2000

The Internet Jitters: Lessons from Technology Revolutions Past

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Jitters indeed!

If Sven Birkerts prove himself a prophet, we had better learn to speak of convulsions and delirium. A few quotations from his 1994 book *The Gutenberg Elegies* will serve to outline, if not the particular ways in which civilization is collapsing at the hands of Nintendo machines, MTV, "ebooks," and the Internet, then perhaps at least the enormity of that apocalypse toward which we hie, like white-hot electrons coursing along superconductive circuits. I quote:

> The complexity and distinctiveness of spoken and written expression, which are deeply bound to traditions of print literacy, will gradually be replaced by a more telegraphic sort

of "plainspeak." [...] Simple linguistic prefab is now the norm, while ambiguity, paradox, irony, subtlety, and wit are fast disappearing ... Verbal intelligence, which has long been viewed as suspect as the act of reading, will come to seem positively conspiratorial. The greater part of any articulate person's energy will be deployed in dumbing down her discourse. (128-9)

Language will grow increasingly impoverished through a series of vicious cycles. Fewer and fewer people will be able to contend with the so-called masterworks of literature or ideas. Joyce, Woolf, Soyinka, not to mention the masters who preceded them, will go unread, and the civilizing energies of their prose will circulate aimlessly between closed covers. (129)

One day we will conduct our public and private lives within networks so dense, among so many channels of instantaneous information, that it will make almost no sense to speak of the differentiations of subjective individualism. [...] We will bring our terminals, our modems, and menus further and further into our former privacies; we will implicate ourselves by degrees in the unitary life, and there may come a day when we no longer remember that there was any other life. (131)

It gets worse ...

The devil no longer moves about on cloven hooves, reeking of brimstone. He is an affable, efficient fellow. He claims to want to help us all along to a brighter, easier future, and his sales pitch is very smooth. I was, as the old song goes, almost persuaded. I saw what it could be like, our toil and misery

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replaced by a vivid, pleasant dream. Fingers tap keys, oceans
of fact and sensation get downloaded, are dissolved through
the nervous system. Bottomless wells of data are accessed
and manipulated, everything flowing at circuit speed. Gone
the rock in the field, the broken hoe, the grueling distances.
(229)

I must admit to feeling a certain sense of weariness at the prospect of
defending my profession and my intellectual sensibilities against these
charges yet again. August defenders of wisdom, truth, authenticity, and
the personal like Birkerts are so used to fighting with visionary proponents
of progress, technology, global citizenship, and the glorious newness of
new media (like myself), that we tend to anticipate one another's objec-
tions. Birkerts and I have never met, but as you can guess from my title,
I am one of those poor, deluded quasi-empiricists whom Birkerts accuses
early on of naively chiming in with "Well, the more things change, the
more they stay the same" while Rome burns like a great books bonfire.
Conversely, after about five pages of Birkerts, I feel assured that I am
dealing with yet another one of those incorrigible cranks, banging away
on his IBM Selectric typewriter about how the world is coming to an end
because he can't figure out how to get his VCR to display anything other
than a blinking 12:00.

But this won't do. *The Gutenberg Elegies* presented, to me at least,
something so new and so provocative, that it managed to alter my sense
of these issues in ways that still seem slightly unnerving. It wasn't the
doomsday scenarios cited above. Such threnodies as these are quite fa-
miliar to those of us who defend the machines against the Luddites on a
regular basis. It was rather that the life of this particular crank bears such
an unsettling resemblance to my own.

I'm not talking about the sort of casual similarities that people admit
to before they lay into each other's arguments with abandon. Birkerts
likes to read and I like to read. I'm a reader, some of my best friends are

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readers, and so on. Birkerts and I share not only a deep love of books, but a similar relationship to them. Novels and poems are not an "entertaining diversion" for either of us. We have, both of us, used books over the years to ward off the drab inanity of our parent's lives, the day-to-day meaninglessness of nine-to-five existence. We have, both of us, tried to decide who we are by comparing ourselves to the heros and anti-heros of literature (it seems we both passed through a Wolfian, a Kerouackian, and a Hemingwayesqe phase). We both share a conviction that a world without stories, though perhaps not unthinkable, is surely unlivable. We have for years secretly believed that the world of fiction (whether one reads it, writes it, or talks about it), is not less, but more authentic than the world at large. There are days when we feel more at home in that liminal, luminous world than in our own lives.

