

Introduction

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The notion that we live in a technology-obsessed society has become axiomatic, requiring no demonstration or corroborating evidence. And yet who can resist, in our technology-obsessed society, going ahead anyway, needlessly but irresistibly employing high-tech means of demonstrating what is already absolutely clear? In this case, as always, Google – today’s definitive tech-startup-turned-tech-behemoth; purveyor of universally employed search engines, web browsers, mobile operating systems; pioneering developer of such futuristic devices as augmented-reality glasses, quantum computers, and self-driving cars – is there to oblige. A quick search of their Ngram Viewer (Figure 0.1), which instantly scans the contents of millions of digitized Google Books, shows the meteoric rise in employment of the word “technology” over the past four centuries.

The *OED* informs us that the word “technology” entered the English language in the early seventeenth century. Its etymons are the Greek τέχνη – “art” in the practical, hands-on sense of craft creation, τέχνη being the root of the Greek τέκτων, “carpenter” – and λογία, from λόγος, *logos*, “word” or “discourse.”¹ In the first two centuries of its employment in English, usage of “technology” hewed close to this etymology. It was used to refer to treatises or discourses on the arts, particularly the practical arts; the terminology of particular branches of knowledge, particularly technical language; and systematic treatments of grammar.² Employed in these senses, the word was not used frequently enough to appear as more than a minuscule blip on the chart produced by the Ngram Viewer.

Around the turn of the nineteenth century, an expanded modern sense of technology began to develop. The word was now used to refer to “the branch of knowledge dealing with the mechanical arts and applied

¹ *OED*, “techno-, comb. form.” “Technology” notably shares this root with “text,” etymologically derived from another craft, weaving.

² *OED*, “technology,” 1, 2, 3.

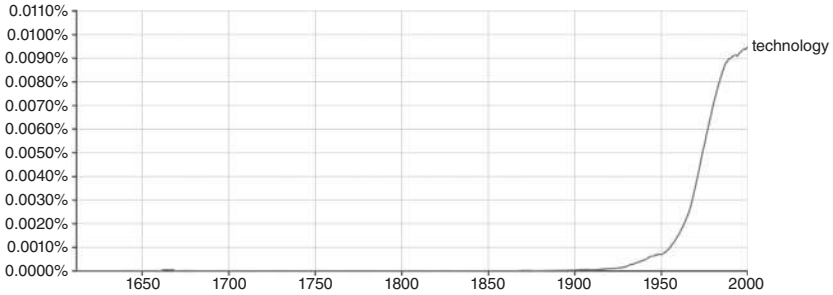


Figure 0.1 Google Books Ngram Viewer chart for “technology,” 1600–2000, English corpus.

sciences” as well as “the application of such knowledge for practical purposes, esp. in industry, manufacturing.” As such, “technology” became synonymous with “mechanical (or useful or practical or industrial) arts.” Later in the nineteenth century, the word came also to refer to “the product of such application”: Technology was not only the branch of knowledge or the process employed to produce objects – not only *logos* – but the object itself, synonymous now also with “machine,” “machinery,” and “mechanism.”³ Drawing on the word’s etymological connection to hands-on production, these uses distinguished technology from science – whose Latin root is *scientia*, “knowledge” – on the basis of *application*. Science was theoretical and abstract; once its concepts were put to work in the realm of practical production and concrete objects, they became technology. If science could be “pure,” technology could not, since it depended by definition on its use in the real world.

Although the vastly expanded modern sense of “technology” entered the language with the onset of industrialization, the Ngram Viewer shows that it did not attain broad currency until the next century. Compare technology’s sudden upward trend in the twentieth century with the graphs for “science,” the discipline on which its definition depended, and our own discipline, “literature” (Figure 0.2). Throughout the twentieth century, science and literature remained relatively stable, both very frequently employed. Technology doesn’t register in the graph until the 1910s, but following an explosion of employment beginning in the 1950s, it catches up with both terms by the late 1980s and, if the finer movements of the

³ *OED*, “technology,” 4a, 4b, and 4c.

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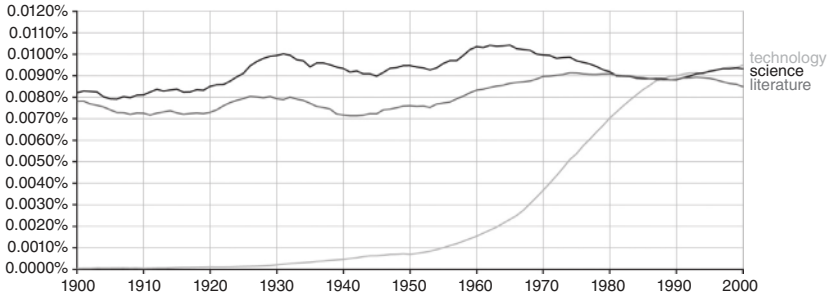


Figure 0.2 Google Books Ngram Viewer chart for “technology,” “science,” and “literature,” 1900–2000, English corpus.

graphs can be trusted, leaves literature behind, keeping pace with and occasionally surpassing science.

