Week 6

Mediated Communication

"On the Internet, nobody knows you're a dog."

From cartoonbank.com

Question: Consider the extent to which different electronic communication technologies such as email, SMS, social networking spaces like Facebook and Twitter merely replace traditional forms of communication. Do they change the nature of the communication experience?

of the Electronic Age," a 1952 article he wrote for *Popular Mechanics*, he crowed about his creation of the Audion, referring to it as "this small acorn from which has sprung the gigantic oak that is today world-embracing." At the same time, he lamented the "moral depravity" of commercial broadcast media. "A melancholy view of our national mental level is obtained from a survey of the moronic quality of the majority of today's radio programs," he wrote.

Looking ahead to future applications of electronics, he grew even gloomier. He believed that "electron physiologists" would eventually be able to monitor and analyze "thought or brain waves," allowing "joy and grief [to] be measured in definite, quantitative units." Ultimately, he concluded, "a professor may be able to implant knowledge into the reluctant brains of his 22nd-century pupils. What terrifying political possibilities may be lurking there! Let us be thankful that such things are only for posterity, not for us."[3]

From Carr, N (2010) The Shallows: What the Internet is doing to our Brains London, Norton AD 81-98

Five

A MEDIUM OF THE MOST GENERAL NATURE

In the spring of 1954, as the first digital computers were moving into mass production, the brilliant British mathematician Alan Turing killed himself by eating a cyanide-laced apple—a piece of fruit that had been plucked at incalculable cost, the act begs us to conclude, from the tree of knowledge. Turing, who displayed throughout his short life what one biographer calls an "otherworldly innocence,"[1] had during the Second World War played a crucial part in cracking the codes of Enigma, the elaborate typewriter that the Nazis used to encipher and decipher military commands and other sensitive messages. The breaking of Enigma was an epic achievement that helped turn the tide of the war and ensure an Allied victory, though it didn't save Turing from the humiliation of being arrested, a few years later, for having sex with another man.

Today, Alan Turing is best remembered as the creator of an imaginary computing device that anticipated, and served as a blueprint for, the modern computer. He was just twenty-four, a recently elected fellow at Cambridge University, when he introduced what would come to be called the Turing machine in a 1936 paper enti-

tled "On Computable Numbers, with an Application to the Entscheidungsproblem." Turing's intent in writing the paper was to show that there is no such thing as a perfect system of logic or mathematics—that there will always be some statements that cannot be proven either true or false, that will remain "uncomputable." To help prove the point, he conjured up a simple, digital calculator able to follow coded instructions and to read, write, and erase symbols. Such a computer, he demonstrated, could be programmed to perform the function of any other information-processing device. It was a "universal machine."[2]

In a later paper, "Computing Machinery and Intelligence," Turing explained how the existence of programmable computers "has the important consequence that, considerations of speed apart, it is unnecessary to design various new machines to do various computing processes. They can all be done with one digital computer, suitably programmed for each case." What that means, he concluded, is that "all digital computers are in a sense equivalent."[3] Turing was not the first person to imagine how a programmable computer might work—more than a century earlier, another English mathematician, Charles Babbage, had drawn up plans for an "analytical engine" that would be "a machine of the most general nature"[4]—but Turing seems to have been the first to understand the digital computer's limitless adaptability.

What he could not have anticipated was the way his universal machine would, just a few decades after his death, become our universal medium. Because the different sorts of information distributed by traditional media—words, numbers, sounds, images, moving pictures—can all be translated into digital code, they can all be "computed." Everything from Beethoven's Ninth to a porn flick can be reduced to a string of ones and zeros and processed, transmitted, and displayed or played by a computer. Today, with the Internet, we're seeing firsthand the extraordinary implications of Turing's discovery. Constructed of millions of interconnected computers and data banks, the Net is a Turing machine of immeasurable power, and

it is, true to form, subsuming most of our other intellectual technologies. It's becoming our typewriter and our printing press, our map and our clock, our calculator and our telephone, our post office and our library, our radio and our TV. It's even taking over the functions of other computers; more and more of our software programs run through the Internet—or "in the cloud," as the Silicon Valley types say—rather than inside our home computers.

