. 204

“Typography as the first mechanization of a handicraft is itself the perfect instance not of a new knowledge, but of applied knowledge.” (171)

“The printing presses made available authors of remote times. People began to imitate their styles. The schoolmen had such a technical terse way that they fell quite out of fashion, being utterly unable to develop any popularity with the new reading public. The growing public could only be won by flowery rhetoric…” (218)

# (Moodie 2014) (Moodie 2014)

Language of scholarship

“Many manuscript books were produced in vernacular languages. Narrative fiction in German was circulated in the late Middle Ages. Teachers and preachers published manuscripts in vernaculars to popularize their ideas and by 1400 most English readers preferred their books in the vernacular…

“Printing greatly expanded the number of books produced and their readership. Vernacular languages were more accessible to this broadened readership….Vernaculars grew in prestige and popularity. But vernaculars’ displacement of Latin was not quick. Three quarters of books were printed in Latin for the first 50 years of printing; the rest were printed in various vernaculars…probably more than half of books were printed in vernaculars by the end of the sixteenth century. Latin remained an international language even for mathematics until the eighteenth century.

Latin persisted partly because many languages such as Dutch and even German were rarely learned by foreigners and Latin remained the language of international communications.” (7-8)

“Latin continued to be important in European schools at least until the sixteenth century. English schools started teaching in English by increasingly using bilingual—Latin and English—versions of classical texts in the sixteenth and seventeenth centuries.” (8)

“Lectures and debates were always held in Latin until the mid-seventeenth century, when exigencies arose to justify the use of the vernacular language. However, vernaculars did not prevail generally until the end of the eighteenth century.” (9)

“…the shift to English occurred in the 1750s and 1760s, three centuries after Guttenberg, not because of the ubiquity of books printed in the vernacular, but probably because the new heavily mathematicised curriculum of Newtonian natural philosophy was more easily handled in the vernacular.

There was not a direct switch from manuscripts copied in Latin to books printed in vernaculars. Many manuscripts were written in vernaculars. Books continued to be copied by scribes into the seventeenth century. Most books were printed in Latin in the early years of printing and books continued to be printed in Latin in the following centuries, particularly if they were addressed to an international audience. **Universities persisted with Latin for a long time after Gutenberg and eventually relinquished Latin to better handle a new curriculum whose introduction was due to printing only indirectly.” (8-9)**

Libraries

“Early Medieval Oxford colleges owned manuscript books which were loaned to fellows ‘*in electione sociorum’*: they were made available for selection or borrowing by fellows in order of seniority for a year or sometimes longer. Manuscripts were kept in locked chests until needed. By the high Middle Ages colleges set aside rooms in which manuscripts not *in electione* were chained to sloping lectern desks so they may be read by any fellow.” (9)

“These arrangements changed by the sixteenth century when the *electione* system came to an end…one possibility is that after half a century of printing books had become inexpensive enough for fellows to be able to afford to buy for themselves their own copy of the books they needed for an extended time….in the 1570s and 1580s…Oxford men often had 300 or more books. Also by the sixteenth century universities started establishing libraries, complementing those of their colleges, and nearly every new university had a public library.” (9-10)

“Libraries were closed to undergraduates,” and “did not reflect…curriculum” and was distanced from pedagogy of university (10-11)

Curriculum

Scarcity of manuscript books limited university curriculums in two ways: subjects and organization. Uniform across schools and “each course of lectures was limited to an intensive examination of just one text or part of a text.” (11)

“Instead of a master having to concentrate on one text in a series of lectures and analyse just it in great and exclusive depth, it was now much easier to compare different authorities. This supported the development of a new organization of the curriculum pioneered by the Jesuits which surveyed different authorities on one subject rather than one authority possibly on different subjects…from the end of the sixteenth century there was a gradual abandonment of the traditional method of teaching the standard texts.” (11)

“Printing thus had a major role in changing universities’ curriculum, broadly, from one organized around authorities who addressed various subjects, to more diverse curricula organized around subjects which were informed by various authorities. But the subjects studied in **universities were changing anyway during the modern period due to broader intellectual movements which emerged before printing which printing extended and amplified, but did not change fundamentally**.” (12)

Pedagogy

“While educational institutions were increasingly differentiated in the later Middle Ages after the thirteenth century, the curriculum was not explicitly sequenced by level…the *trivium* and *quadrivium* disciplines could be taught at both elementary and advanced levels to young and mature students. Printing made it feasible and indeed profitable to produce texts of graded difficulty instead of having just one introductory text on grammar or logic. Textbooks were newly designed to take students in sequence from the most elementary to the most advanced level of a subject….In the 1520s in Paris a small group of teachers started teaching languages from the simplest to the most difficult grammatical elements, demonstrating their use in classical texts and getting students to practice them with oral exercises and prose compositions. They divided the course into classes according to level of competence. This entirely novel form instruction was known as the *modus Parisiensis.*” (12-3)

“At least some Medieval universities had ‘*cursorie’* or cursory lectures in which bachelors read set texts to undergraduates to take notes or dictation….Cursory lectures were necessary when undergraduates did not have access to set texts because manuscripts were far too expensive to be afforded by most students. Printing greatly increased the availability and affordability of texts, thus removing the need for cursory lectures.” (14)