What explains our increasing obsession with technology – our growing interest in applied as opposed to abstract science? As the word rode its upward slope in the second half of the twentieth century, numerous theories were advanced. In his under-appreciated *Television: Technology and Cultural Form* (1975), Raymond Williams explains the shift in terms of a social phenomenon he calls “mobile privatization.”⁴ In the course of the nineteenth and early twentieth centuries, he argues, populations became increasingly mobile – moving from the country to the city – yet also increasingly isolated in a home-centered lifestyle. Technology – particularly communications technology – filled the need to connect the isolated household with the dispersed kinship network. As populations became increasingly atomized and increasingly mobile, the mediating function of technology increased proportionally, and our fascination grew through intimacy; whereas “science” remained in the laboratory and the classroom, technology came to mediate the most basic activities of everyday life. In an analogous argument in *The Machine in the Garden: Technology and the Pastoral Ideal* (1964), Leo Marx explains the rising interest in technology as a response to the increasing sense of alienation from nature that accompanied urbanization.⁵ Drawing on contemporaneous philosophers such as Herbert Marcuse and Martin Heidegger and sociologists such as Lewis

⁴ Raymond Williams, *Television: Technology and Cultural Form* (London: Routledge, 1990), 26ff.

⁵ Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964). Marx defines his position in “American Literary Culture and the Fatalistic View of Technology,” *The Pilot and the Passenger: Essays on Literature, Technology, and Culture in the United States* (New York: Oxford University Press, 1988), 179–207.

Mumford and Jacques Ellul, Marx describes a process by which “technology” – which by this time could be used to refer to anything from a body of knowledge (as in the Massachusetts Institute of Technology) to an industrial process to the machines such processes produced – became conventionalized as the opposite of the natural. As such, Marx argues, technology became an object of paranoid fascination that could be used to explain the repressed, dehumanized, dissatisfied condition of the 1960s. Toward the end of the century, Bernard Stiegler offered an explanation that resisted the narratives of rapid change and sudden transformation presented by Williams and Marx. In *Technics and Time, 1: The Fault of Epimetheus* (1994), Stiegler rejects the notion of a split between technology and nature, arguing for an “originary technicity” of the human, by which we have always depended on and “co-evolved” with our tools.⁶ Whatever the rising *interest* in technology, he argues, we are no more “technological” today than at any other point in our history.

More common than such explanations of the *causes* of the rising interest in technology, however, have been investigations of its *effects*. Since the word attained its modern sense, commentators have been less interested in why we are so fascinated with technology than in predicting where our fascination will land us. As early as the mid-nineteenth century, long before the word “technology” entered widespread use, bold predictions of the social effects of new machines began to circulate. In his essay “Signs of the Times” (1829), Thomas Carlyle argued that in the “Mechanical Age,” industrial processes had come to regulate not only “modes of action” but also “modes of thought and feeling”: “Men are grown mechanical in head and in heart as well as in hand.”⁷ In an early example of what would come to be known as technological determinism, Karl Marx wrote in *The Poverty of Philosophy* (1847) that “The hand-mill gives you society with the feudal lord; the steam-mill society with the industrial capitalist.”⁸ Such determinist accounts dominated discussion of technology in the period of its rapid rise in the second half of the twentieth century. In works such as *Understanding Media* (1964), Marshall McLuhan advanced an influential theory whereby shifts in communications technologies alter subjective “sense ratios” and thereby alter the fundamental categories of individual thought and identity. For McLuhan, media technologies “work us over

⁶ Bernard Stiegler, *Technics and Time 1: The Fault of Epimetheus*, trans. George Collins and Richard Beardsworth (Stanford, CA: Stanford University Press, 1998).

⁷ Thomas Carlyle, “Signs of the Times,” *The Edinburgh Review* 49 (1829): 439–459.

