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Gutenberg, chemistry and the advancement of knowledge

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ABSTRACT

This article is a brief review of the history of printing, centred around the life and inventions of Johannes Gutenberg, who is widely regarded as the father of printing. Starting with what we know of the earliest developments in printing in China, the article will present the little knowledge we have about Gutenberg's life and a summary of his contribution to the invention and development of the printing press and its associated technologies. This will be illuminated by an examination of how his most famous publication, the 42-line Gutenberg Bible, came to be created. Gutenberg's improvements to the chemistry of metal type and printing ink are outlined. The crucial importance of printing on the development of European society in the critical periods of the Reformation and the Renaissance and in the development and culture of science is obvious, but the lasting impact of the language of printing in today's world is surprising.

Keywords: Gutenberg, history of science, ink chemistry, knowledge, lead alloys, printing, publishing, typography.

Introduction

The phrase 'publish or perish' has long been a motto for personal success in academic science.[1] However, without the ability to publish and distribute, at reasonable cost, scientific works from identifiable authors working at known locations, the progress of science would have been severely hampered. The word 'authority' itself derives from the notion of authorship, carrying with it the connotation of expertise that resides in and evolves from being a scientific author. Science without printing and publication seems unimaginable, even though printing today is largely digital and most scientific publishing is now on-line. In this article, the origins of printing in 15th century Europe are reviewed, including some of the technological and chemical discoveries that enabled the development of the printing press. The impact and importance of printing for human thought and development, particularly in the world of science, is discussed, and the persistence in modern English of words and phrases that derive from printing is documented.

Results and discussion

In the introduction, I used the aphorism 'publish or perish', which is generally acknowledged to have been coined in the 20th century.[2] However, although I give credit to the first use of the phrase to a sociologist in 1928,[1] there is considerable dispute about who first used it in a scientific research context. Claims have been made for Logan Wilson in 1942,[3] the geneticist Kimball Atwood at some unspecified date before 1950[4] and Marshall Mcluhan in 1951.[5] If there is confusion and uncertainty about the coining of a phrase first used in the 20th century, it should be no surprise that documenting discoveries that occurred more than 500 years ago is fraught with difficulties. With that caveat, I will try to document as best I can the development of printing as it emerges from history.

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Printing before Gutenberg

Humans are known to have made marks and designs on various substrates such as pottery, wood and fabric for more than five millenia. The invention of printing is generally credited to the Chinese, who used carved wooden blocks to impress images onto paper and silk. The earliest example of this technology is thought to be from the 5th century AD,[6] and by the Tang dynasty, during the 7th century AD, the printing of Buddist texts on to paper scrolls had become commonplace. Radiocarbon dating has confirmed that several surviving scrolls were produced in the last two decades of the 7th century.[7] The earliest printed document with a contemporary date is the 'Diamond Sutra', a 5 m paper scroll found in Dunhuang, China in 1907.[8] It ends with the world's oldest colophon, or printer's mark, which contains a wonderful declaration of the principle of what we now call public domain publishing. The colophon reads in translation:

> *Reverently made for universal free distribution by Wang Jie on behalf of his two parents on the 13th of the 4th moon of the 9th year of Xiantong* (11 May AD 868).

Printing from wooden blocks became more widespread in China during the 10th–13th centuries and, in combination with the well-developed Chinese paper industry, led to the proliferation of printed materials for the literate members of Chinese society.[9] This in turn led to successive changes in Chinese book format from the traditional scroll to a concertina-like folded format and then the so-called whirlwind binding, called *Xuanfeng Zhuang* in Mandarin, which allowed folded pages to be easily opened and read.[10] Printing was still on one side of the paper only, one of the main drawbacks of woodblock printing. In the 11th century a system of folding and gluing paper sheets, with two pages printed on the same side of each sheet, allowed for the construction of a folded paper codex, or book, which had alternating pairs of openings with printed pages and blank pages.[11] Later, in the 14th century, a more sophisticated folding method was developed that allowed the continuous display of printed pages with the intervening blank sides hidden from view. It was not until the late 15th century that the Chinese adopted the western style of sewn gatherings of paper sheets which had been cut and folded into pages, resulting in the basic format of almost all the books produced in the world up to the present day.

