Print and Print Culture in the Victorian Age

The Victorian Web  literature, history, & culture in the age of Victoria

Printing Technology

Literature, Science, and Technology

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The Reciprocal Relations of Science, Technology, Literature, and the Arts

Although in ancient times scientific and technological knowledge was often presented in form of poetry, modern scientists, engineers, and writers tend to think of their enterprises as fundamentally different and perhaps even diametrically opposed. Writers and literary scholars in particular often find questions involving possible relations between the fields annoying, irrelevant, and threatening. Can you explain why this might be the case?

Despite general lack of interest in examining the relation of science and technology to the arts, major twentieth-century artists and writers have sought to embody theories of modern science in their art. Many critics of early twentieth-century modernism now explain the narrative and representational experimentation of Picasso, Braque, Joyce, Woolf, and Faulkner as attempts to come to terms with the theories of Einstein and Heisenberg; in the Alexandria Quartet Lawrence Durrell has explicitly sought to do the same. Although at least some major writers and critics see an intimate relationship among science, technology, and the arts, scientists tend to see their fields in complete isolation from art and culture. Science, they reason, is a field unto itself, and if it has a language it is that of mathematics. As usual, the story has not turned out to be so simple and direct. Historians of science have shown how pioneering researchers inevitably draw upon the cultures surrounding them for their ideas and images. In Darwin's Plots, for example, Gillian Beer shows quite convincingly the way reading Victorian novels, particularly Charles Dickens, influenced The Origin of Species.

The Effects of Information Technology upon Literature and the Arts

The development of cinema, television, video, and digital information technology has provided the kind of intellectual distance necessary for students of information technology and culture to perceive the effects of our still dominant information technology — the printed book — upon literature. Increasingly, literary, art, and cultural historians have discovered important relations among paper-making, print technology, modes of publication, economic factors, ideas of creativity, and the specific works of art and literature produced? Try a few thought experiments and ask yourself the following:

- What effect does the cost of paper have on sales of poetry? Does poetry become more or less popular when paper becomes expensive?
How did railways influence the popularity of novels?
How does the printing press support standarized grammar and spelling? What does this have to do with nationalism?
How does one define printing as an information technology? Is it the printing press, the press plus the methods used for typesetting, those plus systems of sale and distribution?

**Literature as Information Technology**

The coming of computer-based information technologies with their emphasis upon process, system, and code has enabled students of literature and the arts to perceive that they, too, function as forms or subsets of information technology. Soon after people began to write computer programs, teachers of expository writing noticed that programming shared methods used in argumentative writing. Considering literature in terms of process, system, and codes (or semiotics) reveals that on several levels it clearly functions as an information technology. Complex forms of argument and patterns of rhetoric thus appear to be a branch of information technology, as do literary kinds or genres, such as the epic, the novel, tragedy, and so on. One of the most obvious and intersting forms of convergence between students of literature and computer science has come in the area of computer-generated narratives: computer scientists working in artificial intelligence (AI) and folklorists, narratologists, and structuralist theoreticians of story telling all break down stories into component parts or structures and attempt to show how meaningful narratives can be generated from these parts.

**Science and Technology as Subject in Literature and the Arts**

Since the coming of Romanticism in the late eighteenth century, many poets, such as Blake and Keats, have tended to oppose science and technology to the arts, choosing to see them as different, even antithetical, modes of thought. Such has not always been the case, for only a few generations before, the great Neoclassical poet Alexander Pope celebrated Newton's discoveries in the The Optics as wonderful sources of beauty and order. One question for cultural historians, historians of ideas, and those who study the connections of science, technology, and the societies in which the occur, then, is how could such a change in attitude have occurred.

Throughout the twentieth century writers, painters, and photographers have rejected (or reconfigured?) romantic attitudes towards science and technology, finding great beauty in machines, factories, and the modern city. At least as early as the 1930s, for example, photographers presented giant steam locomotives as objects of aesthetic enjoyment.

**The Printed Book — the Invisible Machine**

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As Marshal Mcluhan and Elizabeth Eisenstein have shown, the chief cultural effects of the printed book derive from its combined qualities of *fixity* and *multiplicity*. Unlike the manuscript, the object that contains and conveys a text in pre-print writing cultures, the modern printed book does not vary from copy to copy. At the same time, multiplicity (having many, many copies of essentially the same text)

- permits readers widely separated in time and space to encounter essentially the same text. By doing so, print creates a new kind of *virtual community* of readers: People who have read the same text can share ideas and information even though they live hundreds of years or miles apart.

- creates a mass audience, one vastly larger than possible in a manuscript culture.

- radically changes the notions of a chirographic (manuscript) culture about how to preserve texts: one creates more texts rather than permitting fewer readers.

- creates a kind of self-teaching machine that turns out to be far more accessible and hence more quickly democratizing than manuscript texts can ever be.

- and therefore contributes importantly to our basic conceptions of education and scholarship.

- emphasizes interiority (Romanticism, autobiography).

- leads to modern (though not to postmodern or poststructuralist) conceptions of authorship, creativity, intellectual property, and copyright: the need to promote the economic survival of those involved in the book business — authors, printers, booksellers, and publishers (the last three were originally often the same person) — leads directly to modern notions of *creativity* and *originality*, since these distinguishing features or qualities permit individuals to own texts themselves and not just the individual printed book, which is the physical instantiations of a text.

- becomes so central a part of western culture that the effects of printed book becomes invisible with the result that we can became aware of the way the book shapes the way we think and act only after other media, such as cinema, television, and digital computing, begin to rival it as a means of storing and communicating word and image.

- *fictionalizes* earlier literature written before print technology: Homer spoke or sung *The Iliad*, Vergil and Chaucer similarly spoke or sung *The Aeneid* and *The Canterbury Tales* while reading from their manuscripts, but we almost always read them silently from books, having a very different experience.
**Bibliography**


Pioneering study of the different forms literacy has taken within the different information regimes produced by technologies of writing, print, and electronic text.


Discussions of how computing has radically changed the way we think about the printed book, specifically about how scholars now understand the notion of an accurate or authoritative text of a literary work originally written for publication as a printed book.


[On copyright, intellectual property law, and their effects upon culture and other relations to it.]


Seminal study of the often unexpected effects of print technology upon European culture. Whereas the printed book was thought to be an agent of peace and knowledge, it, among other effects, led to centuries of religious wars.


Fascinating explanation of how Johnson took advantage of newly created copyright laws and thereby made himself the first truly modern author, the first to depend upon purchases by readers rather than upon the patronage of the wealthy. In other words, commodification of literature as a good thing.