But Birkerts hates computers. He hates their glitz, their infuriating speed, and the 10-second attention spans which they seem both to demand and create. I love computers. I love their exquisite rigor, their supreme exactitude; inventions for creating other inventions; machines in a permanent state of becoming.

I am a Senior Software Engineer at the Institute for Advanced Technology in the Humanities at the University of Virginia—a research group devoted to what is usually known in this country as "Humanities Computing," but which goes by the delightful name of "Humanistic Informatics" abroad. It is a young discipline: its name and institutional identity barely ten years old, though people have been engaged in it in various ways since the late forties. The mission of the Institute, and of humanities computing more broadly, is to explore and expand the potential of information technology as a tool for pursuing those questions traditionally considered within the province of humanistic inquiry. In other words, we use the machines of the new world order to study the old world artifacts of history, literary studies, philosophy, art and architectural history, linguistics, classics, and related fields. My role in all of this involves the design and creation of n-tiered architectures for the dissemination of writ-

ten and graphical materials using SQL-based relational databases, XML-compliant search and delivery architectures, and allied forms of knowledge representation and dissemination using C, C++, Java, and Perl.

Not only do none of my friends know what the hell that means, but most of them regard it as a rather absurd thing for me to be doing with my life, since the only educational training I have is in English studies, in which I hold a Master's degree and most of doctorate. I have never taken a single computer science course in my entire life.

How did that happen? The question may or may not be fully relevant to the topic at hand, but Birkerts began his argument with a lengthy autobiography. Clearly he wants to tell us where he's coming from—in a sense to explain why he takes all of this so personally. I couldn't help but wonder, as I read *The Gutenberg Elegies,* if there's something about my own intellectual journey that accounts for why I feel so annoyed—threatened, even—by the Birkerts of the world.

One of the strangest things about reading Birkerts for me, is that most of my younger life was very much like his. My college years were spent in smoky cafés and dorm rooms having long ponderous discussions of Chekhov, Freud, and Max Weber. I wrote a lot of poetry (most of it terrible), drank a lot of beer, and fancied myself very deep. Some of it was posing, surely, (I feel that same blush that Birkerts does in recalling some of my attitudes and opinions), but some of it was the true beginning of what I was coming to identify as the life of the mind. I wanted my whole life to be about thinking and reading. Needless to say, as a card-carrying member of the black-turtleneck-and-cigarette crowd, I would often speak sneeringly of those who were squandering their salad days on meaningless trivialities like engineering. The life of the mind meant "Art and Literature." It did not mean the prime number theorem, the tensile strength of aluminum, or better living through chemistry.

I continued with this smug attitude until one afternoon in the fall of 1993 when I managed to install NCSA Mosaic version 1 (the first web browser) on my girlfriend's Macintosh. It was absurdly slow, and a bit

difficult to navigate. We were still a year away from really good search engines like "Dave and Jerry's Web page" (some of you may know it by a different name—it's now called YaHoo and has a market capitalization of over 20 billion dollars). But I found it utterly intoxicating. It wasn't the hype that drew me in (there really wasn't that much hype in 1993). I merely thought what everyone else who was exploring this new medium thought: that email, the web, chat rooms, muds, and bulletin boards were going to change the world. Every man, woman, and child would become their own publisher. Information would move around at unimaginable speeds, as the news cycle was reduced to only a couple of hours. Anyone would be able to get at any document (whether it was a novel or a referendum) at any time. There would be new kinds of novels, new kinds of essays, new kinds of correspondence, and new kinds of conversations.

Around about 1995, I began to notice that a sizable group of my colleagues were using the Internet—and more importantly, the computer itself—as a serious research tool in the humanities. Various groups and centers had begun to appear around The University of Virginia: the Institute for Advanced Technology in the Humanities, the Electronic Text Center, the Virginia Center for Digital History, the Teaching and Technology Initiative. It's five years later. My dissertation (which had been about modern adaptations of Greek tragedies) is now a sophisticated piece of textual analysis software. Most of my speaking engagements involve at least half a roomful of engineers. My desk at home has books on probabilistic models of text retrieval and discrete mathematics next to *Wuthering Heights* and the *Papers of the Modern Language Association.* And as if all those poor engineers I had mocked so roundly in my younger days, in concert with the ghosts of my high school algebra teachers, had sought some sort of cosmic vengeance against the sins of my past life, I spend every evening attempting to work my way . . . through calculus.