As Turing pointed out, the limiting factor of his universal machine was speed. Even the earliest digital computer could, in theory, do any information-processing job, but a complicated task—rendering a photograph, say—would have taken it far too long, and cost far too much, to be practicable. A guy in a darkroom with trays of chemicals could do the work much more quickly and cheaply. Computing's speed limits, though, turned out to be only temporary obstacles. Since the first mainframe was assembled in the 1940s, the speed of computers and data networks has increased at a breakneck pace, and the cost of processing and transmitting data has fallen equally rapidly. Over the past three decades, the number of instructions a computer chip can process every second has doubled about every three years, while the cost of processing those instructions has fallen by almost half every year. Overall, the price of a typical computing task has dropped by 99.9 percent since the 1960s.[5] Network bandwidth has expanded at an equally fast clip, with Internet traffic doubling, on average, every year since the World Wide Web was invented.[6] Computer applications that were unimaginable in Turing's day are now routine.

The way the Web has progressed as a medium replays, with the velocity of a time-lapse film, the entire history of modern media. Hundreds of years have been compressed into a couple of decades. The first information-processing machine that the Net replicated was Gutenberg's press. Because text is fairly simple to translate into software code and to share over networks—it doesn't require a lot of memory to store, a lot of bandwidth to transmit, or a lot of processing power to render on a screen—early Web sites were usually con-

structed entirely of typographical symbols. The very term we came to use to describe what we look at online—*pages*—emphasized the connection with printed documents. Publishers of magazines and newspapers, realizing that large quantities of text could, for the first time in history, be broadcast the way radio and TV programs had always been, were among the first businesses to open online outlets, posting articles, excerpts, and other pieces of writing on their sites. The ease with which words could be transmitted led, as well, to the widespread and extraordinarily rapid adoption of e-mail, rendering the personal letter obsolete.

As the cost of memory and bandwidth fell, it became possible to incorporate photographs and drawings into Web pages. At first, the images, like the text they often accompanied, were in black and white, and their low resolution made them blurry. They looked like the first photos printed in newspapers a hundred years ago. But the capacity of the Net expanded to handle color pictures, and the size and quality of the images increased enormously. Soon, simple animations began to play online, mimicking the herky-jerky motions of the flip books, or kineographs, that were popular at the end of the nineteenth century.

Next, the Web began to take over the work of our traditional sound-processing equipment—radios and phonographs and tape decks. The earliest sounds to be heard online were spoken words, but soon snippets of music, and then entire songs and even symphonies, were streaming through sites, at ever-higher levels of fidelity. The network's ability to handle audio streams was aided by the development of software algorithms, such as the one used to produce MP3 files, that erase from music and other recordings sounds that are hard for the human ear to hear. The algorithms allowed sound files to be compressed to much smaller sizes with only slight sacrifices in quality. Telephone calls also began to be routed over the fiber-optic cables of the Internet, bypassing traditional phone lines.

Finally, video came online, as the Net subsumed the technologies of cinema and television. Because the transmission and display of

moving pictures place great demands on computers and networks, the first online videos played in tiny windows inside browsers. The pictures would often stutter or drop out, and they were usually out of sync with their soundtracks. But here, too, gains came swiftly. Within just a few years, elaborate three-dimensional games were being played online, and companies like Netflix and Apple were sending high-definition movies and TV shows over the network and onto screens in customers' homes. Even the long-promised "picture phone" is finally becoming a reality, as webcams become a regular feature of computers and Net-connected televisions, and popular Internet telephone services like Skype incorporate video transmissions.