The Chinese are also credited with the invention of moveable type, having experimented with both carved wood and pottery types. Both ceramic and wooden types were said to have been invented by Bi Sheng in the Northern Song Dynasty of the mid-11th century.[12] The ceramic types did not hold ink well enough to succeed as a viable technology, and neither ceramics nor wood were durable enough materials to be reused multiple times, and so their use was never taken up widely, and they did not displace woodblock printing in China. The first metal movable type was a bronze type developed in China in the early 13th century which was used for printing banknotes.[13] The earliest surviving example is dated 1215. The first book to be printed from bronze movable type was produced in Goryeo, now part of modern Korea, in the easy-to-remember year 1234 AD. This was Choe Yun-ui's *Prescribed Texts for Rites of the Past and Present*, which comprised 50 volumes.[14] No copy has survived. The oldest book printed from bronze type that we do currently have is the final volume of another Korean book, *Anthology of the Great Buddist Priests' Zen Teachings*, also known as the *Jikyi Simche*, printed in 1377,[12] almost 100 years before the Gutenberg Bible. The only surviving copy of the final volume of *Jikyi Simche* is today in the Bibliotheque Nationale de France in Paris.

The nature of the ideographic scripts traditionally used in China and Korea did not facilitate the use of moveable types, as it has been estimated that more than 50 000 characters would need to be designed and produced in multiple copies to allow a printing press to be operated effectively.[10] This is in contrast to the fewer than 300 characters or glyphs needed for a single typeface based on the western alphabet. The great advantages of moveable metal type did not become apparent until the advent of Gutenberg and his printing workshop in Mainz.

Life of Johannes Gutenberg

One might imagine that a person as significant as Johannes Gutenberg would have been the subject of such intense scrutiny and research that his life would be fully documented. Nothing could be further from the truth, partly because of the enigmatic and elusive nature of the man and partly due to the quirks and disruptions of history. What follows is the little that we do know or can surmise about his life.

Johannes Gutenberg's full name was Johannes Gensfleisch zur Laden zum Gutenberg. He was born in Mainz in what is now the Rhineland-Palatinate state of Germany at some time between 1394 and 1404. He was the youngest of three children born in Mainz to Friele Gensfleisch zur Laden and Else Wyrich. It is thought that he was baptised at the church of St Christophe in Mainz. To mark the presumed 500th anniversary of his birth, the city of Mainz decided to set Gutenberg's official birthday to 24th June 1400.

Mainz, at that time, was a small town of about 10 000 people that was ruled by an archbishop. Gutenberg's family had a traditional role with the episcopal mint and supplied some of the metals used by the mint to manufacture coins. Some commentators believed that Friele Gensfleisch zur Laden was a goldsmith, while others have stated that he was a merchant.[15] There was a large civil uprising in Mainz in 1411, mainly due to disputes between various professional guilds. This led to many patrician families fleeing Mainz and taking refuge in other more welcoming towns. Gutenberg's family seems to have left Mainz for

Eltville am Rein, where Gutenberg's mother owned an estate. A Johannes de Altavilla (the latinised form of Eltville), who enrolled at the University of Erfurt in 1418, is assumed by some commentators to be Johannes Gutenberg. We know Gutenberg's father died sometime in 1419, and Johannes is mentioned in documents concerning his father's estate.[16]

Nothing is known of Gutenberg for the next 15 years. We next find documentary evidence in 1434 of Gutenberg living in Strasburg in the Alsace, now Strasbourg in France. He was still in Strasburg in 1436, where he joined the guild of goldsmiths, was involved in gemstone polishing and is mentioned in court documents as suppling 'printing requisites.' In 1437, he was taken to court in Strasburg for breach of promise of marriage. Other court documents from 1439 have recorded his involvement in a printing partnership with two other men in Strasburg.[15] One of them, Andreas Dritzehen, was the owner of a paper mill. These documents report Gutenberg's development of a type-mould, list his inventory of metals, which includes lead, and report the casting of metal type. It seems that Gutenberg's activities in Strasburg were mainly concerned with the development of moveable metal type. There is no record of any commercial printing activity by Gutenberg in Strasburg.