Oral *exposito* lectures fell into disuse (15)

Focus on general discussion rather than textual commentary. This was a response “Humanists’ trenchant and sustained criticisms of the scholastic method rather than to the introduction of printing *per se*.” (15)

Few printed editions of ancient literature printed for scholars or libraries, instead small pamphlet sized ‘lecture texts’ (15)

“Masters continued to dictate at least some of their lectures, perhaps partly due to the patchy availability of standard texts but also presumably as a conservative hangover from earlier times when dictation was necessary…remained common during lectures until well into the eighteenth century.” (16)

“’books which are silent instructors.’” (quoted page 17, source 95)

“…lectures…persisted after printed books became ubiquitous despite problems with attendance (then, as ever!).” (17)

“So printing led to important changes in pedagogy in the sequencing of the curriculum in schools and universities. But it did not revolutionise university teaching by, for example, replacing lecturers or their lectures.” (17)

**Assessment**

“To be admitted to a degree Medieval students had to attend prescribed lectures and possibly *repititiones* wherein masters recapitulated and explained the preceding day’s lectures, and some statutes prescribed exercises such as the *repetition* (memorization) and *resumption* (recapitulation) of earlier material. But the most important form of assessment was the disputation, which may have developed out of *quaestiones*—lectures in which masters debated contested propositions in texts they were expounding. Disputations were required not only of bachelors, masters and doctoral candidates but professors were also expected to dispute as part of their scholarly duties.” (17)

Disputations operated like debates (18)

“…oral disputations remained the main form of assessment until at least the end of the sixteenth century.” (18)

“Disputations fell into disuse because they were unsuitable for the mathematical curriculum adopted first at Cambridge…they were unsuitable to class, classify or rank at least the leading candidates as became the practice…and because they could not handle the increasing number of candidates being examined. The modern written examination may be…an indirect result of printing.” (19)

“Eisenstein argues that printing enabled the accurate reproduction of formulae, tables of figures, diagrams, illustrations and maps and hence was crucial to the emergence of the scientific revolution. It may therefore be possible to argue that printing fostered replacement of the scholastic epistemology of the Middle Ages with the modern scientific method and therefore indirectly changed universities’ curriculum and assessment.” (19)

# (Murrell 2012) (Murrell 2012)

\*\*\*scratch

Murrell, M. E. (2012) *The open book: Digital form in the making* (Unpublished doctoral thesis) University of California, Berkeley, California.

# (Meggs 2012) (Meggs 2012)

“The origins of woodblock printing in Europe are shrounded in mystery. After the Crusades opened Europe to Eastern influence, relief printing arrived on the heels of paper. Playing cards and religious-image prints were early manifestations. Circumstantial evidence implies that, like paper, relief printing from woodblocks also spread westward from China. By the early 1300s pictorial designs were being printed on textiles in Europe. Card playing was popular, and in spite of being outlawed and denounced by zealous clergy, this pastime stimulated a thriving underground block-printing industry, possibly before 1400.” (69)

“Playing cards were the first printed pieces to move into an illiterate culture, making them the earliest European manifestation of printing’s democratizing ability: the games of kings could now become the games of peasants and craftsmen. Because these cards introduced the masses to symbol recognition, sequencing, and logical deduction, their intrinsic value transcended idle entertainment.” (69)

“The first known European block printings with a communications function were devotional prints of saints, ranging from small images fitting a person’s hand to larger images of 25 by 35 centimeters…. Many were hand-colored, and, because of their basic linear style, they were probably intended to serve as less expensive alternatives for paintings. These early prints evolved into block books…which were woodcut picture books with religious subject matter and brief text…it is not known whether the block book preceded the typographic book.” (69)

“Drawn in a simplified illustration style, with the visual elements dominant as in contemporary comic books, the block book was used for religious instruction of illiterates. This form gradually declined during the fifteenth century as literacy increased.” (71)

“Europe’s population was decimated by the great cycles of bubonic plague, called the Black Death, which claimed one-fourth of the continent’s inhabitants during the fourteenth century and caused a thousand villages either to vanish totally or to be critically depopulated; death was an . ever-present preoccupation.” (71)

**Illustrations and explanation of Gutenberg’s system for casting type (73)**

“With the availability of paper, relief printing from woodblocks, and growing demand for books, the mechanization of book production by such means as movable type was sought by printers in Germany, the Netherlands, France, and Italy. In Avignon, France, goldsmith Procopius Waldfoghel was involved in the production of ‘alphabets of steel’ around 1444, but with no known results. The Dutchman Laurens Janszoon Coster (c. 1370- c. 1440) of Haarlem explored the concept of movable type by cutting out letters or words from his woodblocks for reuse….The judgement of history, however, is that Johann Gensfleisch zum Gutenberg…of Mainz, Germany, first brought together the complex systems and subsystems necessary to print a typographic book around the year 1450.” (72)