Chapters on the way computing reconfigures our assumptions about text, self, authorship, and writing illuminate the way the printed book functions as a central paradigm of our culture.


The most recent version takes into account recent developments in digital culture.

Written in what I now realize to be a proto-hypertextual style, McLuhan's pioneering Gutenberg Galaxy has long proved one of the seminal books in your webmaster's intellectual development.


An excellent exploration of oral cultures by someone who was also a great scholar of the Renaissance world of print.

**Jasper Fforde on the Relation of Information Technology and Narrative**

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In *The Well of Lost Plots* and his other novels set in an alternative universe in which fictional characters and real people move between this real world and the world of fiction, Jasper Fforde creates comedy from many ideas accepted by both eighteenth-century Neoclassical and twentieth-century Poststructuralist literary theorists — not as one might expect by mocking these ideas but by dramatizing them, by making them the stuff of his plots. In particular, Fforde, like any good neoclassicist, rejects romantic and modernist notions of creativity and originality: according to him, literature, especially storytelling, is a technology employing lots of off-the-shelf parts. As Miss Havisham explains at one point, all characters begin as generic types that authors then modify and embellish as they wish. Plots, too, have a limited number of possibilities, and this turns out to threatens literature as we know it. Most important media and infotech should be thought of as technologies, for as Wordmaster Xavier Libris explains Story Operating Systems,

First there was OralTrad, upgraded ten thousand years later by the rhyming (for easier recall) OralTradPlus. For thousands of years this was the only Story Operating System and it is still in use today. The system branched in two about twenty thousand years ago; on one side with CaveDaub Pro (forerunner of Paint Plus V2.3, GrecianUrn VI.2, Sculp- Marble VI.4 and the latest, all-encompassing Super Artistic Expression-5). The other strand, the Picto-Phonetic Storytelling Systems, started with ClayTablet V2.1 and went through several competing systems (Wax-Tablet, Papyrus, VellumPlus) before merging into the award-winning SCROLL, which was upgraded eight times to V3.5 before being swept aside by the all new and clearly superior BOOK VI. Stable, easy to store and transport, compact and with a workable index, BOOK has led the way for nearly eighteen hundred years.
When we first came up with the 'page' concept in BOOK VI, we thought we'd reached the zenith of story containment — compact, easy to read, and by using integrated PageNumber™ and SpineTitle™ technologies, we had a system of indexing far superior to anything SCROLL could offer. Over the years . . . . we have been refining the BOOK system. Illustrations were the first upgrade at 1.1, standardized spelling at V3.1 and vowel and irregular verb stability in V4.2. Today we use BOOK V8.3, one of the most stable and complex imaginotransference technologies ever devised — the smooth transfer of the written word into the reader's imagination has never been faster.

References

Print Technology and Publishing: A Selective Chronology

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1692 Richard Bentley's fifty "modern novels" reprints an early example of serial installments

1698 Edward Ward's London Spy appears in eighteen parts; inspires few successors

1732 Boom in cheap publications begins about this time

1740 Publishing in parts well established by this date

1760 Smollett publishes Sir Launcelot Greaves in his British Magazine -- "first large piece of fiction written expressly for publication in a magazine" (Patten, 52).

c. 1800 Stanhope tests iron printing press

1803 Gamble and Donkin's Fourdrinier cylindrical paper-making machine, which leads to cheaper, more quickly accessible paper.

1804 First book printed by stereotype process

1810 Steel-plate process for printing large numbers of illustrations patented; takes a decade to become popular

1811 Friedrich Koenig patents steam-powered cylindrical printing press

1814 The Times of London is printed on the Koenig-Bauer high-speed press, thus initiating the age of mass media.
1820 Pierce Egan devises scheme to issue monthly colored plates by the Cruikshanks.
1822 Church's composing machine for setting type
1826 Photographic processes used in making illustrations
1830 Edward Chapman and William Hall establish bookselling establishment
1831 Captain Maryat's Metropolitan Magazine "first to make a regular feature of original serial stories" (Patten, 50-51).
1831 Depression in book trade
1832 Penny weeklies built large circulations; Charles Knight's Penny Magazine builds enormous circulation by providing illustrations
1836 Dickens's Pickwick Papers accidentally invents Victorian boom in serial publication

References

Guttenberg's Printing Press

Collection Deutches Museum

Munich, Germany

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High-Speed Printing Press by Friedrich Gottlob Koenig and Andreas Friedrich Bauer. 1812.
Collection: Deutches Museum, Munich. Photograph 2000 and text by George P. Landow. [This image may be used without prior permission for any scholarly or educational purpose.]

Friedrich Gottlob Koenig and Andreas Friedrich Bauer, who invented the world's first high-speed printing press, could not interest anyone in their native Germany in their invention, and so took it to England. In 1814 they sold it to The Times of London, thus initiating the age of mass media.
Perkins D cylinder Printing Press
British Library
London
The history of nineteenth-century printing is intimately bound up with the engraved boxwood block, the single most significant piece of illustration technology, which dominated early Victorian book illustration. The first book to be so illustrated was Thomas Bewick's The General History of Quadrupeds (1790). The artist engraved his own white line illustrations on boxwood blocks, and the artist-engraver remained a common figure in book illustration until mid-century.

Between 1850 and 1900, approximately 1,200 "art" books were produced in Britain. The decline in importance of the woodblock over those five decades as new technologies were introduced is evident: in the 1860s, only 6.5% of these books utilised two or more different methods of illustration, but by the 1890s this figure had risen to almost 30%. In the period 1850-1880, wood engravings accounted for 25% or better of all illustrations, with lithographs in second place (accounting for 27%, 20%, and 15% respectively over those three decades). The situation changed dramatically after 1881, a period in which wood engravings sharply declined and line illustrations became extremely popular, thanks in large measure to noted American book illustrator Joseph Pennell (1857-1926), who began his career in the United States, illustrating the works of George Washington Cable and William Dean Howells, but who in 1885 together with
his wife, Elizabeth Robins, decided to work in London. Pennell was adept at producing pen and ink drawings that were easily transferred to wood photographically.