⁸ Karl Marx, *The Poverty of Philosophy* (London: Martin Lawrence, [1847] n.d.), 92.

completely”; in particular, the shifts from orality to writing and writing to print brought about corresponding shifts from “tribal” identity and magic to individualism and rationality, which, he prophesied, the new technology of television would reverse.⁹ Elizabeth Eisenstein’s *The Printing Press as an Agent of Change* (1979) developed McLuhan’s notion, changing focus from the psychological to the world-historical to argue that the defining functions of print – the standardization, preservation, and dissemination of knowledge – made the Protestant Reformation, the Renaissance, and the Scientific Revolution inevitable.¹⁰ Such determinist accounts of the effects of communications technologies remain widespread, from Friedrich Kittler’s pronouncement that “media determine our situation” to Marc N. B. Hansen’s more modest reworking, “media *are* our situation.”¹¹

Increasingly, however, leading thinkers have pushed back against what they regard as a simplistic and misleading account of the social effects of technology. In *Television*, Williams argues that determinism overlooks the crucial role of human intention in the development and implementation of communications technologies. Technology, in his view, does not emerge autonomously but is always “looked for and developed with certain purposes and practices in mind.”¹² McLuhan’s procedure of working backward from present effects to technological causes, Williams argues, serves to “ratif[y] the society and culture we now have” and to “desocializ[e]” all “media operations.”¹³ In *The Nature of the Book* (1998) and elsewhere, Adrian Johns has mounted a similarly forceful argument against Eisenstein’s determinist account of the “print revolution.” Focusing on the new social and economic structures that needed to be developed before print could contribute to any “revolution,” Johns argues that “the nature of the printed book emerged from social machinery as much as from technological.”¹⁴ In *The Letters of the Republic* (1990), Michael Warner argues against the “retrodetermination” of McLuhan and Eisenstein on the basis that its appeal

⁹ Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw Hill, 1964) and Marshall McLuhan, Quentin Fiore, and Jerome Agel, *The Medium Is the Massage: An Inventory of Effects* (New York: Random House, 1967).

¹⁰ Elizabeth L. Eisenstein, *The Printing Press as an Agent of Change* (Cambridge: Cambridge University Press, 1979).

¹¹ Friedrich Kittler, “Preface to *Gramophone, Film, Typewriter*,” in *Literature, Media, Information Systems: Essays*, ed. John Johnston, trans. Stefanie Harris (Amsterdam: G+B Arts, 1985), 28. Mark B. N. Hansen, “Media Studies,” in *The Routledge Companion to Literature and Science*, ed. Bruce Clarke and Manuela Rossini (London: Routledge, 2011), 360.

¹² Williams, *Technology*, 14.

¹³ *Ibid.*, 127.

¹⁴ Adrian Johns, “The Coming of Print to Europe,” in *The Cambridge Companion to the History of the Book*, ed. Leslie Howsam (Cambridge: Cambridge University Press, 2015), 119.

to “the agency of print upon culture” falsely presupposes that technology and culture are “distinct entities.”¹⁵ Warner argues instead for a model of “*reciprocal* determination” that takes into account both the social effects of new technologies and the social effects *on* technological development, “always with an eye to their changing mutual determination.”¹⁶ In a late essay, Leo Marx warned of the growing tendency to seek solutions to social problems in technology rather than in deliberate human action, declaring technology a “hazardous concept” that in practice “relieves the citizenry of onerous decision-making obligations and intensifies their gathering sense of political impotence.”¹⁷ For Marx as for Williams, Johns, and Warner, this dangerous situation results from an attitude that “consign[s] technologies to the realms of things” rather than approaching them through the “human relations” that structure their uses and ends.¹⁸

As this summary suggests, literary scholars have contributed tremendously to contemporary understanding of the origins and tendencies of our technological society. They have perhaps been able to take this leading role because their object of study, literature, has been so profoundly shaped and affected by developments in communications technology. As writers from Marshall McLuhan to Benedict Anderson have noted, the book, still the most familiar literary medium, was the first mass-produced industrial commodity. With the successive inventions of writing, the scroll, the printing press, the steam press, electronic media, and the digital computer – some of the most significant technological developments in history – literature and the literary experience have changed palpably. Further, literature is not only conspicuous in its technological mediation, but is also productively understood *as* a technology. For Walter Ong, all writing must be seen as technological because it requires, at minimum, the use of numerous “artificial” tools and implements such as styli, paper, and ink.¹⁹ Clare Pettitt sees literature as “a tool for the organization of the experience of human life, and for the invention of meaning.”²⁰ Nicholas Dames argues that the genre of the novel in particular is “a machine

¹⁵ Michael Warner, *The Letters of the Republic: Publication and the Public Sphere in Eighteenth-Century America* (Cambridge, MA: Harvard University Press, 1990), 9, 6. Emphasis in original.

¹⁶ *Ibid.*, xii.

¹⁷ Leo Marx, “Technology: The Emergence of a Hazardous Concept,” *Technology and Culture* 51.3 (July 2010): 576–577.