“In September 1428 he was exiled from Mainz for his leadership role in a power struggle between the landed noblemen and the burghers of the trade guilds who sought a greater political voice.” (72)

“Typographic printing did not grow directly out of block printing because wood was too fragile. Block printing remained popular among the Chinese because alignment between characters was not critical and sorting over five thousand basic characters was untenable. By contrast, the need for exact alignment and the modest alphabetic system of about two dozen letters made the printing of text material from independent, movable, and reusable type highly desirable in the West.” (72)

“Gutenberg made the obvious choice of the square, compact textura lettering style commonly used by German scribes of his day. Early printers sought to compete with calligraphers by imitating their work as closely as possible.” (72)

Needed fifty thousand single pieces of type in use at a time (73)

“The medieval block printer used a thin, watery ink made from oak gall. This ink worked fine on a woodblock, because the wood could absorb excess moisture, but it would run off or puddle on metal type. Gutenberg used boiled linseed oil colored with lampblack, which produced a thick, tacky ink that could be smoothly applied. To ink type, a dollop of ink was placed on a flat surface and smeared with a soft leather ball, coating the ball’s bottom. The ball was then daubed onto the type for an even coating of ink.” (73)

Presses used in making wine, cheese, and baling paper—adapted by G. (73)

“This precision machine allowed tremendous printing speed and consistent quality, in contrast to the hand-rubbing method used in East Asia and by early European block printers.” (73)

“Because the relentless expenses of research and development were a constant drain on Gutenberg’s financial resources, in 1450 he found it necessary to borrow…from Johann Fust…a wealthy Mainz burgher and merchant, to continue his work.” (75)

“1455, as work [on his printed Bible] neared completion, Fust suddenly sued Guttenberg…in payment of loans and interest….Fust…seized possession of Guttenberg’s printing equipment and all work in progress; on the eve of completion of the immensely valuable forty-two-line Bible, which would have enabled him to pay all debts, Gutenberg was locked out of his printing shop.” (76)

“When the French observed the number and conformity of the volumes, they thought witchcraft was involved. To avoid indictment and conviction, Fust was forced to reveal his secret. This event is alleged to be the basis for the popular story, related by several authors, of the German magician Dr. Faustus…who grew dissatisfied with the limits of human knowledge and sold his soul to the devil in exchange for knowledge and power.” (77)

“For a brief few years, printing was centered in Mainz, as Fust and Schoeffer, Gutenberg, and former apprentices who had established their own firms were located there. Ironically, the swift spread of printing was hastened by a bloody conflict. German nobles were involved in power struggles that erupted into full-scale war. Leading a sizable army, Adolf of Nassau descended upon Mainz in 1462 and sacked the town. Plundering and looting brought trade and commerce to a halt. Warnings from other towns in Adolf’s path enabled many Mainz merchants and craftsmen to load everything possible on wagons and carts and flee. Many younger printers and apprentices did not return. Rather, presses were soon established as far away as France and Italy.” (79)

“Printing was resisted in some quarters. Scribes in Genoa banded together and demanded that the town council forbid printing in the town. They argued that greedy printers were threatening their livelihood. The council did not support the petition, and within two years Genoa joined the growing ranks of towns with printers. Parisian illuminators filed suits in the courts in a vain attempt to win damages from printers who, it was claimed, were engaged in unfair competition that reduced the demand for manuscript books. Some bibliophiles maintained that type was inferior to calligraphy and unworthy of their libraries….

The tide could not be stayed, however, and manuscript production slowly declined. Typographic printing reduced a book’s price to a fraction of its previous cost, turning a serious shortage of books (and the knowledge they contained) into an abundance. The philosopher Alfred North Whitehead once observed how major advances in civilization are processes that all but wreck the society where they occur. Typography is the major communications advance etween the invention of writing and twentieth-century electronic mass communicationsl it played a pivotal role in the social, economic, and religious upheavals of the fifteenth and sixteenth centuries.” (80-1)

“Printing stabilized and unified languages….languages became typographic mass media communicating to audiences of unprecedented size with one voice, contributing to the vigorous spirit of nationalism that led to the development of the modern nation-state. The new medium was also a powerful vehicle for spreading ideas about human rights and the sovereignty of the peoples, ideas that led to the American and French revolutions….And in terms of the history of technology, Gutenberg’s invention was the first mechanization of a skilled handicraft. As such, it set into motion the processes that over the next three hundred years would lead to the Industrial Revolution.” (81)

“…the proliferation of the ever-present broadside” (81)

“Tumbling book prices, the beginnings of popular genres such as the romance (precursor of the modern novel), and the proliferation of the ever-present broadside made reading desirable and increasingly necessary for Renaissance townspeople.” (81)

“The medieval classroom had been a scriptorium of sorts, where each student penned his own book. Typography radically altered education. Learning became an increasingly private, rather than communal, process. Within that private sphere, however, the typographic book extended human dialogue to an unprecedented degree, bridging expanses of time and space.” (81)

Renaissance innovators changed information perception through two visual systems:

1. Paintings: “evoked illusions of the natural world on a flat surface through such means as the single light source and light-and-shadow modeling; the fixed viewpoint and linear perspective; and atmospheric perspective.
2. Typography: “created a sequential and repeatable ordering of information and space that encouraged linear thought and logic. It inspired a categorization and compartmentalization of information that formed the basis for empirical scientific enquiry. It fostered individualism, a dominant aspect of Western society since the Renaissance.” (81)

“Publican of edition after edition of the Bible made increased study possible. People throughout Europe formulated their own interpretations instead of relying on established religious authority…Both Luther and Pope Leo X used printed broadsides and tracts in a theological dispute before a mass audience throughout the continent.” (81)

“Scribes and artists were often called upon to make exemplars, or layouts, for illustrated books and broadsides. Manuscript books…use[d] as layouts and manuscripts for printed books.” (81)

“As the decades passed, typographic printers dramatically increased their use of woodblock illustrations….met resistance from…woodcutter’s guild…” (83)

“It was not Florence, where the wealthy Medicis scorned printing as inferior to manuscript books, but Venice—a centre of commerce and Europe’s gateway to trade with the eastern Mediterranean, India, and East Asia—that led the way in Italian typographic book design.” (98)

“Censorship became an increasingly difficult problem during the 1500s, as church and state sought to maintain their authority and control. Propagating ideas, not printing, was the main purpose of the scholar-printers, who often found their quest for knowledge and critical study in conflict with religious leaders and royalty. In spite of war and censorship, however, the humanist spirit took hold in France and produced both excellent scholarship and a notable school of book design.” (107)

“The word *renaissance* means ‘revival’ or ‘rebirth.’ Originally this term was used to denote the period that began in the fourteenth and fifteenth centuries in Italy, when the classical literature of ancient Greece and Rome was revived and read anew. However, the word is now generally used to encompass the period marking the transition from the medieval to the modern world. In the history of graphic design, the renaissance of classical literature and the work of the Italian humanists are closely bound to an innovative approach to book design.” (98)

“Early typographic books in each European country had an identifiable national style.” (113)

**Printing shop illustration (120)**

“Printing has been called ‘the artillery of the intellect.’” (124)

**Photography to wood carving illustrations (157)**

Lithography (162)

**Lithography to signboards/posters (167) (with illustrations)**

# (Rikin 2009) (Rifkin 2009)

“Beginning in the tenth century, a new energy regime slowly began to take hold across Europe. The harnessing of horses, water, and wind power spawned a dramatic growth in population, the rebirth of urban life, the reintroduction of commerce and trade, and the resurgence of literacy and learning. The Italian Renaissance, in the thirteenth, fourteenth, and fifteenth centuries, which spread unevenly to other parts of Europe, signaled an official cultural awakening from centuries of European hibernation. In the fifteenth century, a new communications revolution—the print press—emerged and converged with the new energy regime, giving birth to a second Renaissance and the beginning of the humanist era. The new energy/communications revolution spawned new, more complex, urban environments, more dense living arrangements, greater differentiation, more diverse exposure to others, and a qualitative leap in self-consciousness and individualization.” (258)

“Literacy, which had been the prerogative of a small group of elites, had become partially democratized, along with the harnessing of energy. It is estimated that by the end of the sixteenth century, more than half the population of the cities was literate, less so in the rural and backward regions.” (263)

Europe in fifteenth century had more sources of power than any previous culture and the technical skill to use that energy for more. Much of Europe’s expansion, productivity, economic weight, military might was based on their high energy consumption. (261)

“The new, more decentralized energy technologies gave a boost to the economic and political fortunes of the thousands of towns and small cities emerging across the European continent and put an emerging burgher and bourgeois class at loggerheads with the entrenched feudal aristocracy—a conflict that would deepen and eventually spell the demise of the feudal order as protocapitalism metamorphosed into mercantilism and eventually industrial capitalism in the centuries that followed.” (262)

“Print replaced human memory with tables of contents, pagination, footnotes, and indexes, freeing the human mind from continually recalling the past so that it might fix on the future.” (268)

Precise measurement and description were possible because of print (269)

“Print introduced charts, lists, graphs, and other visual aids that were to prove so important in creating more accurate descriptions of the world. Print made possible standardized, easily reproducible maps, making navigation and land travel more predictable and accessible. The opening up of oceans and land routes spread commercial markets and trade.” (269)

# (Sissingh 2017) (Sissingh 2017)

Printing press developed 1436-1450

Papermaking 105 AD by Ts’ai Lun, official of Emperor Ho Ti

“…there are indications that the invention of paper had actually taken place in China more than 200 years earlier during the Han Dynasty (206 BC – 220 AD). Regardless, from the time of Ts’ai Lun onwards, the ancient Chinese made paper from an aqueous suspension of hemp into a sludge. Eventually, after hundreds of years of being confined to China, the technology of papermaking spread eastwards to Korean and Japan where the production of paper began respectively in the sixth and in the earliest seventh century. In the eighth century the art of the Chinese papermakers spread into Central Asia. From there traders spread the technology into the Middle East, northernmost Africa…southern Europe…and finally to Western Europe.” (9)