Gutenberg is thought to have left Strasburg around 1444, and had certainly returned to Mainz by 1448, where he was lent 150 gulden by his sister's husband, presumably to fund his printing work. Around this time, he may have been working on the development and refinement of the printing press. It is likely that Gutenberg's printing press was based on local designs for wine presses, which had been developed from classical Greek and Roman wine presses in many monastic communities in France and Germany during the Middle Ages. The earliest printing produced by Gutenberg in Mainz also seems to have been around this time, when several religious indulgences were said to have been printed by Gutenberg on vellum, a parchment prepared from the skin of calves or kids, although the earliest datable one that has survived is from 1453. He also printed a small book of poetry on paper, and may also have printed copies of Donatus' Latin Primer *Ars Minor*.[17] A calendar for 1448 appeared in a font recognised as by Gutenberg. These activities have been viewed as practice runs for the printing of the Gutenberg Bible.

In 1450, Gutenberg was lent 800 gulden by Johan Fust (*c*. 1400–1466), a financier living in Mainz. At this time, or 2 years later in 1452, when Fust lent Gutenberg another 800 gulden, the two men formed a partnership with the specific aim of printing a Bible and a Psalter. These were the famous 42-line Gutenberg Bible and the Mainz Psalter of 1457. The two partners were joined in their endeavours in 1452 by Peter Schoeffer (*c*. 1425–1505), who is thought to have been an apprentice to Gutenberg, and was clearly a key member of Gutenberg's workforce, which has been estimated to be around 20 men and boys. Johan Fust became dissatisfied with their business arrangements and, in 1455, sued Gutenberg for the return of his loans, which with interest were now worth more than 2000 gulden. The court found in Fust's favour, and he assumed ownership of all of Gutenberg's printing assets and half of the printed Bibles. Fust accused Gutenberg of using the money for purposes other than the 'project of the books'. Some have thought that Fust was a greedy man who had succeeded in stealing Gutenberg's intellectual property; others have felt that Gutenberg was a multitalented genius who was lacking in business ethics.[18]

Little is known about Gutenberg's activities in his later years. Gutenberg-style ink seems to have been used by an unknown printer in Bamberg, who, in 1459, published a 36-line Bible that was closely based on the Gutenberg Bible, but printed using an inferior typeface. The exact source of the ink is unknown, and there is no evidence that Gutenberg visited Bamberg. Gutenberg may have been involved directly in other printing activities in Mainz in the late 1450s, possibly including the printing of more indulgences for the church and more copies of Donatus' *Ars Minor*.

There was a further huge disruption to life in Mainz from 1460, when the Mainz Diocesan Feud started after the citizen electors appointed a local favourite to the position of Archbishop and ruler. This was contrary to the Pope's wishes, and led to his appointment of Archbishop Adolph von Nassau to the position. Armed conflict raged throughout the region. Eventually, the dispute culminated in the sacking of Mainz by von Nassau in October 1462, with the deaths of 400 citizens of Mainz and the expulsion of another 400 from the city.[19] Johannes Gutenberg did quite well out of this dispute, and, in January 1465, he was honoured by Archbishop Adolph von Nassau and granted a pension and a grant of grain and 2000 L of wine, tax free. Gutenberg eventually died in Mainz on 3rd February 1468 and was buried in the Franciscan church.[20] The church and cemetery were both destroyed by Allied bombing in 1945, along with much of the old medieval centre of Mainz.