**Two Styles of Woodblock Illustration**

From mid-century, two styles of woodblock illustration occur, the 'old vignette' and the pen-and-ink drawing. In English Book Illustration 1800-1900 (1947), James defines the illustrated book as "a partnership between author and artist to which the artist contributes something which is a pictorial comment on the author's words or an interpretation of his meaning in another medium" (7). Often the artist was the first outside reader of the text and, in a sense, its first critic, as may be said of Phiz (Hablot Knight Browne) in his artistic collaborations with Charles Dickens from the 1830s up to the end of the 1850s. The most celebrated wood-engravers were the brothers Dalziel (George, Edward, Margaret, and John), who founded Camden Press in 1857. George Dalziel worked on John Leech's first Punch illustration, and was frequently commissioned by the Illustrated London News. The Dalziels also produced the blocks for the Pre-Raphaelite-influenced Moxon Tennyson, which featured a total of fifty-five illustrations, thirty by Millais, Holman Hunt, and Dante Gabriel Rossetti, and the remainder by such academic artists as Maclise and Landseer.

Most woodblock illustrations appeared in the second half of the century, in periodicals published in London, which the 1872 Post Office Directory indicates was home to 128 wood-engraving firms. Among the outstanding woodblock series of the era are those by Gustav Doré for Douglas Jerrold's London: A Pilgrimage (1872), contrasting the lives of the affluent and the indigent, John Tenniel's highly imaginative illustrations for Lewis Carroll's Alice books (1865 and 1872), and those by Linley Sambourne for Charles Kingsley's The Water-Babies (1863).

**Electrotyping**

The Voltaic Process, also known as electrotyping, which Thomas Spenser of Liverpool discovered in 1839, quickly replaced the various kinds of stereotyped woodcuts for the production of fine artwork in books. According to Spenser's Instructions for the Multiplication of Works of Art by Voltaic Electricity (1840), the engraved block could either be impressed into soft lead (which would serve as the cathode) or have a metallic face imposed upon before producing a mould and subsequently an electrotype. In the second half of the century, most woodblock engravings were actually printed from electrotypes of one kind or the other.

In The Art of Engraving (1841), T. H. Fielding describes two kinds of woodblocks. With the laid on style, the artist used India ink for the main tints and a pencil for the final details. In the less challenging facsimile style, the artist drew on the block every line that he intended his engraver to incise. Since the material used in both cases was boxwood, and the box is a tree with a trunk of small diameter, any illustration over five square inches in size had to be engraved on a composite block, that is, a block composed of two or more separate pieces of boxwood that had been glued together. Occasionally, in order to speed up the engraving process, several engravers would work on the same illustration at one time with each having a separate block; when finished, the four blocks would be screwed together. This was not an uncommon practice among illustrators of the pictorial journals and magazines of the 1860s.
The Appearance of Cylinder Presses

Around mid-century, however, the presses used to produce books and periodicals changed, as hand presses were replaced by various cylinder presses, such as the power platen press manufactured Napier, Hopkinson, and Cope. These high-speed presses were far more efficient for longer runs, although certain art books were still produced in limited run on the hand press -- Moxon's celebrated edition of Tennyson in 1857 is an example. Later in the century, as photographic techniques replaced the woodblock, the art of wood engraving under the influence of William Morris's Arts and Crafts movement was once again practised by artists who were also engravers. Morris's Kelmscott Press, which he established in 1891, established a vogue for such high quality, limited production books produced in the manner of by-gone days.

Etching

A very different pictorial technology co-existed with the woodblock, the etching. In this system of illustration, the surface of a copper (in the eighteenth century) or a steel plate was covered with an etching 'ground' designed to protect the plate's surface. The ground, a mixture of wax and pitch called asphaltum, was rubbed onto the heated plate's surface, which was then blackened by using a candle flame. With a lead pencil the workman would copy the picture on tracing paper, then place the tracing paper face down on the treated plate; he would then run paper and plate together through a rolling press to transfer the image from the paper to the plate's surface, which would present the desired image as a series of silvery lines against the black background. The engraver would work on the image with a series of steel needles with points of varying thickness, then immerse the plate in diluted nitric acid. About 1824, Edmund Turrell substituted a plate of steel, which he immersed in a corrosive mixture of nitric and pyroligneous acids and alcohol. The most prominent Victorian illustrator to employ steel engravings was George Cruikshank, who provided such plates for Bentley's Miscellany from 1837 to 1843, and for The Ingoldsby Legends from 1840 to 1847. Whereas the copper plates used in late eighteenth and early nineteenth century book illustration would wear out after 4,000 good impressions, steel was much more durable.

Illustration in Color

Next we come to matter of coloured illustrations. According to Martin Hardie, "Hand-colouring, of course, increased the cost of the plates, and books containing them were generally from half as much again to twice the cost of uncoloured copies" (25). The mezzotint was produced on a plate of copper, or later steel, which would be deeply scratched with an instrument called a "cradle." The burrs on the plate would then be burnished or scraped away. Before the plate was grounded, the outline of the drawing was etched lightly, and then more deeply after all the tones had been put in place. As a result of the constant wiping of the plate's surface, a mezzotint plate wore so rapidly that only the early prints were suitable for book illustration. In 1820, William Say introduced the steel mezzotint plate, from which he was able to take 1,500 good impressions, although they lacked the rich tones which characterized images taken from copper mezzotint plate.
The aquatint involved an etched plate with a reticulated pattern; the image taken was then hand-coloured to simulate the effect of a water-colour painting. The process was introduced in the 1770s, but was little used after the 1830s.

John Leech's first book, *Etchings and Sketchings*, by A. Pen, Esqu. (1836), was published at two shillings "plain," but at three shillings "coloured." The price difference, as we have seen, is accounted for by the fact that "coloured" meant "hand-coloured," a time-consuming and therefore expensive process of applying water colours to printed images, whether etchings or engravings.

There is a long gap between Leech's first publication with plates coloured by hand, the *Etchings and Sketchings* of 1836, and his next venture in 1843, though in the meantime he had become the most successful artist-humourist of the day. In 1843 his services were secured by Charles Dickens to illustrate the *Christmas Carol*, the first and best of Dickens's Christmas Books, and the only one illustrated exclusively by Leech. The original issue was in brown cloth with gilt devices and edges, and bears as the heading to the first chapter, 'Stave I;' afterwards altered to 'Stave One' to harmonise with the other headings, which were always 'Stave Two,' 'Three,' 'Four,' and 'Five.' Moreover, in the first issue the end-papers are green, in the second they are yellow. In it there are four full-page etchings, beautifully tinted, and four wood-engravings drawn by the artist in his best manner. The first edition of the book (it reached a tenth edition by 1846) is valuable for the sake of both artist and author as well as for its rarity. It was followed by *The Chimes* in 1845 [sic], *The Cricket on the Hearth* and *The Battle of Life* in 1846, and *The Haunted Man* in 1848, all of them partly illustrated by Leech, but without any plates in colour. [Hardie, pp. 209-210]

It is possible that the successors to *A Christmas Carol* were not coloured because of the extra price that would have to be charged, and also because Bradbury and Evans had insufficient time before the publication date to have such work done. Whereas the Carol had only eight plates, the other Christmas Books contained many more--the last of the series, for example, *The Haunted Man* (1848), contained seventeen illustrations. As late as 1860, Leech's plates, as in *Mr. Briggs and His Doings*, were being hand-coloured.