“The first printing of paper occurred in China about 600 AD during the Sui Dynasty….Printing was done using carved wooden blocks rolled with ink….Between 1041 and 1048 AD…the first kind of movable type was invented in China. The type consisted of baked clay and was consequently too fragile for large-scale printing. By the late thirteenth century, the Chinese experimented with less cumbersome types of wood. However, in Korea during the Goryeo Dynasty (918-1392 AD), movable metal type had already been developed. This particular invention was marked by a major printing effort, that of the fifty-volume *Singeing Gigue Yemun.* Its printing began in 1234 AD and was completed in 1241 AD.” (9)

Gutenberg political exile 1428 from Mainz (9)

“…the printing of books using engraved wooden blocks…than novel technique was first used in Europe in 1423.” (9)

“The epoch-making press of Gutenberg remained technologically much the same from the Late Renaissance to the Enlightenment. Early in the nineteenth century…the hand-operated Gutenberg-style cast-iron press was replaced by a steam-powered rotary press that doubled the output of the ancient old-style press.” (10)

“In the Late Renaissance the first books for sale from the printing workships of the Holy Roman Empire were mostly bibles and religious tracts. However, printers also published chronicles, courtly and chivalrous romances and other secular reading matter, including handbooks of education such as grammars, dictionaries and encyclopedias. This included humanist and other works of learning dating back to amongst others the Greek philosopher Aristotle. These works had been brought back from the Middle East by the crusaders of the eleventh to thirteenth century. In fact, the classical canon was substantially available in print by the end of the fifteenth century…humanist scholars and publishers created a Pre-Enlightenment cultural and intellectual movement which evolved into the Enlightenment that emphasized reason, challenged authority and favoured individualism.” (10)

And a bunch of history about geology books

# (Man 2009) (Man 2009)

“In 1400 modern concepts of scientific and historical truth hardly existed—sources were as rare as desert flowers, to be found, if at all, only by a lifetime of travel. The only *true* truth was that of the Church, which, like Big Brother, controlled the media, in the form of scribes (for the written word), priests (for oral transmission) and artists, who served both. The Church had become rich beyond imagining, with the faults that wealth and privilege bring.” (46)

“Something in the air” (106)

“One crucial element in printing is paper, invented in AD 105, according to Chinese tradition, by the imperial counsellor Cai Lun… Five hundred years later, Buddhist monks carried the secret to Korea and Japan, and in the eighth century Chinese prisoners captured in Samarkand brought the art to the world of Islam, and thus to Spain, then under Arab control, in the twelfth century. This paper, made for Chinese calligraphy, was thin, soft, pliable and absorbent, more like toilet paper than typing paper. It could be used on one side only, because the marks showed through. Europeans found this material too soft for their quill pens and took to hardening it with animal glue, creating a firm, impervious surface, which, as luck would have it, could take writing—and printing—on both sides.” (107)

“In the eighth century, China, Japan and Korea were all printing whole books made from carved blocks of wood or stone.” (107)

Pi Sheng invented wet clay movable type (108)

Koreans first movable metal type, printed fifty-volume in 1234. Remained labour intensive to select from 40,000 characters then hand-rub (109)

Mongolian empire connected Europe to Pacific coast. Traders traveled silk routes with ease (110)

“After the Mongols first invaded Korea in 1231, the beginning of a conquest that took twenty years to complete, among the treasures they seized could well have been a number of books set in movable metal type. They thus had in their possession in the mid-thirteenth century three of the vital elements necessary for the development of Western-style printing: paper, movable metal type and an alphabetical system. Nor, as heirs to Chinese culture, did they lack technical ability, having been quick to seize on that devastating Chinese invention—gun-powder—as a terrific means of breaking into otherwise impregnable cities.

Yet it never occurred to the Mongols to explore the possibilities further. They were blocked not by technical elements so much as social ones. Mongolia lacked a written literature, and the only purpose of adopting Uigur script was to keep records for administration of the expanding empire…. But Chinese traditions were the only ones to hand to provide a model for how the records were to be kept, and for whom: by scribes, for the leaders. There was no market, no need for the leaders to reach out to their subjects, no need to raise or invest capital in a new industry the administration of the expanding empire.” (113)

“The Mongols issued their first notes in 1236” (110)

Sejong, Korean alphabetic script with Uigur and Tibetan scripts as templates (114)

308 books published in movable type in 22 year period (114)

“And yet no revolution followed. Hangul was used in a few of Sejong’s pet projects and in Buddhist literature. But it did not sweep the country, because Korea’s elite were appalled at the idea of losing Chinese, the badge of their elitism. Even an invention of undisputed brilliance by the emperor himself was not enough to overcome the weight of conservatism, with nowhere near the impetus to inspire technical and social change. In fact, Hangul has only come into its own, slowly, after 1945, first in Communist North Korea, and finally, during the 1990s, in South Korea where Sejong, always a hero, became a national icon.” (115)

“In summary, Eastern cultures had a number of elements that seem in hindsight to predispose them to the invention of printing. In fact, the positive elements discussed above disguise the absence of a number of other elements necessary for the emergence of Gutenberg’s invention:

* Writing systems were too complex: printing needs an alphabetic base;
* Established writing systems are intrinsically conservative: no one was interested in change, even if the agent of change was an emperor;
* The paper was the wrong sort: Chinese paper was suitable only for calligraphy or block-printing;
* There were no screw-based presses in the East, because they were no wine-drinkers, didn’t have olives, and used other means to dry their paper;
* Printing is expensive, and in China, Korea and Japan there was no system to release capital for research and development.