Printing and publication of the Gutenberg Bible

The publication of the Gutenberg Bible is widely acknowledged to be a pivotal point in human history. The ability to produce many copies of a printed book of the highest quality in a short period of time, which could be sold at a reasonable price, and that still returned a profit to the printer was truly revolutionary. It would take a scribe more than a year to produce a fine manuscript bible, with the attendant risk that there would be errors in copying and thus a debasement of the text. Errors in printing can and do still occur, but can be easily corrected in the printshop by a careful reading of the first sheets printed from any typesetting before a large print run is undertaken. Gutenberg printed about 180 identical copies of his bible in less than 5 years, at a cost that was a fraction that of a traditional manuscript.

Conscious that his printed bible would be compared with the best manuscript bibles, he designed the pages to look as

close as possible to the style of the traditional manuscript bibles. The format he chose was of two well separated columns of text on each page, with 42 lines of text in each column. Some early printed pages of his bible had 40 or 41 lines per column, but these were mostly replaced by the 42-line format, so we refer to this bible as the '42-line Bible' or sometimes the '42-line Bible of 1455'. Most of the bibles were printed on paper, but a small number of copies were printed on vellum and were sold at a higher price. The paper used was a standard size of 42 × 60 cm, called royal, which allowed two pages to be printed on each side of the sheet. Each sheet was then folded once to give a basic unit of four printed pages per sheet, with each page being 42 × 30 cm. This form of book is called a 'royal folio' to indicate that each royal sheet has been folded once. Typically, five folded sheets would be assembled into a gathering called a quinternion, which comprised 20 pages. The complete 42-line Bible was printed on 322 sheets of royal paper to produce 1288 pages. These were usually bound into two volumes, with volume 1 containing the Old Testament up to the book of Psalms and volume 2 containing the remainder of the Old Testament and the New Testament. The bulkier vellum copies were usually bound into three or four volumes. About 180 copies were printed of which 49 survive today, in various states of repair, with only 21 regarded as complete. Many fragments, particularly single pages, also still survive, which account for a minimum of 16 further copies.

Gutenberg had clearly been developing his printing techniques for 20 years before the appearance of the Bible. Most researchers believe that work on printing the 42-line Bible started around 1452, when the second Fust loan to Gutenberg occurred. Others feel that it may have started in 1450, when the original arrangements between Fust and Gutenberg were made. As the third key member of the team, Peter Schoeffer, was still working in Paris in 1451, the later date seems more likely.

The precise date of publication of the Gutenberg 42-line Bible is problematic, as the Bible was printed without any title page, name of publisher, or date and place of printing. It was almost certainly printed over several years, but it does not seem that copies were available for sale before October 1454. It has become customary to give a conservative publication date as 'before 15th August 1456.' This is due to the discovery of inscriptions in both volumes of a surviving copy of the 42-line Bible in the Bibliotheque Nationale de France in Paris. The inscription in volume 1 reads:

> *Here endeth the First Part of the Old Testament of the Holy Bible, which was illuminated by Henry Albech, or Cremer, on Saint Bartholomew's Day* [August 24th] *in the year of our Lord 1456. Thanks be to God. Hallelujah.*

The inscription in volume 2 reads:

> *This book was illuminated, bound and perfected by Henry Cremer, vicar of the Collegiate Church of Saint Stephen in Mainz, on the feast of the Assumption of the Blessed Virgin* [August 15th] *in the year of our Lord 1456. Thanks be to God.*[21]

While the second inscription clearly means that the books were printed some time before 15th August 1456, Henry Cremer did not record the date on which he acquired the bible.