¹⁸ *Ibid.*, 576.

¹⁹ Walter J. Ong, *Orality and Literacy: The Technologizing of the Word* (London: Routledge, 2012), 80–82.

²⁰ Clare Pettitt, “‘The Annihilation of Space and Time’: Literature and Technology,” in *The Cambridge History of Victorian Literature*, ed. Kate Flint (Cambridge: Cambridge University Press, 2012), 571.

constructed to make its reader feel through an only slightly variable, and possibly perfectable, series of events.”²¹ Literary studies have been so attuned to technology because literature is so inescapably technological: produced by machines, distributed by machines, read through machines, itself a machine.

The emphasis on technology is not new in literary studies, but it has become a particular focus in recent years. If Thomas Carlyle can be seen as representing a first phase of interest in literature and technology, Walter Benjamin and other modernists as initiating a second, and Leo Marx, Marshall McLuhan, and Raymond Williams as constituting a third, the advent of our own digital age has brought renewed attention to the subject. Perhaps the most conspicuously technological approach to literature has been that of Digital Literary Studies, a subdiscipline of the Digital Humanities that uses quantitative methods and computational models to study literary history and style, produce archives and digital editions, and theorize new digital literary genres. Literature and Science, a relatively new “interdiscipline” concerned with overlaps and resonances between the two fields,²² has likewise demonstrated an interest in technology, despite privileging traditional scientific disciplines. Another thriving discipline concerned with literary technology is Book History, practitioners of which – Eisenstein, Warner, and Johns among them – have made major contributions to historical understandings of the relationship between technology, literature, culture, and society. Media Studies, descended from McLuhan’s technology-focused approach, has emerged as an important sister discipline to literary studies. “Mainstream,” historically focused literary studies has experienced a technological turn of its own. In their 2008 *PMLA* report on the state of my own discipline, Modernist Studies, Douglas Mao and Rebecca Walkowitz point to exemplary work such as Todd Avery’s *Radio Modernism* in order to argue that “attention to [modernist] technologies” – particularly the role that mass communications play in promoting global and transnational ways of thinking and writing – represented a vibrant new direction in the field.²³ In the ensuing years, this trend has only continued, and the pattern has been repeated in every historical field of literary studies.

²¹ Nicholas Dames, *The Physiology of the Novel: Reading, Neural Science, and the Form of Victorian Fiction* (Oxford: Oxford University Press, 2007), 57–58.

²² Cf. Martin Willis, *Literature and Science: A Reader’s Guide to Essential Criticism* (London: Palgrave, 2015), 1.

²³ Douglas Mao and Rebecca Walkowitz, “The New Modernist Studies,” *PMLA* 123.3 (May 2008): 742–745.

While the recent interest in literature and technology has been intense, it has been dispersed between fields that are seldom in conversation, and none of these fields has individually taken on the subject in its full breadth. Within Digital Literary Studies, the question of technology has proven divisive; in particular, the much-debated “hack versus yack” controversy has pitted keen users and developers of new digital technologies (generally those practicing computational text analysis, who “build code”) against those who wish to theorize and often resist digital technologies (generally those who come from a Media Studies background, who “break code”). Book History has arguably made the greatest contribution to the analysis of literature and technology of any single discipline, yet technology is only one focus among many – with activities such as critical editing and analytic bibliography only incidentally concerned with the subject – while the history of *literary* books is a consistent but not an exclusive focus. While Science and Technology Studies and its more recent offshoot Technology Studies have proven fruitful sources of theoretical models for studying the social lives of literary texts, the disciplines themselves are not concerned with literature.²⁴ The interdiscipline of Literature and Science, as its name implies, has tended to focus on science rather than technology. Although Bruno Latour and others have disputed the notion of a clear separation between science and technology, preferring the hybrid term *technoscience*, the scholarship emerging from Literature and Science demonstrates the continued relevance of the distinction. Critics such as Charlotte Sleight and Martin Willis have argued that Literature and Science too often treats science as prior to and separate from literature: On the one hand, this scholarship dutifully notes the “science bits” in literary texts in order to present “a one-way process by which literary writers reflect the metaphors of science”;²⁵ on the other, it calls for a “dialogue” between literary and scientific texts that it thereby posits as belonging to separate spheres.²⁶ Whereas a focus on *science* and literature leads inevitably to such oppositions, the focus on *technology* and literature does not. This is because while literature is not a science, it *is* a technology. The study of Literature and Science, a separate discipline, tends to lead away from literature itself. Because literature can be understood as a technology – and since it is produced, distributed, and mediated technologically – the study of literature

²⁴ Rather than analyze literature, Science and Technology Studies applies hermeneutic methods informed by literary studies and literary theory, treating scientific works and the discipline of science itself as texts.