By contrast, all the elements for Gutenberg’s invention were in place in every major European city by 1440.” (116-117)

“Having fled Prague during the Hussite troubles, Waldvogel settled in Lucerne, then turned up in Avignon in 1444…he was (like Gutenberg) a goldsmith. He had with him two steel alphabets and various metal ‘formes’…Waldvogel vanished without a trace.” (118-119)

**Hand-mould diagram on pages 28-29**

“…to the heart of Gutenberg’s invention, which comes in two parts: an invention and a technique.

The invention is the hand-held mould. This was truly something new under the sun, something so simple to use that it became a standard piece of equipment for typefounders over the next 500 years, until it was replaced by mechanical type-casting in the late nineteenth century.” (126-127)

“…the second part of Gutenberg’s innovation: the technique of binding the type into a ‘forme’…Years of experiment lay ahead to perfect the elements of the hand mould.” (133-134)

“Gutenberg also had to refine dozens of other sub-technologies—the business of storing type, composing it, setting it in multiple pages, getting it on to a suitable press, making the right paper, manufacturing the best sort of ink, and then ensuring quality control to make sure the same standards applied right through the publications. As printers soon discovered, they were entering a universe of expertise and had to devise encyclopedias of technical terms.” (134-135)

“Primitive presses, with great wooden screws that could be turned to force down a plate, were easy to come by. They had been used in paper-making to squeeze sheets dry, and these in their turn derived from pre-Roman presses used for wine- and oil-making. The problem would have been to adopt this technology to printing—to position several pages of type, set into a solid block of metal sometimes weighing as much as a grown man, so that the plate of the press descended fair and square with an equal pressure on every square centimeter, from outer edge to centre.” (135)

“For making ink, Gutenberg would have known to use linseed oil, soot and amber as basic ingredients, but he would have had to experiment to see what combination worked best. He would have discovered that printers’ ink needs to be a substance of great complexity. The oil for the varnish had to be of just the right consistency, the soot—which was best derived from burned oil and resin—had to be degreased by careful roasting.” (135-136)

“Problems must have accumulated with every trial, as type, ink, paper and pressure all interreacted.” Lots of issues transition from scribe paper to print paper (136)

“…sometime around the middle of 1455, with the *42-Line Bible* off the oress, pre-sold, with the money about to roll in, and fame and fortune about to be secured for all, Fust pulled the plug.” (184)

“…there was the eighty-dinar loan from Strasbourg to be serviced, as well as the 150 gulden from his cousin Arnold)…. In effect, Fust was accusing Gutenberg of sharp practice, if not embezzlement, and Gutenberg knew he had a point.” (188)

Fust got the press and equipment as collateral, Gutenberg didn’t have to repay him. Gutenberg set up a knew shop (189)

1462 Mainz was invaded by Adolf’s army, who took everything. (206)

“It must have seemed the end of everything for which he had struggled for the last thirty years. That was the surface reality. Underneath, though, something new had grown, and Mainz’s catastrophic little war, which seemed to end with conservatism supreme, in fact ensured the release and scattering of the seeds of revolution…in Strasbourg…Bamberg, to Basel, to Cologne, and across the Alps to Italy.” (207)

“By 1500 Europe’s presses had printed some 15-20 million books.” (213)

“I’m searching for an analogy. It has been called a media explosion, and it was in a way, when you consider how Mainz exploded in 1462, but an explosion dies as it expands. This grew, more like an animal population colonizing new land. It was entirely natural, spontaneous expansion, flowing along trade routes, seeking out the likeliest nesting-sites—those towns with universities, cathedrals, generous rulers, large law courts.

It was not entirely unrestrained. For ten years Schoffer tried to preserve his monopoly by making his trainees promise not to tell their secrets. There is a story that when Johann Fust took samples of the *42-Line Bible* to sell in Paris—Europe’s biggest university, the Sorbonne, with 10,000 students: surely a terrific market—the guildsmen of the book trade took one look and had this new rival chased out of town for consorting with the devil. Scribal practices endured, their products in demand for another twenty years. And printed book prices, as with any new technology, did not at once undercut manuscripts.