THE NET DIFFERS from most of the mass media it replaces in an obvious and very important way: it's bidirectional. We can send messages through the network as well as receive them. That's made the system all the more useful. The ability to exchange information online, to upload as well as download, has turned the Net into a thoroughfare for business and commerce. With a few clicks, people can search virtual catalogues, place orders, track shipments, and update information in corporate databases. But the Net doesn't just connect us with businesses; it connects us with one another. It's a personal broadcasting medium as well as a commercial one. Millions of people use it to distribute their own digital creations, in the form of blogs, videos, photos, songs, and podcasts, as well as to critique, edit, or otherwise modify the creations of others. The vast, volunteer-written encyclopedia Wikipedia, the largely amateur-produced YouTube video service, the massive Flickr photo repository, the sprawling Huffington Post blog compendium—all of these popular media services were unimaginable before the Web came along. The interactivity of the medium has also turned it into the world's meetinghouse, where people gather to chat, gossip, argue, show off, and flirt on Facebook, Twitter, MySpace, and all sorts of other social (and sometimes antisocial) networks.

As the uses of the Internet have proliferated, the time we devote to the medium has grown apace, even as speedier connections have allowed us to do more during every minute we're logged on. By 2009, adults in North America were spending an average of twelve hours online a week, double the average in 2005.[7] If you consider only those adults with Internet access, online hours jump considerably, to more than seventeen a week. For younger adults, the figure is higher still, with people in their twenties spending more than nineteen hours a week online.[8] American children between the ages of two and eleven were using the Net about eleven hours a week in 2009, an increase of more than sixty percent since 2004.[9] The typical European adult was online nearly eight hours a week in 2009, up about thirty percent since 2005. Europeans in their twenties were online about twelve hours a week on average.[10] A 2008 international survey of 27,500 adults between the ages of eighteen and fifty-five found that people are spending thirty percent of their leisure time online, with the Chinese being the most intensive surfers, devoting forty-four percent of their off-work hours to the Net.[11]

These figures don't include the time people spend using their mobile phones and other handheld computers to exchange text messages, which also continues to increase rapidly. Text messaging now represents one of the most common uses of computers, particularly for the young. By the beginning of 2009, the average American cell phone user was sending or receiving nearly 400 texts a month, more than a fourfold increase from 2006. The average American teen was sending or receiving a mind-boggling 2,272 texts a month.[12] Worldwide, well over two trillion text messages zip between mobile phones every year, far outstripping the number of voice calls.[13] Thanks to our ever-present messaging systems and devices, we "never really have to disconnect," says Danah Boyd, a social scientist who works for Microsoft.[14]

It's often assumed that the time we devote to the Net comes out of the time we would otherwise spend watching TV. But statistics suggest otherwise. Most studies of media activity indicate that as

Net use has gone up, television viewing has either held steady or increased. The Nielsen Company's long-running media-tracking survey reveals that the time Americans devote to TV viewing has been going up throughout the Web era. The hours we spend in front of the tube rose another two percent between 2008 and 2009, reaching 153 hours a month, the highest level since Nielsen began collecting data in the 1950s (and that doesn't include the time people spend watching TV shows on their computers).[15] In Europe as well, people continue to watch television as much as they ever have. The average European viewed more than a dozen hours of TV a week in 2009, nearly an hour more than in 2004..[16]

A 2006 study by Jupiter Research revealed "a huge overlap" between TV viewing and Web surfing, with forty-two percent of the most avid TV fans (those watching thirty-five or more hours of programming a week) also being among the most intensive users of the Net (those spending thirty or more hours online a week).[17] The growth in our online time has, in other words, expanded the total amount of time we spend in front of screens. According to an extensive 2009 study conducted by Ball State University's Center for Media Design, most Americans, no matter what their age, spend at least eight and a half hours a day looking at a television, a computer monitor, or the screen of their mobile phone. Frequently, they use two or even all three of the devices simultaneously.[18]