²⁵ Charlotte Sleight, *Literature and Science* (London: Palgrave Macmillan, 2011), x.

²⁶ Willis, *Literature and Science*, 1.

and technology brings ever closer focus to the culture, nature, and reception of literary texts.

Cambridge Critical Concepts: Technology and Literature does not, then, announce the creation of a new field. Instead, it gathers technologically focused work from a variety of subfields of literary studies – work that, although collectively constituting the most exciting and progressive research in the field today, has yet to be placed in conversation.

Part I, “Origins,” draws together scholars of literature, Book History, and Media Studies to tell the story of how literature “co-evolved” with communications technologies – how new technologies such as the scroll, the printing press, and the digital computer reshaped the literary communications circuit, and how these technologies were in turn shaped by the needs and desires of writers, printers, publishers, booksellers, and readers. As becomes clear from I. J. MacRae’s “Orality and Writing” (Chapter 1), in tracing the mutual impact of literature and key literary technologies, the chapters in this section resist the widespread tendency to read media history as a teleological progression that naturalizes and justifies our present-day media environment. Pushing against standard scholarly accounts of the triumph of print that have served to provide “an intellectual bulwark for imperialism and colonialism” — what he calls “romances of technological ascension” – MacRae positions orality and oral performance as rich and generative technologies whose complex affordances are impossible to render in other media: Writing and printing, he argues, “impact literature and culture” primarily “by leaving things out: gestures, colors, coughs, shouts, and murmurs, the sound of falling rain: the entire three-dimensional world of human experience.”

Several chapters from Part I take on another technology too often left behind in scholarly accounts of technological progress: the human body. In “Manuscript” (Chapter 2), Bonnie Mak presents the human hand – which “supports the production and circulation of ideas in manuscript, printed, digital, and other forms” – as central to all textual transmission, “whether it be scribes who took dictation in antiquity, stonemasons who fashioned the inkstones to the world of scholarship and art in China, or the legions of students and overseas workers who manually transcribe and encode literary, medical, and other texts in service of their digital use.” Writing on “The Hand Press” (Chapter 3), Paula McDowell similarly argues for approaches that consider the human body as an essential literary technology; indeed, her approach to the long history of the hand-operated press makes us question any neat separation of body and machine. Hand-printed works, she argues, are the product neither of a

human or a of mere tool, but the two formed into a hybrid: “neither a printing press nor a hand can produce a printed text,” McDowell argues, “but together, machine and worker can and do.” In “Typewriters” (Chapter 5), Darren Wershler makes the case for the typewriter as an “assemblage”: a series of technologies, techniques, and discourses that work together to shape the expressive pathways in which humans express and constitute their subjectivities. The history of hand-made literature shows us that technology is not categorically exterior to the human, but is rather an essential, defining dimension of it.

The chapters in Part I also explore the way that literary technologies have increasingly served to break down another border: that between literature and the other arts. In “The Mechanical Press” (Chapter 4), Simon Reader shows that any scholarly investigation of the literary legacy of steam-driven presses must leave behind narrow disciplinary boundaries: “Literary scholars wishing to assert the importance of machine printing,” Reader argues, “must necessarily place texts in relation not only to other works of literature but also to competing media: journalism, advertising, and other products of the print industry.” Lise Jaillant’s “Literature in the Electric Age” (Chapter 6) focuses not on a particular literary technology, but on the shifts in the literary field that occurred in response to the threat of obsolescence at the hands of competing media such as film and television. Adapting marketing techniques from those media, and capitalizing on new formats such as the paperback, the literary field broadened to expand its appeal to an ever-widening “middlebrow” reading public. By the 1930s, Jaillant argues, these developments in format and marketing had effectively broken down any rigid dividing line between “literary” and “nonliterary” reading publics, so that advertisements for a bestseller such as Pearl S. Buck’s *The Good Earth* and James Joyce’s modernist classic *Ulysses* could appear side by side. Closing Part I, Maxwell Foxman argues in “Digital Text” (Chapter 7) that developments in the digital representation of texts have continued to challenge divisions long held to be immutable – not least those separating content, author, and reading. As we arrive in the digital present, Foxman argues, we are left questioning all our traditional beliefs about what text is.

Part II, “Developments,” draws on period-focused literary scholarship as well as Media Studies, Literature and Science, Disability Studies, and Postcolonial Studies to investigate how literary texts have served to frame public understanding of new nonliterary technologies such as clocks, telescopes, steam engines, and computer networks. Drawing on Williams, Johns, and Warner, the chapters in this section show how