But the secret was out, and the market was hungry, and prices dropped, and the boom was on.” (213-214)

“…at an average rate of about eight new printers a year, printing spread to sixty German cities by 1500, many with two or more…making some 300 German printing works in all.” (215)

**Printing towns in Europe 1480 Chart 221**

Italy 50

Germany 30

France 9

Holland 8

Spain 8

Belgium 5

Switzerland 5

England 4

Bohemia 2

“By 1500 some 1,000 printing works may have been employing 10-20,000 people.” (221)

**Titles per anum production 1450 to 1500 (222)**

“…Venice was printing capital not simply of Italy but of all Europe, with 150 presses. Success came for many reasons. It was a city-state that had preserved its independence from the dynastic rivalries of its neighbours. It was beautifully positioned for land and sea commerce, which it exploited to make itself Europe’s richest city. And it had within reach of its ships the Greek-speaking world of Byzantium. Thus, when the Turks seized Constantinople in 1453 and turned it into Istanbul, it was to Venice that its scholars fled, forming a community of expatriate academics…. The Fall of Constantinople was a notorious disaster for Christendom; yet it contributed to a boom in scholarship in Europe…. The influx of Greeks and their manuscripts fueled a feeling among Renaissance scholars and artists that, in their search for classical antecedents, they had better explore their pre-Latin roots among the writings of the ancient Greeks.” (226-227)

“Yet at Europe’s southern fringes the inexorable advance of the printing press proved suddenly and surprisingly exorable. It stopped dead in its tracks, blocked by the world of Islam.

Now this, to European eyes, is something of a mystery. Islam, having established itself by the sword, had then developed an entirely different dimension, in which scholarship, art and science thrived. By 1000 it was a cultural, religious and trading unity that Islam dominated the world beyond Europe’s frontiers, from Spain to the Punjab…. This was not a world of inward-looking extremists. Hungry for learning, Islamic scholars looked back to the Greeks for their foundations in science and philosophy, and translated Greek classics en masse.” (240)

“With its wealth, scholastic traditions and urban comforts, Islam, you might think, was a perfect seedbed for the printing press. The Muslims had paper; they had ink; they even had wine presses, for the stern injunction against all alcohol came later. Moreover, Arabic is an alphabetical script….

Yet what happened when confronted with the possibilities inherent in Gutenberg’s invention?

Absolutely nothing.” (241)

“Print made no impact at all on the Muslim world for 400 years, until the nineteenth century, when Muslims in India started printing tracts, and then newspapers.” (242)

“It was not through lack of awareness, for knowledge of printing came with Jewish refugees fleeing from persecution in Spain to Constantinople…. In 1493 Jewish refugees in Constantinople produced the first books in Hebrew. A Qur-an was printed in Arabic in Italy by 1500. A generation later, in 1530….the grandson of Israel Nathan Soncino, founder of the great Jewish-German-Italian publishing family, set up in Istanbul, and later moved to Cairo. There is no way that an educated Muslim could not have known about printing or its potential.” (242)

“For Muslims, the Qur’an is the word of God, even more so than the Bible is for Christians or the Torah for Jews. The Qur’an’s beauty is a proof of God’s existence. And ‘Qur’an’ means ‘recitation’. Its divinity is realized by being learned and read aloud…. It was written only as an aid to memory and oral transmission.” (243)

“In a Quranic school (*madrasa*) the teacher would dictate and the pupils write, but the purpose was always to transfer an oral text from memory to memory. The book was secondary.” (244)

“Imams would not willingly have done themselves out of a job by allowing people direct access to knowledge…. True, f

“When the alphabet—‘Phoenician writing’, as the Greeks called it—made its breakthrough into Greek culture, in around 750 BC, it filtered in from below, being adopted by artisans in contact with Phoenician traders. Two hundred and fifty years later, many intellectuals were not sure that writing was a good idea.” (245)

“’those who seem to agree that momentous changes were entailed always seem to stop short of telling us just what they were’” (Elizabeth Eisenstein) (246)

Scribes out of business (246)

“…new specialties. Markets expanded, building on their own success, in a flurry of feedbacks. Accountancy books were bought by authors writing more accountancy books; books on etiquette…shepherds’ almanacs…” (247)

“Printing, of course, allowed the spread of reason, science and scholarship, but rather slowly. What sold fast was good old-fashioned dross: astrology, alchemy and esoteric lore.” (247)

“Scientists gathering information from newly discovered lands—this was the century in which the New World was opened and the earth first circumnavigated—could stand on each other’s shoulders in recoding distant plants, animals, landforms, cities and peoples.” (248)

“The master printer emerged as a social force, coordinating finance, authors, proofreaders, suppliers, punch-cutters, typefounders, pressmen and salesmen, rivalling each other with promises of clearer title pages and better indexes and ever more perfect proofreading. But the print shops were also mini-universities under their deans, the master printers, attracting multilingual scholars, gathering and dispersing information…. In Italy, the home from home of the printing press, it found good rich earth already bursting with the growths of Renaissance art and scholarship. It was the printing press that seized these creative forces and catapulted them across the face of Europe.” (248-249)

“…the classical revival, which, once in full flow, quickly moved on from being a wellspring to a foundation for further progress.” (249)

“In Victor Hugo’s *Notre Dame de Paris*, a scholar gazes at the first printed book to come his way and stares out at the cathedral, an encyclopedia in stone and statuary and stained glass recording Christian faith and knowledge passed from generation to generation. ‘*Ceci tuera cela,*’ he says: ‘This will kill that’, the printed word will bring an end to stories in stone, and—the words imply—to received religion as passed on by priests and their artists.” (254)