What does seem to be decreasing as Net use grows is the time we spend reading print publications—particularly newspapers and magazines, but also books. Of the four major categories of personal media, print is now the least used, lagging well behind television, computers, and radio. By 2008, according to the U.S. Bureau of Labor Statistics, the time that the average American over the age of fourteen devoted to reading printed works had fallen to 143 minutes a week, a drop of eleven percent since 2004. Young adults between the ages of twenty-five and thirty-four, who are among the most avid Net users, were reading printed works for a total of just forty-nine minutes a week in 2008, down a precipitous twenty-nine percent

from 2004.[19] In a small but telling 2008 study conducted for *Adweek* magazine, four typical Americans—a barber, a chemist, an elementary school principal, and a real estate agent—were shadowed during the course of a day to document their media usage. The people displayed very different habits, but they shared one thing in common, according to the magazine: "None of the four cracked open any print media during their observed hours."[20] Because of the ubiquity of text on the Net and our phones, we're almost certainly reading more words today than we did twenty years ago, but we're devoting much less time to reading words printed on paper.

The Internet, like the personal computer before it, has proven to be so useful in so many ways that we've welcomed every expansion of its scope. Rarely have we paused to ponder, much less question, the media revolution that has been playing out all around us, in our homes, our workplaces, our schools. Until the Net arrived, the history of media had been a tale of fragmentation. Different technologies progressed down different paths, leading to a proliferation of special-purpose tools. Books and newspapers could present text and images, but they couldn't handle sounds or moving pictures. Visual media like cinema and TV were unsuited to the display of text, except in the smallest of quantities. Radios, telephones, phonographs, and tape players were limited to transmitting sounds. If you wanted to add up numbers, you used a calculator. If you wanted to look up facts, you consulted a set of encyclopedias or a *World Almanac*. The production end of the business was every bit as fragmented as the consumption end. If a company wanted to sell words, it printed them on paper. If it wanted to sell movies, it wound them onto spools of film. If it wanted to sell songs, it pressed them onto vinyl records or recorded them onto magnetic tape. If it wanted to distribute TV shows and commercials, it shot them through the air from a big antenna or sent them down thick black coaxial cables.

Once information is digitized, the boundaries between media dissolve. We replace our special-purpose tools with an all-purpose tool. And because the economics of digital production and distribution are almost always superior to what came before—the cost of creating electronic products and transmitting them through the Net is a small fraction of the cost of manufacturing physical goods and shipping them through warehouses and into stores—the shift happens very quickly, following capitalism's inexorable logic. Today, nearly all media companies distribute digital versions of their products through the Net, and the growth in the consumption of media goods is taking place almost entirely online.

That doesn't mean that traditional forms of media have disappeared. We still buy books and subscribe to magazines. We still go to the movies and listen to the radio. Some of us still buy music on CDs and movies on DVDs. A few of us will even pick up a newspaper now and then. When old technologies are supplanted by new ones, the old technologies often continue to be used for a long time, sometimes indefinitely. Decades after the invention of movable type, many books were still being handwritten by scribes or printed from woodblocks—and some of the most beautiful books continue to be produced in those ways today. Quite a few people still listen to vinyl records, use film cameras to take photographs, and look up phone numbers in the printed Yellow Pages. But the old technologies lose their economic and cultural force. They become progress's dead ends. It's the new technologies that govern production and consumption, that guide people's behavior and shape their perceptions. That's why the future of knowledge and culture no longer lies in books or newspapers or TV shows or radio programs or records or CDs. It lies in digital files shot through our universal medium at the speed of light.

"A NEW MEDIUM is never an addition to an old one," wrote McLuhan in *Understanding Media*, "nor does it leave the old one in peace. It never ceases to oppress the older media until it finds new shapes and positions for them."[21] His observation rings particularly true today. Traditional media, even electronic ones, are being refashioned and repositioned as they go through the shift to online distribution.