Although many of Thackeray's plates were entirely hand-coloured, the fifteen plates in *The Kickleburys on the Rhine* (1851), engraved on wood, were finished with one colour already printed. Coloured lithography and colour-printing from woodblocks, innovations of the 1860s, helped to bring down the cost of books with colour illustrations. Another significant invention of the period was Alois Auer's "natural" printing process, in which an actual object such as a leaf was passed between plates of lead and copper through two tightly screwed rollers, leaving a textured impression of that object on the softer (lead) plate. Various colours could then be applied to the lead plate to obtain highly detailed and life-like images. An improvement in the process was stereotyping or galvanizing the soft lead plate in order to increase the plate's durability and therefore the number of impressions that might be taken. Auer patented his *Naturselbstdruck* method in 1852. Henry Bradbury (eldest son of William Bradbury of London's Bradbury and Evans, Dickens's publishers after 1843), who had become familiar with Auer's process while studying graphic arts in Vienna, introduced it into England in 1855, when his
father's firm used it for the fifty-one colour plates in T. Moore and J. Lindley's folio The Ferns of Great Britain and Ireland.

Lithography

Lithography, cheaper and more versatile than nature printing, was invented by the small-time Czech printer and publisher Aloys Senefelder in 1798. By accident, he applied a ground composed of wax, soap, and lamp-black to a polished limestone surface, which he then bit with acid to produce an elevated image suitable for printing. Afterwards, he refined the process by using an ink composed of tallow, wax, soap, shellac, and Paris black to draw a picture on the polished stone surface before pouring an acid solution over the drawing to decompose the lime in the stone and the soap in the ink. "Before printing, the stone is well moistened with water, and when inked with the roller will receive the ink only on the greasy parts, that is the parts drawn upon, and will reject the ink from the parts treated with acid, gum, and water" (Hardie 235). Senefelder described his discovery in his Complete Course in Lithography (1818).

By the end of the 1830s it was in common use, being employed in some very attractive books like John Britton's Drawings of the London and Birmingham Railway, 1839, with illustrations by John Cooke Bourne. It depends for its effect upon the antipathy between grease and water: a greasy image on a surface of smooth limestone is first moistened and then inked; the image repels the water but accepts the ink, while the stone accepts the water and consequently repels the ink. The image can then be printed on paper by passing stone and paper through a scraper press, which gives a picture in black on a white background. By 1837 it was becoming common practice to add the impression of another stone, printed in a straw colour to give a tinted background, and this produced what are known as tinted lithographs. In England they were developed by C. J. Hullmandel, who was the most important lithographer working in England in the earlier part of the century. (Wakeman p. 37)

Charles Joseph Hullmandel and J. D. Harding, the major watercolorist who was Ruskin's drawing teacher, continued to experiment with lithography; one method they tried involved overprinting the lithograph with a single yellow tint to bring out the highlights, patented as the "lithotint" in 1840. "The system now is to print one colour on each stone, or rather one tone, for the chromo-lithographer often builds up what may seem simple colours by the super-position of two or more tones. A saving, however, of time and expense may occasionally be effected by the same stone carrying two distinct colours on two separate parts" (Hardie 239). Some lithographs required more than twenty printings in various colours before they were finished. Once introduced to England in the early 1830s, lithography remained one of the most popular techniques for illustrating books to the end of the century, when photogravure displaced it.

Having spoken of the use for colour-printing in modern days of lithography, wood-blocks, and process, separately and in conjunction, it is right to add a reference to the rarer and more expensive method of colour photogravure. This is a way of printing photo-engravings in colours at one impression after the manner of the old mezzotints and stipple. Messrs. Boussod, Valadon et Cie. Have been particularly successful in their reproduction of water-colours by this method; and for its application to books one may mention the magnificent Goupil series of English Historical Memoirs’ (1893--), Skelton's Charles I., Holmes's Queen Victoria, etc. (Hardie 298)
References


Gutenberg Monument
David d'Angers (1788-1856)

1840

Bronze on a granite base, with four bronze relief panels

Place Gutenberg, Strasbourg

Johannes Gensfleisch Gutenberg was born in Mainz on the River Rhine, where he is honoured by a statue executed by the Danish neo-classicist, Bertel Thorvaldsen (1770-1844). But it was in Strasbourg, between 1430 and 1440, that Gutenberg made his first attempts at printing with movable type, and here that the younger French sculptor (Pierre-Jean) David d'Angers was commissioned to prepare this monument. [continued below]

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David's figure holds out the world-famous bible for all to see, and is more dynamic but perhaps less dignified than Thorvaldsen's. The same may be said of the design for the plinth. Instead of Thorvaldsen's restrained stone carving, David's plinth features four crowded panels of bronze reliefs, telling the story of the printing press's influence on every corner of the globe.

Thorvaldsen's statue was installed in 1837, so the almost contemporaneous work of the two sculptors makes a fascinating contrast, demonstrating the swing away from neo-classicism, and perhaps also its dangers. David, who had carried out major commissions like the sculpture for the pediment of the Pantheon in Paris, was undoubtedly "the busiest and most popular of French sculptors of his day." Yet he was also criticised, and his later works were dismissed in the early twentieth century as "hurried, exaggerated and lacking in the calm and dignity which should characterize works of art" (Eaton 187, 191). However, this remark needs to be seen in the context of its times.

The Bas Reliefs

Examples from the reliefs, which all focus on the central image of the printing press:
Left: Detail of America, showing Benjamin Franklin and other signatories to the Declaration of Independence, including George Clinton, Francis Hopkinson, Charles Carroll, George Wythe, John Morton, Samuel Chase and Thomas Nelson. Other famous liberators like General Lafayette and Simon Bolivar are present too. Right: Africa, showing Wilberforce and other abolitionists bringing freedom and enlightenment to the slaves.

The printing press in Europe, showing such renowned men of letters as Erasmus, Chaucer, Milton, Molière, Rousseau, Voltaire, Kant and Schiller; the original plaster panel, which gave prominence to Martin Luther, caused an uproar (see Braun). N.B. The Asian panel is more weathered, but includes Brahmans exchanging manuscripts for books, and Chinese people reading Confucius.