All of this raises a corollary question to the one I posed just a moment ago—about there being something in my life which would make me shudder at Birkerts's objections. And we might phrase that question this way:

How could such a bohemian bookworm become such a total geek?

Well, perhaps the two groups—the "Two Cultures" as the novelist C. P. Snow once called the humanities and the sciences—aren't so far apart after all. I read the novels of Tolstoy and D. H. Lawrence, the poetry of Matthew Arnold and Wallace Stevens, the plays of Shakespeare and Eugene O'Neil because it has become a habit of my restless mind. I'm looking for intellectual thrills, for connections with the past, for simple pleasures, and complex ones as well. Why should computers—the realm of Leibniz, Pascal and Von Neumann, of set theory, propositional logic, and matrices—be any less fertile in this regard? Birkerts isn't talking about any old books; he means good books. I, likewise, am not talking about any old technology. I'm talking about the technologies that actualize the highest aspirations of the thinking self; those machines that permit us to re-imagine the way we relate to one another. Surely, the fact that I saw all of this only late, reflects less on the capacity of computers to challenge us as creative beings, and more upon my own obtuseness as an intellectual.

I hope you'll excuse this biographical meandering into my own technological revolution as pertinent to our theme. The autobiographical frame tale of *The Gutenberg Elegies,* after all, is meant not merely as the context and background of his criticism of the information age, but as an integral part of its reasoning. If books, which demand a certain type of attention and engagement can be so constitutive of one's character (as it clearly has in the author's case), then surely anything that threatens one's capacity for that engagement must be a very bad thing—particularly when the move toward that threatening element is as swift, as unreflective, and as hegemonic as the communications revolution of the last thirty years. From my own vita, we might argue something different. If technological revolutions, which require a certain type of attention and engagement, have so often arisen from intellectual motives (as it clearly did in my own case), then surely any attempt to stifle one's capacity for that engagement must be a very bad thing—particularly when the old technologies are as limited

as the codex culture of the last few hundred years.

I believe that technological revolutions are the consequence of an irrepressible intellectual disposition. It comes not of hating books, but of holding them in your hands and wondering if they might be something else—perhaps something better. If I have trouble sharing Birkerts fear of those consequences, it is perhaps because I am such a passionate believer in the moment from which those consequences arise. But even with that, Birkerts question remains. The person who changes the book (or any technology of similar magnitude) will change the world. Birkerts doesn't doubt this any more than the hundreds of companies encouraging us to .com ourselves. But will that change, whatever its motives, be a good one?

I'm not sure that I am willing to answer that question in as bold an affirmative as Birkerts's negative; there are simply too many factors at work, too many criss-crossed lines to be drawn between our technologies and our lives, and too many individual temperaments to consider. But I cannot resist remarking the fact that neither technological revolution nor fear are new to the human species, and that while our technology startles with its newness, our fears have a certain ring of the ancient about them. Birkerts comes at the end of a long line, and there will be more to follow.

Machine Guns and Wonder Drugs

We should be clear at the outset, before we begin to pour anything into the rigid mold of the good and the bad, about what kind of technology we're talking about. I like to think of it as the space between machine guns and wonder drugs.

In 1862, Richard Jordan Gatling demonstrated the first working model of what would come to be known as the Gatling Gun—the forerunner of modern automatic weapons. In an age of primitive, hand-loaded firearms, Gatling's gun could fire off over two hundred shots in the time it took

a soldier to prepare a single rifle round. Even in its earliest forms, the Gatling Gun was a weapon of such awesome power and efficiency as to almost single-handedly force the traditional rank-and-file style of combat into obsolescence (you could, after all, gun down an entire rank and a few files as well in an instant). With each passing decade, Gatling's design improved. By the time the army formally retired the Gatling Gun in favor of the still more efficient machine gun, it had reached a firing rate of 1500 shots per second. But this was nothing in comparison to its later manifestation, the M61 Vulcan. This weapon, still based on the essential principle Gatling used, is mounted on most of the combat aircraft in the U.S. military. It fires at a rate of 6000 shots per second.

Even the most hawkish among us will have to admit that such technology provides a gruesome commentary on the ways in which our technical prowess can be put to ill use. This technology, after all, was about killing people more efficiently. It hadn't the redeeming feature of peaceful civilian use, nor was it ever deemed necessary to end any war. That Gatling himself defended his invention by claiming that a high rate-of-fire automatic gun would reduce the number of soldiers required to man the battlefield (thus reducing their exposure to disease and other hazards of war) makes the whole thing seem all the more perverse. Gatling had inaugurated modern warfare with his new technology—a world in which flamethrowers, pathogens, chemical gas, and nuclear fission, were all deemed necessary for the maintenance of peace.