When the Net absorbs a medium, it re-creates that medium in its own image. It not only dissolves the medium's physical form; it injects the medium's content with hyperlinks, breaks up the content into searchable chunks, and surrounds the content with the content of all the other media it has absorbed. All these changes in the form of the content also change the way we use, experience, and even understand the content.

A page of online text viewed through a computer screen may seem similar to a page of printed text. But scrolling or clicking through a Web document involves physical actions and sensory stimuli very different from those involved in holding and turning the pages of a book or a magazine. Research has shown that the cognitive act of reading draws not just on our sense of sight but also on our sense of touch. It's tactile as well as visual. "All reading," writes Anne Mangen, a Norwegian literary studies professor, is "multi-sensory." There's "a crucial link" between "the sensory-motor experience of the materiality" of a written work and "the cognitive processing of the text content."[22] The shift from paper to screen doesn't just change the way we navigate a piece of writing. It also influences the degree of attention we devote to it and the depth of our immersion in it.

Hyperlinks also alter our experience of media. Links are in one sense a variation on the textual allusions, citations, and footnotes that have long been common elements of documents. But their effect on us as we read is not at all the same. Links don't just point us to related or supplemental works; they propel us toward them. They encourage us to dip in and out of a series of texts rather than devote sustained attention to any one of them. Hyperlinks are designed to grab our attention. Their value as navigational tools is inextricable from the distraction they cause.

The searchability of online works also represents a variation on older navigational aids such as tables of contents, indexes, and concordances. But here, too, the effects are different. As with links, the ease and ready availability of searching make it much simpler to jump between digital documents than it ever was to jump between printed

ones. Our attachment to any one text becomes more tenuous, more provisional. Searches also lead to the fragmentation of online works. A search engine often draws our attention to a particular snippet of text, a few words or sentences that have strong relevance to whatever we're searching for at the moment, while providing little incentive for taking in the work as a whole. We don't see the forest when we search the Web. We don't even see the trees. We see twigs and leaves. As companies like Google and Microsoft perfect search engines for video and audio content, more products are undergoing the fragmentation that already characterizes written works.

By combining many different kinds of information on a single screen, the multimedia Net further fragments content and disrupts our concentration. A single Web page may contain a few chunks of text, a video or audio stream, a set of navigational tools, various advertisements, and several small software applications, or "widgets," running in their own windows. We all know how distracting this cacophony of stimuli can be. We joke about it all the time. A new e-mail message announces its arrival as we're glancing over the latest headlines at a newspaper's site. A few seconds later, our RSS reader tells us that one of our favorite bloggers has uploaded a new post. A moment after that, our mobile phone plays the ringtone that signals an incoming text message. Simultaneously, a Facebook or Twitter alert blinks on-screen. In addition to everything flowing through the network, we also have immediate access to all the other software programs running on our computers—they, too, compete for a piece of our mind. Whenever we turn on our computer, we are plunged into an "ecosystem of interruption technologies," as the blogger and science fiction writer Cory Doctorow terms it.[23]

Interactivity, hyperlinking, searchability, multimedia—all these qualities of the Net bring attractive benefits. Along with the unprecedented volume of information available online, they're the main reasons that most of us are drawn to using the Net so much. We like to be able to switch between reading and listening and watching without having to get up and turn on another appliance or dig

through a pile of magazines or disks. We like to be able to find and be transported instantly to relevant data—without having to sort through lots of extraneous stuff. We like to be in touch with friends, family members, and colleagues. We like to feel connected—and we hate to feel disconnected. The Internet doesn't change our intellectual habits against our will. But change them it does.