References


Printing, publishing, and society

The Growth of a Working-Class Audience: Political, Economic, and Technological Factors

Fyfe's chapter entitled "The Techniques of Evangelical Publishing" skillfully explains the complex factors that permitted the rather sudden development of a mass readership. According to her, "The existence of a 'mass audience' was just beginning to be recognised in the 1840s, and it was frequently perceived as a crowd of different sorts of people rather than as the homogeneous mass that we tend to think of today" (6). During the first decades of the nineteenth century publishers, such as Murray and Constable, were uncertain about "both the size of the potential market and the price tag that the market could take. A few years later the success of the penny weekly magazines demonstrated to the entire book trade that an enormous reading audience definitely did exist — if the price was pennies rather than shillings" (48). An old adage relating British money to the Victorian class system held that items for the upper classes cost pounds and guineas, those for the middling classes shillings, and those for the lowest classes . . . pennies. If they hoped to reach a mass audience, publishers had to find a way to produce books that they could then sell for pennies.
Before books could be sold for pennies, a series of economic, political, and technological changes had to take place. First, publishers had to demonstrate to themselves that lowering book prices produced larger audiences, though at first these audiences did not include the working-class readers.

The book series of the 1840s were successful in a way that their predecessors in the 1820s simply had not been. By using reprints, it was possible to break even at a price of five or six shillings, and publishers like Chambers, Knight, and Routledge showed that it could be done at even lower prices. There are several reasons why this had become possible. One was that the "taxes on knowledge" had begun to be repealed in 1833, although the process was not complete until 1861. Attitudes toward cheap publishing were also changing. Particularly after 1848, there was much less fear of working-class unrest and potential revolt than there had been in the years before the 1832 Reform Act. Despite being the year of European revolutions, the British Parliament's rejection (for the third time) of the People's Charter, a petition demanding extensive electoral reforms, had passed off quietly in April 1848. [53]

These political developments convinced the Religious Tract Society that educating the lower classes by providing them with adequate cheap books was not only not safe but necessary.

"Important as the political changes were," Fyfe points out, "the most obvious cause of the transformation in cheap publishing was the introduction of mechanisation and steam power" (53). The crucial technologies appeared early in the century, but book publishers, who did not yet have a mass audience, saw no reason to take advantage of them. Newspapers and periodicals, which had to produce large numbers of copies as quickly and cheaply as possible, did. The Times being the pioneer when it purchased German-invented steam printing presses in 1814. By the time the Religious Tract Society and commercial publishers decided that a potentially large audience existed in the poorer classes, printers had accumulated a lot of experience with the newer printing technologies, which included the practice of stereotyping — casting a metal plate based on an impression from hand-set type — which permitted both quick reuse of the type for other pages and multiple copies of the metal plates for even faster printing of multiple copies (162).

References


History of Initial Tract Enterprises (1894)

John M'Clintock and James Strong
Aside from the circulation of portions of the Holy Scriptures in fragmentary or tract form, the use of tracts as an agency of religious usefulness dates from the dawn of the Reformation in Europe. Long before the invention of printing, the early Reformers sent out their little tractates to awaken and instruct the people who still sat under the shadow of the Dark Ages. Wycliffe's writings were the means of extensive usefulness. He sent out more than one hundred volumes, small and great, besides his translation of the Bible. Notwithstanding many of his works were burned and people were forbidden to read them on pain of death, yet they spread far and wide. Like seeds of truth borne by the wind, they lodged on the soil of the Continent, and brought forth fruit there in after-years. Works produced by the writers of that period, although extensively useful, were greatly hindered in their circulation by the size and expensiveness of the manuscript form in which they were issued.

The invention of printing in the 15th century removed many formidable obstacles to the diffusion of truth, and greatly stimulated the literary efforts of those who were striving to reform the Church. Luther appeared, and by his powerful writings and those of his associates, millions of people were led to renounce the errors than which they previously knew nothing better. The efforts of the later Reformers are thus characterized by one of their opponents: The Gospellers of these days do fill the realm with so many of their noisome little books that they be like to the swarms of locusts which did infest the land of Egypt." Fox, the martyrlogist, exults over the work and promise of the art of printing in language like this: "God hath opened the press to preach, whose voice the pope is never able to stop with all the puissance of his triple crown. In this printing, as by the gift of tongues and as by the singular organ of the Holy Spirit, the doctrine of the Gospel soundeth to all nations and countries under heaven; and what God revealed unto one man is dispersed to many; and what is known to one nation is opened to all."

In the 17th century several traces are found of associations for promoting the printing and sale of religious works, while much good resulted from the efforts of individuals, both in England and on the Continent. At length, movements on a larger scale began to be made in the line of associated efforts for the diffusion of truth in printed form. The earlier organizations of this kind, though not strictly tract societies, were preliminary, and in some sense introductory, to the great institutions subsequently formed for the exclusive object of printing and circulating religious tracts. In 1701 the Society for Promoting Christian Knowledge was established in England, In 1742 the Rev. John Wesley, in the prosecution of his evangelical work in Great Britain, commenced printing and circulating religious tracts by personal effort and the co-operation of the preachers associated with him. In 1750 the Society for Promoting Religious Knowledge among the Poor was organized. In 1756 societies for a similar object were commenced both in Edinburgh and Glasgow. Although the three societies named accomplished good, they did not remain permanently established. In 1782 Mr. Wesley instituted a Society for the Distribution of Religious Tracts among the Poor. In his published proposals in behalf of the society, lie said," I cannot but earnestly recommend this to all those who desire to see true scriptural Christianity
spread throughout these nations. Men wholly unawakened will not take the pains to read the Bible. They have no relish for it. But a small tract may engage their attention for half an hour, and may, by the blessing of God, prepare them for going forward." Membership in the society required. the subscription of half a guinea or more, for which a quota of tracts would be delivered yearly. The publications of the society at that date were thirty in number, embracing Alleine's Alarm, Baxter's Call, Ten Short Sermons, Tokens fur Children, A Word to a Soldier, A Word to a Sailor, A Word to a Swearer, A Word to a Sabbath-breaker, A Word to a Drunkard, etc. It is not difficult to see in the above scheme, the germ of the largest tract societies now in existence. Its tenor, more especially when taken in connection with Mr. Wesley's methods of supplying religious books wherever his societies existed or his preachers went, fully authorized the following assertion of his biographer, Richard Watson: "He was probably the first to use, on any extensive scale, this means of popular reformation." About 1790 Hannah More appeared as a writer of popular tracts. Her first tract, entitled William Chip, was published anonymously. Having been encouraged by its reception, she prepared, with the aid of her sisters, a series of small publications, entitled The Cheap Repository Tracts. In a private memorandum, published after her decease, she said, "I have devoted three years to this work. Two millions of these tracts were disposed of during the first year. God works by weak instruments to show that the glory is all his own." From that time forward the number of persons who made themselves useful by publishing and circulating tracts in various ways became considerably increased. Among them honorable mention may be made of Mrs. Rebecca Wilkinson, of Clapham; Rev. Charles Simeon, of Cambridge; and Rev. John Campbell, of Edinburgh.