In 1929, a physician and researcher by the name of Alexander Fleming isolated a chemical from a common mold *(Penicillium notatum)* which had the peculiar property of preventing the growth of germs. As earth-shattering as this discovery was, a technological revolution was required for transforming Fleming's insight into a wonder drug. In 1938, three research scientists at Oxford—Howard Florey, Ernst Chain and Norman Heatley—began to expand upon his work by developing methods that would, by the time of the Second World War—allow for the mass production of Fleming's penicillin. Prior to 1938, medical sophistication

concerning the treatment of infection was roughly equivalent to that possessed by the Greek army; people were as likely to die from a routine infection as Alexander the Great had been.

It would not be an exaggeration to say that a sizable number of the people in this room would not be here without the technologies developed by Florey, Chain, and Heatley. Though we don't think of it often, many of our lives have at one point or another been saved by the fact that penicillin is so readily available, or if not our own lives, the lives of one of our ancestors.

One occasionally encounters a person with a penchant for antique firearms, as well as those who prefer the simplicity of herbal remedies to antibiotics, but in general, most of us regard the Gatling gun as bad technology and penicillin as good technology. Our cultural anxiety over the new technological order isn't centered on weapons technology or advances in medicine. It isn't about our ability to make automobiles more safe or armor piercing bullets more deadly. We debate and discuss these things, of course, but they don't move us to invoke the ancient genres of elegy and apocalypse.

Our apocalypticism is reserved for ATM machines, email, and cell phones. Pay-at-the-pump gasoline islands, pagers, and web addresses. Distance learning, video phones, and MP3's. Electronic books, electronic classrooms, electronic surveillance. E-business driving e-tailers in the e-economy. Our elegies are for the book and the fountain pen, for the Sunday morning paper and the on-the-street political leaflet. Typewriters and printing presses. Papyrus, parchment, and vellum. Scented love letters and libraries. The slow, deliberate loops of cursive handwriting.

Our anxiety, in other words, is specifically about information technology. Which is another way of saying that we are worried (as worried as we are excited) about what will happen if we change the ways in which we communicate ourselves to one another.

I see three principal ways in which that anxiety manifests itself, and I'd like to touch upon each one in turn.

It's All Happening Too Fast (And It's Never Happened This Fast Before)

There are a number of strong candidates for the title of first computer. Certainly one would have to consider Charles Babbage's "Difference Engine"—a completely digital, albeit completely mechanical device built in 1839, which was capable of performing mathematical operations (including calculating the solutions to elementary differential equations). It also responded to instructions provided by someone whom we would have to call the first computer programmer (who was, incidentally, a woman: Augusta Ada, Countess of Lovelace). Other important possibilities would include the Atanasoff-Berry Computer of the late 1930s, which had been designed to perform high-speed mathematical computations, as was a machine built by scientists at a company famous for their punch card tabulators called International Business Machines. The romantics among us will want to award the laurels to the Colossus, the famous electronic computer built by British Intelligence during the Second World War (the existence of which was classified until the 1970s).

But we could go back quite a bit further. Considering the subject more broadly, we would be forced to mention Pascal's gear-driven "Pascaline" calculator of 1642, as well as the unbuilt, but no less uncanny computer proposed by Leibniz in 1666 (a device which bears an eerie resemblance to the von Neumann architecture of modern computers). Why not mention the Islamic astronomer al-Biruni, who created a device in the eleventh century for calculating the motions of planets and stars, or the mysterious Antikythera Mechanism (a bronze device designed to do much the same thing) which was discovered in 1901 on an Aegean shipwreck from the year 80 B.C.E. Indeed, the latter was so complex, its precise purpose wasn't entirely understood until 1950 (Arnold 1). Many will point out (not without justification) that various architectural structures for predicting the calendar (like Stonehenge) as well as the counting frames of the

ancient world (like the abacus) qualify as calculating machines. There's no question that as a species, we have been about the business of computing technology for a very long time.

But I would have to join those who award the prize to the ENIAC. The ENIAC was built by a group of researchers at the University of Pennsylvania in the early 1940s. It owed much to its predecessors, but had the distinction of being the first general-purpose computing machine—a close ancestor of that invention of inventions I alluded to earlier, and the great grandparent of most of the machines driving the Internet today.