Our use of the Net will only grow, and its impact on us will only strengthen, as it becomes ever more present in our lives. Like the clock and the book before it, the computer continues to get smaller and cheaper as technology advances. Inexpensive laptops gave us the ability to take the Internet with us when we left our office or our home. But the laptop was itself a cumbersome device, and connecting one to the Internet was not always easy. The introduction of the tiny netbook and the even tinier smartphone solves those problems. Powerful pocket-sized computers like the Apple iPhone, the Motorola Droid, and the Google Nexus One come bundled with Internet access. Along with the incorporation of Internet services into everything from car dashboards to televisions to the cabins of airplanes, these small devices promise to more deeply integrate the Web into our everyday activities, making our universal medium all the more universal.

As the Net expands, other media contract. By changing the economics of production and distribution, the Net has cut into the profitability of many news, information, and entertainment businesses, particularly those that have traditionally sold physical products. Sales of music CDs have fallen steadily over the last decade, dropping twenty percent in 2008 alone.[24] Sales of movie DVDs, a major recent source of profits for Hollywood studios, are also now in decline, falling six percent during 2008 and then plunging another fourteen percent during the first half of 2009.[25] Unit sales of greeting cards and postcards are dropping.[26] The volume of mail sent through the U.S. Postal Service declined at its fastest pace ever during 2009.[27] Universities are discontinuing the printed editions of scholarly monographs and journals and moving to strictly electronic distribution.[28] Public schools are pushing students

to use online reference materials in place of what California Governor Arnold Schwarzenegger refers to as "antiquated, heavy, expensive textbooks."[29] Everywhere you look, you see signs of the Net's growing hegemony over the packaging and flow of information.

Nowhere have the effects been so unsettling as in the newspaper industry, which faces particularly severe financial challenges as readers and advertisers embrace the Net as their medium of choice. The decline in Americans' newspaper reading began decades ago, when radio and TV began consuming more of peoples' leisure time, but the Internet has accelerated the trend. Between 2008 and 2009, newspaper circulation dropped more than seven percent, while visits to newspaper Web sites grew by more than ten percent.[30] One of America's oldest dailies, the *Christian Science Monitor*, announced in early 2009 that after a hundred years it was stopping its presses. The Web would become its main channel for distributing news. The move, said the paper's publisher, Jonathan Wells, was a harbinger of what lay in store for other newspapers. "Changes in the industry—changes in the concept of news and the economics underlying the industry—hit the *Monitor* first," he explained.[31]

He was soon proved correct. Within months, Colorado's oldest newspaper, the *Rocky Mountain News*, had gone out of business; the *Seattle Post-Intelligencer* had abandoned its print edition and fired most of its staff; the *Washington Post* had shut down all its U.S. bureaus and let more than a hundred journalists go; and the owners of more than thirty other U.S. newspapers, including the *Los Angeles Times*, *Chicago Tribune*, *Philadelphia Inquirer*, and *Minneapolis Star Tribune*, had filed for bankruptcy. Tim Brooks, the managing director of Guardian News and Media, which publishes *The Guardian* and *The Independent* in Britain, announced that all his company's future investments would go into multimedia digital products, mainly delivered through its Web sites. "The days when you can trade in just words are gone," he told an industry conference.[32]

AS PEOPLE'S MINDS become attuned to the crazy quilt of Web content, media companies have to adapt to the audience's new expectations. Many producers are chopping up their products to fit the shorter attention spans of online consumers, as well as to raise their profiles on search engines. Snippets of TV shows and movies are distributed through YouTube, Hulu, and other video services. Excerpts of radio programs are offered as podcasts or streams. Individual magazine and newspaper articles circulate in isolation. Pages of books are displayed through Amazon.com and Google Book Search. Music albums are split apart, their songs sold through iTunes or streamed through Spotify. Even the songs themselves are broken into pieces, with their riffs and hooks packaged as ringtones for cell phones or embedded in video games. There's much to be said for what economists call the "unbundling" of content. It provides people with more choices and frees them from unwanted purchases. But it also illustrates and reinforces the changing patterns of media consumption promoted by the Web. As the economist Tyler Cowen says, "When access [to information] is easy, we tend to favor the short, the sweet, and the bitty."[33]