## (Watson 2006) (Watson 2006)

“During the thirteenth century…the moral authority of the papacy was largely dissipated.” (489)

Cathedrals became schools (494) main skills were reading and writing Latin, singing, composing prose and verse; law, medicine, natural history, argue, analyze, exposure to “the main texts of the day” (495)

“Between the early fourteenth century and 1500 the number of universities grew from about fifteen or twenty to about seventy….Most of the fifteenth century universities were founded as secular institutions, by municipalities, and were only confirmed by the papacy.” (511)

“Medieval universities had no formal entrance requirements. A prospective student simply had to demonstrate a proficiency in Latin sufficient to understand the lectures…. There was no obligation to sit a written examination for a degree, but the student was assessed at every point in his academic career…. Apart from attending lectures (obligatory, in the mornings, with no distractions), a student was also required to attend the public disputations which the master delivered once a week in the afternoon…. Advanced students had to contribute to the magisterial disputations as a requirement of their degree.” (512)

“Parallel with the rise of the universities, another major change was overtaking Europe, less coherent, less specific, less sensitive in either religious or political terms, but ultimately just as practical and certainly no less profound. This was the rise of quanitifcation.” (513)

1266-1274 literacy surged (513)

“The spread of quantification, no less than the spread of learning, was amplified and accelerated by the invention of printing. In the thirteenth century the majority of students could not afford to buy copies of the texts they studied, at least not without great sacrifice, because of high manuscript price levels. Consequently, the student was very dependent on the reading and expounding of the texts in the university schools. The situation was eased in the later thirteenth century by the growth of cheaper, utilitarian methods of manuscript production, encouraged and then closely controlled by the universities. The system was based on the multiple copying of *exemplars*, which were accurate copies of the texts and commentaries used in teaching. Each *exemplar* was divided into separate pieces or *peciae*, usually of four folios each (eight pages), and relating to different portions of the text. Several copyists could therefore work on the same *exemplar*, each reproducing a different *pecia*. The system enabled students to buy or hire relatively cheap copies of that particular section. The freer circulation of texts relieved the student of his reliance on the lecturer’s every word, lessened the strain on his memory, and permitted study in a more relaxed and private environment.” (518)

“As the appetite for reading grew, as the universities became more popular, and more populous, so the demand for books rose and, as edition sizes increased, vellum or parchment books became less and less practicable.” (518)

“Paper was in widespread use, at least in Italy, by the fourteenth century…. Paper-makers’ guilds were formed from the turn of the fifteenth century and they too, like scriveners and booksellers, had a close association with the universities.” (519)

“The ‘discovery’ of printing in the West dependent on three innovations: movable type cast in metal; a fat-based ink; the press. Among the precursors we may mention the goldsmiths, who knew how to make stamps which were used to ornament the leather covers of books; pewter makers, who had die stamps, and thirteenth-century metal founders, who knew how to use punches engraved in relief to produce clay moulds from whose hollow matrices they made the relief inscriptions on crests. And of course the production of coins had used dies struck by a hammer. The principles of printing were there for everyone to see.” (519)

Procopius Waldvogel potentially made press (519)

1440-1450 printing was being improved by Gutenberg in Mainz, funded by Fust, Schoeffer as apprentice (520)

“With printing, books ceased to be precious objects. In owning books, readers wanted to be able to carry texts with them on journeys, and so they were produced in smaller and smaller sizes….

It was in the nature of publishing that daring books would sell better because of the scandals they caused, with the result that the early publishers often sheltered writers suspected of heresy. Since they were the first people to read new manuscripts, publishers naturally kept abreast of fresh ideas and frequently were the first to be convinced by new arguments. In this way, printers were among the first converts to Protestantism. But they were also the most vulnerable to victimization—they had the plant, and their names were on the titlepages of their books. It was only too easy for the Inquisition to argue that the easiest way to root out heresy was to close down the presses that were disseminating these ideas. As a result, in the early sixteenth century many printers were forced to flee France in particular to avoid spies, informers and censors.” (521)

“It has been calculated that no fewer than 20 million books were printed *before* 1500. Although to begin with the market was chiefly among universities and other academically minded souls, books soon reached out to the general public. An entirely new literature grew up to reflect and encourage popular piety…Coinciding with the growth of humanism…printing helped promote a new interest in antiquity. There was also an enormous increase in the number of grammars available, and in the chivalric romances of the earlier Middle Ages. But science and mathematics evoked great interest too, especially the scientists and mathematicians of antiquity. Astrology and travel were also popular.

The arrival of printing, therefore, did not so much change the shape of the culture as make it far more readily available to many more people (as was to be expected). The further changes it brought about had more to do with, for example, standards of accuracy (in setting up type for the classics, scholars wanted to use the best examples available), in the propagation of the Reformation…and in the triumph of humanism. Printing made far more people familiar with classical—i.e., pagan—authors, and far more aware of purely literary and stylistic qualities (as opposed to doctrinal matters), contributing further to the secularization of life….it also stimulated a taste for the classics *translated into the vernacular*.” (523-524)

“Latin began to lose ground in 1530” (524)