It was a rather large device. It had 18,000 vacuum tubes, 6,000 switches, 10,000 capacitors, 70,000 resistors and 1,500 relays. It stood 10 feet tall, was a 150 feet long, occupied 1,800 square feet and weighed 30 tons. But it was surely worth it. This magnificent machine, after all, was capable of performing 5000 additions in a single second. It was, mathematically speaking, the Gatling Gun of the information age.

Fifty years have gone by. I write this paper on a computer that is nearly 250,000 times faster than the ENIAC, holds almost 6 billion times as much information, is capable of nearly a billion additions per second, and fits neatly in my book-bag. And this is a mere toy compared to a genuine supercomputer; we would need scientific notation to express the magnitudes of difference between the Intel ASCI Red at Sandia National Laboratories (one of the most powerful in the world) and the ENIAC. For such machines, we speak not of megabytes, gigabytes, or terabytes, but petabytes. Not megahertz, but teraflops.

Even if we concede my point and accept that attempts to create automatic calculators and thinking machines have been going on for a very long time, we still need to grapple with the fact that what had been a slow, logarithmic journey with pulleys and gears, suddenly bursts upward, like the bold ascendant curve of a geometric progression, in the space of only fifty years. Where else on the time-line of our history do we witness such a spike? What possible technology revolution of the past can compare with this sort of speed?

Birkerts invites us to compare the speed of the transition from page to screen with the transition from oral to written culture among the ancient Greeks—a process which took roughly two centuries. But he fails to cite the example of that revolution which is the very subject of his elegy.

The first fifty years of printing produced about 20 million books—more than the estimated product of the previous thousand years. In a hundred years, somewhere between 150 and 200 million books were produced. If ever there were time to write *The Parchment Elegies,* the year 1494 would have done quite well.

The technological shift, much as the shift from ENIAC to laptop, was all about speed and volume. A scribe, working alone, might take months or even years to copy a single book. A printer could set up the type for a manuscript in a couple of weeks (or even a few days), and proceed to print a thousand copies at a fraction of the cost.

As the historian Robert Diebert argued, in a recent book on the history of print media, this was not merely a change in kind. The Protestant Reformation, a social upheaval that fairly dwarfs anything we've witnessed in our lifetimes, was largely facilitated by the advent of printing. The Catholic Church, with its tight monopolies on the manufacture of parchment (the "old technology" as it were), had managed to suppress thousands of lesser "heresies." This one, however, was fueled by the widespread availability of texts in which the arguments for Protestantism were dilated. It would not be an exaggeration to say that the bridge between the medieval world and the Enlightenment was facilitated by the same rapid production and dissemination of written material which, like the hypermedia of today, chiefly distinguishes itself by being cheap and ubiquitous.

Birkerts would like to describe the reading of novels as an activity that "inscribes the limit of the old conception of the individual and his relation to the world" (Birkerts 15). But how old is that conception? Allow me to be a bit perverse for a moment, and point out that out of the 35,000 years in which modern humans have walked the earth, 30,000 of those

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years were spent without even the most crude form of writing (Diebert 49). If we go back 5500 years to the earliest development of writing systems among the Sumerians of Mesopotamia, we would then have to go forward again over five thousand years before we encounter anything like the modern novel. Even in the context of developed literary genres, the novel remains an extremely . . . well, novel . . . art-form. English novels of the sort Birkerts is talking about—stories instantiated by and for the private, contemplative self—were born in the cradle of English Romanticism only a couple of hundred years ago.

Birkerts open his book by noting that "Over the past few decades, in the blink of an eye of history, our culture has begun to go through what promises to be a total metamorphosis" (3). He's right. It's happened before.

But that's not what Birkerts wants to tell us. He really wants to tell us that . . .

The New Technology Isn't As Deep

What web page can compare with *Middlemarch?* What email message can compare with the letters of Abelard and Heloise? What multimedia presentation can compare with "The Last Supper?"

On the one hand, I would like to say, with the great media theorist Marshall McLuhan, that the medium *is* the message—that the material aspects of the thing and the message it communicate are not separable, and that to change the way in which we express ourselves changes what we have to say. Yet this uneasy coupling of great art and new technology makes me want to qualify that statement somewhat.