The other contemporary evidence that we have is a letter from Aeneas Silvius Piccolomini (1405–1464), the future Pope Pius II, to his friend Cardinal Juan de Carjaval, which is dated 15th March 1455. In the letter, he states that:

> *All that has been written to me about that marvellous man seen at Frankfurt is true. I have not seen complete Bibles but only a number of quires of various books of the Bible. The script was very neat and legible, not at all difficult to follow – your grace would be able to read it without any effort, and indeed without glasses.*
>
> *Several people told me that 158 copies have been finished, though others say there are 180. I'm not certain of the exact number but I'm in no doubt that the volumes are finished, if my informants are to be trusted. Had I known your wishes I should certainly have bought you a copy – some quires were actually brought here to the Emperor. I shall try and see if I can have a copy for sale brought here which I can purchase on your behalf. But I fear that won't be possible, both because of the length of the journey and because buyers were said to be lined up even before the books were finished.*[22]

Frankfurt was and still is the dominant city in the Rhein-Main region. It is only 45 km east of Mainz. The event in Frankfurt was the Diet of Frankfurt held in October 1454, which had an associated fair. By 1470, the fair had become the Frankfurt Book Fair, which is still held every October in Frankfurt and has remained the book trade's pre-eminent book fair.

The Piccolomini letter tells us that a significant number of the pages of the 42-line Bible had been printed by October 1454, and perhaps several parts of the Bible had been assembled into gatherings, which have been described by Piccolomini as 'quires'. Piccolomini seems unsure as to the number of Bibles printed, citing both 180 and 158. This confusion may be explained by the current estimates that there were about 150 copies printed on paper and around 30 copies printed on vellum. The inference is also given in the letter that by March 1455, all 180 copies had been sold, even if they had not all yet been printed and bound. The purpose of showing these samples at the fair was presumably to encourage orders for completed Bibles. The identity of '*that marvellous man seen at Frankfurt'* is not known. While it would be tempting to speculate that it was Gutenberg himself, we have no actual evidence that he did

attend the fair in Frankfurt in 1454, nor that he ever played any role in marketing the Bible.

We do know that Gutenberg's financial backer, one-time business partner and eventual successor, Johann Fust, did play an active role in marketing the Bible in Paris, in the years after he gained full control in November 1455 of what had been Gutenberg and Fust's printing business in Mainz, and that he had sold several copies of the 42-line Bible to King Louis XI of France. Fust eventually died of the plague in Paris in October 1466, while on a trip to sell other books printed by Fust and Schoeffer, the successors of Gutenberg in Mainz. Perhaps Fust, rather than Gutenberg, had been the marvellous man in Frankfurt. What we do know for certain is that Piccolomini, who wrote the letter of 1455 cited above, in 1458 became Pope Pius II, who was directly involved in the machinations that led to the sacking of Mainz in 1462.

The science of Gutenberg's printing

Gutenberg is rightly recognised as the father of printing, as he needed to overcome several technical problems in order establish a viable printing system capable of producing high-quality work that could be sold profitably at competitive prices. His innovations included development of a suitable alloy for making type, a process for casting the type, a suitable ink for mechanical printing and a machine that would allow rapid reproduction of printed pages. He also devised the type face used for his famous bible. As Gutenberg left no written or printed notes describing his methods, let alone any patents with fully disclosed descriptions of materials and methods, what he did and how he did it are shrouded with uncertainty.

Gutenberg's type

As a goldsmith, Gutenberg would have been familiar and skilled in several key processes, including casting and moulding the metal required to produce metal type. The composition of the alloys used for metal type is crucial to the performance of the type, particularly in terms of durability, fragility and resistance to deformation. Gutenberg developed an alloy of lead, tin and antimony which he used to make his type. He presumably arrived at his final formulation by testing different compositions to see how well they performed. Astonishingly, Gutenberg's formulation survived as the basic standard printer's alloy for the next 450 years, and was the basis for the similar range of alloys used in the Linotype and Monotype machines which dominated printing from the late 19th to the late 20th century. One of the reasons for this is the very helpful property of the alloy, in that it expands slightly as it sets which creates sharp edges on the type, leading in turn to sharp edges in the resulting print.