Bibliography


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Nineteenth-century novels, bibles, collections of poetry, and gift books are readily found in libraries, bookshops, and private hands. Victorian artifacts with a high survival rate, most of these books are covered with mass-produced, decorated bookbindings — trade bindings. Nineteenth-century bookbindings and their cover art have attracted significant scholarly interest, yet a descriptive bibliography of the scope and detail produced by King has not existed.


Bookbinding as a decorative art has evolved through the ages. Certain styles have become identifiable by date and place. Fourteenth-century Italian bookbindings differ from fourteenth-century German bindings; both differ dramatically from eighteenth-century American bookbindings. Styles changed, but methods of decoration remained remarkably similar: binders used hand stamps and engraved metal rolls to impress cover designs in blind and sometimes gilt.

In the first third of the nineteenth century, technological advances in printing and bookbinding created a divide between texts of the hand press and hand binding period and those which followed. The first significant development was the introduction of binding cloth around 1823. Its acceptance over the next two decades provided a new medium on which binders and book designers could work. Case binding, the mass production of book covers, also began at this time, almost certainly an outgrowth of the use of cloth. No longer constructed as an integral part of a
book's structure, prefabricated case bindings helped binders to keep pace with increasing numbers and sizes of editions.

The 1820s and 1830s were a formative period for cloth cased bindings. Cloth grains were often simple and elaborate toothing was not used. Ornate hand-tooling may have seemed counter intuitive to binders and publishers who first saw cloth as a durable but inexpensive alternative to leather, not worth a finishing binder's best efforts. By the 1840s, however, cloth had become a widely accepted binding material, and case binding allowed binders to begin to use arming presses and later steam presses to emboss covers with engraved metal dies.

Few books from the 1840s through 1880s were left undecorated; nearly all received some level of design consideration. At their simplest, cover designs were made up from routine borders and ornaments impressed in blind or gilt. More elaborate designs used dies created uniquely for a text in conjunction with stock borders and ornaments. The highest level of book design used overall designs created specifically for the book at hand.


Larger binding firms probably had staff for design work, but the highest level of execution called for cover designers. These artists emerged during the 1840s and 1860s; sometimes their work was identified with monograms or initials on the covers but many times not. It is largely the work of these designers that King describes in his bibliography. At the best level their works employ ornament, stylized lettering, line drawings, color, and texture in coherent designs reflecting many different artistic styles.

King has described 752 bindings, the work of 26 identified designers. Covers by the prolific John Leighton account for 455 designs, approximately half of his estimated output (Ball 74). Also included are covers by Robert Dudley, Henry Noel Humphreys, Owen Jones, William Ralston, William Harry Rogers, Dante Gabriel Rossetti, John Sliegh, Albert Henry Warren, and Matthew Digby Wyatt, among others. There are 100 unsigned bindings.

The strength of King's work lies in the descriptions of individual bindings; they are clear and detailed. When appropriate, King provides notes to previous scholarship on covers and designers. The volume is well illustrated with 91 color plates and numerous black and white images. Many intriguing bindings are illustrated, although many more are not.

The slender introductory materials are a disappointment. The study of trade bindings stresses nineteenth-century economics, the book trade, and artistry. It is a rich vein of evidence that illuminates the relationships among cover designers, publishers, binders, and die-cutters. The bindings that King has described provide insight into these relationships, but he leaves the discussion underdeveloped.
A range of additional information would have been welcome. King provides brief introductions to the work of 12 binders but none for Henry Noel Humphreys, a prolific designer who accounts for the third highest total of bindings described. This becomes troublesome for item 74, attributed to both Humphreys and John Leighton. Leighton's initials appear in the cover design, but the Humphrey's attribution is left unexplained. Whether this represents a collaboration between the two designers or a reuse of designs is uncertain.

In places the need to conserve space trumps clarity. Item 490 describes the 1868 London edition of Thomas Hood's Jingles and Jokes for The Little Folks. The description states: "The upper cover has mostly the same design as blocked on the upper cloth cover of BL 11648.cc.40." It would have been helpful to explain that 11648.cc.40 is the British Library's 1865 London edition of the same work.

In the end, though, I offer slight criticism. The potential for investigation offered by these well-described texts is tantalizing. Many of the designers illustrated texts that they themselves wrote: Charles Henry Bennett, Robert Dudley, Henry Noel Humphreys, John Leighton, Dante Gabriel Rossetti. Others collaborated on designs. John Leighton, the most prolific designer of the age, was related to two of the more significant bookbinding firms of the mid nineteenth-century: J & J Leighton and also Leighton, Son, & Hodge. Investigation into any or all of these relationships will be of keen interest to scholars in several disciplines.

Additional study may clarify the most tantalizing question: whether the publisher or binder was in charge of cover design. Who commissioned cover designs, chose cloth grain and color, and retained engraved dies? King does not address this question. Instead, he has collected primary materials, aware that tens of thousands of cover designs were executed during the Victorian period, most which remain undescribed. As the years pass, increasing numbers of these covers will deteriorate or be lost to rebinding. King has skillfully begun an ambitious project, describing the more outstanding covers before they are lost.

This is not a work for the non-specialist. If you want detailed introductions to Victorian bookbinding, look to other works such as those written by Douglas Ball, Ruari McLean, Sybille Pantazzi, Howard Leathlean, and King himself.

King has titled this work a "descriptive bibliography" and fulfills that promise. It is hoped that his work will stimulate further study of Victorian cover designs and lead to a better understanding of the relationships that underline this area of book history.