The Net's influence doesn't end at the edge of a computer screen. Media companies are reshaping their traditional products, even the physical ones, to more closely resemble what people experience when they're online. If, in the early days of the Web, the design of online publications was inspired by print publications (as the design of Gutenberg's Bible was inspired by scribal books), today the inspiration tends to go in the opposite direction. Many magazines have tweaked their layouts to mimic or at least echo the look and feel of Web sites. They've shortened their articles, introduced capsule summaries, and crowded their pages with easy-to-browse blurbs and captions. *Rolling Stone*, once known for publishing sprawling, adventurous features by writers like Hunter S. Thompson, now eschews such works, offering readers a jumble of short articles and reviews. There was "no Internet," publisher Jann Wenner explains, "back when *Rolling Stone* was publishing these seven-thousand-word stories." Most popular magazines have come to be "filled with

color, oversized headlines, graphics, photos, and pull quotes," writes Michael Scherer in the *Columbia Journalism Review*. "The gray text page, once a magazine staple, has been all but banished."[34]

The design of newspapers is also changing. Many papers, including industry stalwarts like the *Wall Street Journal* and the *Los Angeles Times*, have over the last few years moved to trim the length of their articles and introduce more summaries and navigational aids to make the scanning of their contents easier. An editor at the *Times* of London attributes such format changes to the newspaper industry's adaptation to "an Internet age, a headline age."[35] In March of 2008, the *New York Times* announced it would begin devoting three pages of every edition to paragraph-long article abstracts and other brief items. Its design director, Tom Bodkin, explained that the "shortcuts" would allow harried readers to get a quick "taste" of the day's news, sparing them the "less efficient" method of actually turning the pages and reading the articles.[36]

Such copycat strategies haven't been particularly successful in stanching the flow of readers from print to online publications. After a year, during which its circulation continued to decline, the *New York Times* quietly abandoned much of its redesign, restricting article summaries to a single page in most editions. A few magazines, realizing that competing with the Web on its own terms is a losing proposition, have reversed their strategies. They've gone back to simpler, less cluttered designs and longer articles. *Newsweek* overhauled its pages in 2009, placing a greater emphasis on essays and professional photographs and adopting a heavier, more expensive paper stock. The price that publications pay for going against the conventions of the Web is a further whittling of their readership. When *Newsweek* unveiled its new design, it also announced it was slashing the circulation it guaranteed its advertisers from 2.6 million to 1.5 million.[37]

Like their print counterparts, most TV shows and movies are also trying to become more Web-like. Television networks have added text "crawls" and "flippers" to their screens and routinely run info-

graphics and pop-up ads during their programs. Some newer shows, such as NBC's *Late Night with Jimmy Fallon*, have been explicitly designed to cater as much to Net surfers as TV viewers, with an emphasis on brief segments that lend themselves to distribution as YouTube clips. Cable and satellite companies offer theme channels that enable viewers to watch several programs simultaneously, using their remote control as a kind of mouse to click between audio tracks. Web content is also beginning to be offered directly through TVs, as leading television manufacturers like Sony and Samsung redesign their sets to seamlessly combine Internet programming with traditional broadcasts. Movie studios have begun incorporating social-networking features into the disks they sell. With the Blu-ray version of Disney's *Snow White*, viewers can chat with one another through the Net while watching the seven dwarves march off to work. The disk of *Watchmen* automatically syncs with Facebook accounts, letting viewers exchange "live commentary" on the film with their "friends."[38] Craig Kornblau, the president of Universal Studios Home Entertainment, says the studio plans to introduce more such features, with the goal of turning the viewing of movies into "interactive experiences."[39]