In the middle-ages, lead was obtained from its commonest ore galena, which is largely lead sulfide, PbS. The method of smelting galena to obtain metallic lead was well known to the ancients and was described by Pliny the Elder in the 1st century AD. Galena is heated in a furnace in the presence of forced air from bellows. This produces lead sulfate, $PbSO_4$, which was further oxidised to lead oxide, PbO. Addition of carbon, usually in the form of charcoal or coal, reduced the lead oxide to metallic lead, which falls to the bottom of the smelt, allowing its separation from the lighter dross.

Tin was obtained from a similar process of smelting casserite. the commonest form of tin ore, which is mostly stannous oxide, SnO_2. Just as with lead, the ore was heated with carbon to produce liquid tin, with the impurities in a slag floating above the tin. No oxidation step was required.

Antimony was obtained from its common ore stibnite Sb_2S_3 which had been used traditionally in the Mediterranean region and the Middle East to produce the cosmetic kohl. Metallic antimony was obtained from stibnite by a process of heating to around 450 degrees which resulted in the production of antimony trioxide, Sb_2O_3. If iron was added to the smelt, some of the stibnite would yield metallic antimony and ferric sulfide. The antimony trioxide could be converted into metallic antimony by addition of carbon to the smelt. By Gutenberg's time, methods had been devised which involved heating stibnite in a forced air furnace, along with the addition of horse-shoe nails, as the source of iron, and charcoal, as the source of carbon. The proportions and timing of the addition of the iron and carbon were closely held trade secrets, and the first published account of this smelting method appeared nearly 100 years later, in 1540.[23]

It was well recognised by the 15th century that the process of smelting both lead and antimony was hazardous to human health, so, somewhat perversely, the task of metal smelting in workshops in Gutenberg's time was generally done by the youngest boys in the workshop. A potential preventative remedy for the hazardous effects of antimony in printing workshops was described in the first printer's primer to be published in English in 1596.[24]

Gutenberg's ink

Before the development of mechanical printing, most inks had been developed for manual calligraphic purposes, particularly writing on parchment and paper by scribes. These inks were usually based on oak gall dissolved in a water-based solvent. Some of these inks also contained a suspension of carbon particles, usually derived from lamp black. Gutenberg realised that these water-based inks failed to adhere to metal type and so were not effective for his new printing process. He developed a new type of ink that was an oil-based suspension of carbon particles, probably derived from lamp black. This innovation has remained as the basis for commercial printing inks until the present day.

Modern analysis has revealed that Guttenberg's ink also contained fine graphite particles, which could not have come from lamp black. It also had small and variable

amounts of copper, lead and titanium, which were thought to vary from batch to batch of the ink.[25] The oil was a mixture of linseed and other vegetable oils. The printing on surviving copies of the 42-line Bible is remarkably dark and unfaded after more than 500 years. Close visual inspection reveals that it also has a distinctive silvery sheen, possibly due to the presence of the graphite. The ink also reveals minimal 'bleeding' or spreading by diffusion into the high-quality hand-made Italian paper that Gutenberg had bought from a paper maker in Piemonte, just north of modern Turin. The paper was hand made from the pure linens that resulted from the use of the flax plant (*Linum usitatissimum*) that was found all over northern Italy in medieval times. In modern Italy, it is now largely grown in the Po valley. All this means that the printed pages of the Gutenberg bible look as clear and impressive as they looked when they were newly printed. This is in stark contrast to surviving manuscripts of the period, many of which show significant fading.

Spread of printing after Gutenberg

The civil and political disturbances in Mainz during the 1460s caused great harm to the wealth and economy of the city, but also led to a great diaspora of the printing industry that had started in the 1450s. This was to the enormous benefit of the rest of Europe, which saw the newly developed printing technologies spread to other cities and countries. The greatest beneficiaries were Paris, Lyon, Florence and above all Venice. Many of the German printers from Mainz became Italian or French printers, profiting from their early mastery of the printing techniques and the universality of Latin as the scholarly language of medieval Europe.