**Literary Accessibility, Advertising, and Distribution**

Creating the new large audience that could and would purchase this flood of new books obviously involved more than just producing book in numbers larger than ever before. First, one
had to rethink what one meant by "popular" and "popularize." Unlike today, the word popular "was not a description the reception of a work (for example, a book was popular because everyone read it and liked it), but a statement about the intended audience envisaged by writers and publishers. . . . A 'popular' work was one that was intended for 'the people,' which by the middle of the nineteenth century increasingly included the working classes" (56). By the 1840s publishers realized that reducing the purchase price of books was not enough:

Publishers who were committed to reaching the working classes were also focusing on literary accessibility, making sure that the language used was as clear and simple as possible. These changes are reflected in the changing meanings of the verb "to popularize," which came to mean "to make abstruse and technical subjects generally accessible" rather than simply "to make available to the populace." [56]

In addition to lowering the pieces of books and making them more stylistically accessible, publishers also had to develop new ways of advertising and distributing them. Advertising as we know it today came into being. "In the 1840s, the style of advertising was beginning to change. Advertisements ceased to be simple announcements of new titles and began to try to sell their products, using display fonts, pictures, and enticing slogans and promises" (166). In other words, the Religious Tract Society and other publishers who competed for the quickly increasing mass audience played a part in creating the kind of modern advertising that Thomas Carlyle so mocked in Past and Present. Publishers also had find a way to get their books into the hands of working-class readers, who rarely entered bookstores, and one way involved various alternative outlets, including itinerant hawkers, who "sought out working-class readers directly, at their homes or meeting places, and made their living on the difference between the trade and retail prices of their publications. . . . Five hawkers employed by the Town Missionary and Scripture Readers Society . . . [in 1849] had sold no fewer than sixty thousand RTS publications and twenty-four thousand Bibles" (172). Furthermore,

Although it was generally asserted that the working classes did not frequent bookshops, the reports of city missionaries and investigative journalists were revealing the existence of alternative bookselling outlets. New, remaindered, and secondhand books were sold from barrows and stalls, and even from small shops in the working-class districts. Henry Mayhew reported that there were around a thousand individuals employed in sale of stationery and literature on the streets of London. Of these, he found forty selling tracts and pamphlets, twenty with book stalls, and fifty running book barrows. [174]

**Religious Influences and the English Reading Public**

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More and her co-workers cleverly disguised the Tracts to look like the immoral and seditious literature the books were expected to replace (this was the revolutionary period in France and Tom Paine's writings were receiving wide circulation in England), and like the others were to be sold by hawkers in the streets; to that end they were given racy titles and decked out with attractive woodcuts. Because of the money Clapham had raised the prices were as low as a half-
penny each, and in quantity much less. The sales were unprecedented. In the first six weeks three hundred thousand copies flew out the door; by the end of the first year two million had been sold. Even the gentry were captivated by these writings and at their demand there was a second printing on better paper, to be sold in ordinary bookstores. Thus was born a revolutionary means for social indoctrination, one that was to be used for a variety of purposes, not all to the liking of the originators. [Altick, The English Common Reader, 75-77. Cf. John Campbell Colquhoun, William Wilberforce123f: "Her writings reached the upper classes in away then unusual. They were recommended both by her literary fame, and by the variety and sprightliness of her style. The evidence of this is found in the popularity of her works, and their circulation among the higher classes. The work on the 'Manners of the Great' ran rapidly through many editions, and passed from the Queen and the Court to the hands of fashionable ladies, literary persons, and divines. The 'Hints for the Education of a Princess' were read by the Princess Charlotte, by the bishop who was her tutor, and by the Duchess of Gloucester.

Her political Tracts, which she wrote against democratic opinions in the times of the French Revolution, (Will Chip, Village Politics, &c,) were distributed largely by prelates, by politicians, by the Attorney-General and Bishop Porteus, by the stout old king and by Mr. Pitt. When she issued a monthly Tract (which she continued, with her friends' help, for three years), two millions of these were sold in the first year. These efforts, so acceptable to the friends of constitutional order, procured greater attention for her religious works. When she wrote 'Coelebs,' it had a success almost unequalled. It came out in two octavo volumes in 1809, and in a few days the first edition was exhausted. It ran through eleven editions in nine months; and during her lifetime 30,000 copies were sold, and the profits amounted to £7000, though the authoress had only one third of these. In America a single bookseller in New York told her that he had sold 30,000 copies; and she remarks in her later years, that there was hardly a town in the United States in which she had not a correspondent.

Her work on Practical Piety, though more distinctly religious, ran speedily to ten editions; and her work on Christian Morals, also in two volumes, published about two years after, was almost equally successful. Her last original work, 'Moral Sketches,' was written in 1819, when she had reached her 75th year. She had by this time been stripped of much domestic happiness. Her last and dearest sister had passed to her rest. Yet this work was characterized with the usual liveliness of her style; and conveyed her opinions to the upper class, for which she wrote, full of sound patriotism and Christian truth. To these writings we must add her Essay on the Character and Practical Writings of St. Paul, which was published in 1815; and this was translated, under the direction of the Chief Justice of Ceylon, Sir Alexander Johnstone, into Cingalese, into which language and the Tamil several of her tracts and poems also found their way. To celebrate the abolition of slavery in Ceylon, she wrote, in her 74th year, a spirited poem, which was translated and recited with enthusiasm in Ceylon at the anniversaries of their liberty. In her 79th year, she collected from her various works passages on prayer, and put them together in a book, issued under the title of 'The Spirit of Prayer,' which passed through three editions in three months, and of this work 5000 copies were sold. Her Bible Rhythms and religious tracts had a large circulation; and it is pleasant to notice the judgment of so competent an observer as the Rev. John Venn, who, writing from Clapham in 1810, refers a remarkable case of change of character to one of these tracts. In later years, gratifying testimonials poured in upon her both from England and America. It was found that persons moving in the higher classes of society, and
exercising large influence, had received their first impressions of religion from her works. Thus was confirmed the remark made of her in earlier life by John Wesley, that her sphere of good was Society, from which he and his preachers were shut out by the notoriety of their religious views, but into which she had easy access.

More's amazing output included a didactic novel in which she used a young man's search for a wife to present moral teachings in the form of adventurous travels. Thus an innovative form of literature was incorporated into the evangelical mission to reform the nation. [Hannah More, Coelebs in Search of a Wife]

This effort by the Anglican Evangelicals to encourage reading of a certain kind echoed the long-standing efforts of Wesley to encourage his followers to read. Even earlier, English puritanism had promoted the reading of religious literature. But now the success of the Evangelicals in teaching, writing and publishing was turning ever larger numbers of the public into readers.