The Net has begun to alter the way we experience actual performances as well as the recordings of those performances. When we carry a powerful mobile computer into a theater or other venue, we carry, as well, all the communication and social-networking tools available on the Web. It long ago became common for concertgoers to record and broadcast snippets of shows to friends through the cameras in their cell phones. Now, mobile computers are beginning to be deliberately incorporated into performances as a way to appeal to a new generation of Net-saturated patrons. During a 2009 performance of Beethoven's *Pastoral* Symphony at Wolf Trap in Virginia, the National Symphony Orchestra sent out a stream of Twitter tweets, written by conductor Emil de Cou, explaining some of Beethoven's musical references.[40] The New York Philharmonic and the Indianapolis Symphony Orchestra have begun encouraging audience members to use their phones to vote, via text messaging, for the evening's encore. "It was less passive than just sitting there and listening to music," commented an attendee after a recent Philharmonic performance.[41] A growing number of American churches are encouraging parishioners to bring laptops and smartphones to services in order to exchange inspirational messages through Twitter and other microblogging services.[42] Eric Schmidt, Google's chief executive, sees the incorporation of social networking into theatrical and other events as an exciting new business opportunity for Internet firms. "The most obvious use of Twitter," he says, can be seen in situations where "everybody is watching a play and are busy talking about the play while the play is under way."[43] Even the experiences we have in the real world are coming to be mediated by networked computers.

A particularly striking illustration of how the Net is reshaping our expectations about media can be seen in any library. Although we don't tend to think of libraries as media technologies, they are. The public library is, in fact, one of the most important and influential informational media ever created—and one that proliferated only after the arrival of silent reading and movable-type printing. A community's attitudes and preferences toward information take concrete shape in its library's design and services. Until recently, the public library was an oasis of bookish tranquility where people searched through shelves of neatly arranged volumes or sat in carrels and read quietly. Today's library is very different. Internet access is rapidly becoming its most popular service. According to recent surveys by the American Library Association, ninety-nine percent of U.S. public library branches provide Internet access, and the average branch has eleven public computers. More than three-quarters of branches also offer Wi-Fi networks for their patrons' use.[44] The predominant sound in the modern library is the tapping of keys, not the turning of pages.

The architecture of one of the newest branches of the venerable New York Public Library, the Bronx Library Center, testifies to the library's changing role. Writing in the journal *Strategy & Business*, three management consultants describe the building's layout: "On

the library's four main floors, the stacks of books have been placed at each end, leaving ample space in the middle for tables that have computers on them, many with broadband access to the Internet. The people using the computers are young and aren't necessarily using them for academic purposes—here is one doing a Google search on Hannah Montana pictures, there is one updating his Facebook page, and over there a few children are playing video games, including The Fight for Glorton. Librarians answer questions and organize online gaming tournaments, and none of them are shushing anyone."[45] The consultants point to the Bronx branch as an example of how forward-looking libraries are retaining their "relevance" by "launching new digital initiatives to meet users' needs." The library's layout provides, as well, a powerful symbol of our new media landscape: at the center stands the screen of the Internet-connected computer; the printed word has been pushed to the margins.

Six

THE VERY IMAGE OF A BOOK

And what of the book itself? Of all popular media, it's probably the one that has been most resistant to the Net's influence. Book publishers have suffered some losses of business as reading has shifted from the printed page to the screen, but the form of the book itself hasn't changed much. A long sequence of printed pages assembled between a pair of stiff covers has proven to be a remarkably robust technology, remaining useful and popular for more than half a millennium.

It's not hard to see why books have been slow to make the leap into the digital age. There's not a whole lot of difference between a computer monitor and a television screen, and the sounds coming from speakers hit your ears in pretty much the same way whether they're being transmitted through a computer or a radio. But as a device for reading, the book retains some compelling advantages over the computer. You can take a book to the beach without worrying about sand getting in its works. You can take it to bed without being nervous about it falling to the floor should you nod off. You can spill coffee on it. You can sit on it. You can put it down on a table, open to the page you're reading, and when you pick it up a few days