Venice was a particularly attractive destination for printers and publishers fleeing from Mainz. Venice was the richest city in 15th century Europe, boasting political stability and freedom, a wealthy mercantile class who would buy books and a strong trading link with Byzantium, the best source of classical manuscripts at the time. It was also the European city state which had the greatest degree of independence from the doctrinal influence of Rome. The first printer from Mainz to become established in Venice was Johannes von Speyer in September 1469, who became Giovanni de Spira in Venice. Similarly, a Frenchman, Nicholas Jenson, who arrived in Mainz in 1458 to learn printing, set up his own printshop in Venice in 1470. These two pioneers were followed by many others who were attracted by the promise of good business and freedom of expression in Venice. By 1500, there were more than 150 printing businesses working in Venice, and more than 4500 different titles had been published. In the following century, nearly 700 printers were working in Venice, publishing more than 15 000 titles.[26] Printers in Venice and other similar cities were responsible for the dissemination of the explosion of learning and ideas that characterised 16th century Europe. In the Italian city states, this was the Renaissance; in Germany this was the Reformation.

Conclusion

Printing has, without doubt, been an essential development in the expression and dissemination of ideas which underpin all science. The inventions and innovations of Gutenberg have been described as the most important of all human advances. For a much fuller account of the beginnings of this phenomenon, the account by Elizabeth Eisenstein is highly recommended.[27]

In July 1963, a famous joint exhibition to celebrate 500 years of printing was held at The British Museum and at Earl's Court in London called 'Printing and the Mind of Man'.[28] In the exhibition, the impact of the printing press on human advancement was demonstrated by a display of 'Printing Mechanisms and Printed Materials', which included books and printing materials and mechanisms at Earl's Court and 194 iconic books on display at the British Museum, which at that time still housed the collection now at The British Library at Euston. Many have claimed that after printing, the invention of the internet, and specifically the development of the World Wide Web in 1990[29] have been the next greatest influences on the advancement and dissemination of knowledge. I wonder what an analogous exhibition to 'Printing and the Mind of Man', called perhaps 'The Internet and the Mind of Man', might look like in possibly 2490, about 500 years after the development of the Web, when we might be in a proper position to compare the impacts of printing and the internet.

Although Gutenberg-style printing has been largely replaced today by digital technologies, the language of printing still persists. Some examples are obvious, others less so. We still talk of 'fonts', derived from the word foundry. We use the terms 'upper case' and 'lower case', which derive from the placement of the boxes or cases that held the metal type used by Gutenberg-style typesetters. We say that things are 'hot off the press' when they are new. People are told to 'mind their ps and qs', which derives from the proximity of the *p* and *q* in the compositor's case and the difficulty in distinguishing between them when viewed upside down and in mirror image. People not feeling well can be said to be 'out of sorts' which refers to printers running out of a particular letter or 'sort' from a font box in the middle of setting up a page. We can also add stereotype, typecast, making an impression, becoming imprinted, wrong end of the stick (from the compositor's stick that held the type) and 'a dab hand', where the 'dab' is the mushroom-shaped tool used to apply ink to the type.

Finally, if Gutenberg were still printing today, here is how he would render the name of a well-known Australian scientist. This article has been created in his honour.

Professus
Edvardus
Aiciensis

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Biography

Emeritus Professor Chris Browne is a medical researcher and academic who studied at York and Oxford, followed by 5 years at McGill in the 1970s before spending most of his working life in the Faculty of Medicine at Monash University. He spent 10 years developing HPLC methods for biomedical applications. He has been a book collector for more than 50 years and has put together during that time a personal library of nearly 15 000 books. His main interests are 19th and early 20th century English literature. He is currently the Program Director of Melbourne Rare Book Week.