Newman's Opposition to Inexpensive Books

George P. Landow, Professor of English and the History of Art, Brown University

Newman and the Idea of an Electronic University

To us who live in an age in which educators and pundits continually elevate reading books as an educational ideal and continually attack television as a medium that victimizes a passive audience, it comes as a shock to encounter Newman claiming that cheap, easily available reading materials similarly victimized the public. According to him,

What the steam engine does with matter, the printing press is to do with mind; it is to act mechanically, and the population is to be passively, almost unconsciously enlightened, by the mere multiplication and dissemination of volumes. Whether it be the school boy, or the school girl, or the youth at college, or the mechanic in the town, or the politician in the senate, all have been the victims in one way or other of this most preposterous and pernicious of delusions. [108]

Part of Newman's rationale for thus denouncing cheap, abundant reading materials lies in the belief that they supposedly advance the dangerous fallacy that "Learning is to be without exertion, without attention, without toil; without grounding, without advance, without finishing"; but like any a conservative elitist in our own day, he fears the people unsupervised, and he cannot believe that reading without proper guidance — guidance, that is, from those who know, from those in institutions like Oxford — can produce any sort of valid education, and, one expects, had Newman encountered self-taught mill-workers and artisans who made discoveries in chemistry, astronomy, and geology after reading newly available books, he would not have been led to change his mind.

Like Socrates, who feared the effects of writing, which he took to be an anonymous, impersonal denaturing of living speech, Newman also fears an "impersonal" information technology that people can use without supervision. And also like Socrates, he desires institutions of higher learning — which for the ancient takes the form of face-to-face conversation in the form of
dialectic — to be sensitive to the needs of specific individuals. Newman therefore argues that "a University is, according to the usual designation, an Alma Mater, knowing her children one by one, not a foundry, or a mint, or a treadmill."

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**Carlyle and the Institution as Technology**

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**Newman and the Idea of an Electronic University**

Newman would almost certainly consider the use of educational technology with greatest suspicion. He would also fear the true democratization implicit in such apparent educational anarchy, and he would also take the changing intellectual skills implicit in this new media technology as matters for major concern — even, possibly, for its ultimate rejection. Nonetheless, there are several points in the new university of which Newman might fully approve.

First of all, educational hypertext's defining emphasis upon making connections — between text and other texts, text and context, and among various approaches — certainly supports Newman's conviction that education consists fundamentally in making connections, something apparent when he describes an intellect "properly trained and formed to have a connected view or grasp of things" (xliii).

He would also approve of the characteristic multivocality and interdisciplinarity implicit and inevitable in hypertext technology, which blurs the borders between individual texts and separate disciplines. Discussing theology, Newman argues that "all knowledge forms one whole, because its subject matter is one; for the universe in its length and breadth is so intimately knit together, that we cannot separate off portion from portion, operation from operation, except by a mental abstraction" (38). Newman claims that true knowledge, wisdom, and learning are more-than-disciplinary; therefore, anything like hypertext that promises to cross boundaries has the potential to create the kind of education that Newman proposes as an ideal. "These various partial views or abstractions, by which the mind looks out upon its object, are called sciences, and embrace larger or smaller parts of the world of knowledge" (34). Newman here virtually defines one of the chief characteristics of any document once it appears electronically linked to others within a hypertext web. In fact, readers tend to experience documents in a fully linked hypertext corpus, just as they experience the entire web itself, as open-ended, perpetually unfinished, and partial to the degree that their current interests guide the axes of their investigations.

Electronically linking various disciplines and approaches to issues within a single field of discourse, or virtual place, creates hypertext's characteristic multivocality, a quality Newman desires in institutions of higher learning. As he explains, "The advantage of a seat of universal learning, considered as a place of education" lies in the way an "assemblage of learned men, zealous for their own sciences, and rivals of each other, are brought, by familiar intercourse and
for the sake of intellectual peace, to adjust together the claims and relations of their respective subjects of investigation. They learn to respect, to consult, to aid each other." Anyone who has experienced a modern university, read much about Newman's Oxford, or studied in scholarly literature may well be excused for taking a sceptical glance at his claim, "Thus is created a pure and clear atmosphere of thought, which the student also breathes," but one has to agree that, as Newman asserts, the student "profits by an intellectual tradition, which is independent of particular teachers, which guides him in his choice of subjects, and duly interprets for him those which he chooses. He apprehends the great outlines of knowledge, the principles on which it rests, the scale of its parts, its lights and its shades, its great points and its little, as he otherwise cannot apprehend them" (76). By allowing beginning and advanced students (among whom I include members of the faculty) to immerse themselves in the cultures of various disciplines, hypertext corpora and other forms of electronic textuality permit them more efficiently than ever before to encounter both the conflict and the contributions of separate disciplines, each of which forms part of some greater whole.

The reason we do not recognize the wholeness of knowledge, says Newman, derives from our fallen state. As he explains, the "cultivation" of the human mind "lies in fitting it to apprehend and contemplate truth," but

the intellect in its present state... does not discern truth intuitively, or as a whole. We know, not by a direct and simple vision, not at a glance, but as it were, by piecemeal and accumulation, by a mental process by going round an object, by the comparison, the combination, the mutual correction, the continual adaptation, of many partial notions, by the employment, concentration, and joint action of many faculties and exercises of mind. Such a union and concert of the intellectual powers, such an enlargement and development, such a comprehensiveness, is necessarily a matter of training. [114]

As recent as has been the experience of teaching and learning with such digital media, one thing seems clear: they do provide an efficient means of enabling students to develop their intellects "by going round an object, by the comparison, the combination, the mutual correction, the continual adaptation, of many partial notions."

One implication of Newman's emphasis on the inevitable interdisciplinarity of true knowledge appears in his description of the result of education as the recognition that every subject, every science, every discipline, exists as part of a network of interrelations. "That only is true enlargement of mind," he explains in "Knowledge Viewed in Relation to Learning," "which is the power of viewing many things at once as one whole, of referring them severally to their true place in the universal system, of understanding their respective values, and determining their mutual dependence." This general approach to thought, Newman urges, constitutes the "perfection" of intellect, and he explains:

Possessed of this real illumination, the mind never views any part of the extended subject-matter of Knowledge without recollecting that it is but a part, or without the associations which spring from this recollection. It makes every thing in some sort lead to every thing else; it would communicate the image of the whole to every separate portion, till that whole becomes in
imagination like a spirit, every where pervading and penetrating its component parts, and giving them one definite meaning. [103]

Hypertext, which continually presents all information and all beliefs as part of a greater whole, also inevitably "makes every thing in some sort lead to every thing else," thereby encouraging the particular fundamental approach Newman emphasizes as necessary to the truly educated person. [here put last part of "an acquired illumination, it is a habit, a personal possession, and an inward endowment (85)."