I have no trouble admitting that I have never seen a web page that could hold a candle to *Middlemarch.* Nor have I have ever been left shuddering in awe over a multimedia presentation (though games like *Quake* and *Doom* have left me shuddering with glee on more than one occasion). I do

believe that some important art has been created using new media technology in the last thirty years, but I would not be so obtuse as to try to put the hypertext novels of Stuart Moulthrop and Michael Joyce on the same metaphorical shelf with *Remembrance of Things Past* and *The Iliad.*

But when it comes to a new medium, the question the artist must pose is whether the medium has any capacity for creating meaning. There are no hypertextual Hamlets. But can there be no such thing?

Again, technology revolutions of the past help to put this matter in perspective. In 1895, Auguste and Louis Lumiere held what most historians regard as the first public screening of a film in a basement lounge in Paris. There had been many attempts at something along the lines of motion pictures, but the Lumiere brothers had managed to create a portable movie camera and projection device all rolled into one. Unlike Dickson and Edison's kinetescope of a few years earlier, which was both unwieldy and restricted to one viewer at a time, the Lumeire brothers Cinematographe allowed one to film events out in the world, and then show them to a large group of people all at once.

By far the most famous movie they made (they made over 1,400 short films) was a film entitled "Train Arriving at the Station." The entire presentation lasted less than a minute and showed nothing more than a locomotive coming toward the audience at an oblique angle. By all accounts, however, the show produced an effect not unlike that of an amusement part ride, with audiences screaming and scrambling for cover, at least momentarily convinced that the train was about to come through the screen and into their seats.

This, of course, was a parlor trick. Like so many of the dazzling displays of spinning widgets one sees on web pages, this technology began its life by being mostly about itself. It's as if the whole point of the film wasn't to tell a story or communicate a message, but simply to be a film— to do the things that only film could do. The Lumiere brothers, in fact, referred to their own invention as technology without a future. Why, after all, would anyone want to pay to watch a film of something that they

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could go outside and see for themselves?

People had seen photographs (which, in 1895, were still pretty impressive, though no longer new). Seeing a photograph move right before your eyes had to have been absolutely jaw-dropping. We who are used to tie-fighters careening across an alien sky, robots made of liquid metal, and toys that *really* come to life, can't possibly recover a moment like that. But somehow, in the midst of these dazzling impossibilities, a Sergei Eisenstein or a Charlie Chaplin appears to show us what the technology might yet be. One would hesitate to envision a *Middlemarch* proceeding from "Train Arriving at a Station," but when I watch the baby carriage tumbling down the stairs in the famous "Odessa sequence" of Eisenstein's "The Battleship Potemken," I begin to wonder. Eisenstein wasn't creating movies of stage plays. He was using all of the things that made the medium what it was (its ability to switch back and forth quickly between one thing and another, for example) and creating something that seems to me clearly art. If we do not point to such films as on par with our greatest works of art, it may be only a matter of time before we do. The movies are barely a hundred years old; hypermedia, barely ten.

It's almost impossible to study something like the history of the novel and not get the impression, however much evidence we have to contradict it, that the novel made some sort of grand appearance on the world stage sometime in the eighteenth century; that everyone was talking about it, that bookstores were sprouting up everywhere hawking this fabulous new literary genre. But of course nothing could be further from the truth. The most popular literary genre of the eighteenth century wasn't the novel, or even the poem or the familiar essay. The most popular literary genre, by several orders of magnitude, was the sermon. People couldn't get enough of them.

Novels, by contrast, were considered a cheap and frivolous form of entertainment, particularly given to portrayals of violence and absurdity, a perfect medium for pornographers, and generally detrimental to the minds of the youth.

The New Technology Isn't as Authentic

In 1892, in the city of Mainz in Germany, a piece of scrap paper was discovered inside the binding of book that had been dismantled as part of a restoration effort. The paper had been printed with a primitive form of lettering and appeared to be an excerpt from a page of the Bible describing the Final Judgement. As it turns out, this is the oldest piece of written material produced with movable type in the western world, having been printed by Gutenberg himself sometime between 1444 and 1447.

The most fascinating element of this fragment, however, is not its age, but the actual typeface itself. There can be no mistaking from this example what Gutenberg had been trying to do with his new invention. He was clearly trying to make printed books look as if they had been handwritten (the type is almost indistinguishable from the handwriting of mid-fifteenth century Rhenish scribes).

Why not dive in to the new technology with both feet? Why emulate the past when you're on the cusp of the new? Well, partly because your own habits of mind make bold thinking rather difficult. The problem facing Gutenberg involved the reproduction of written texts quickly and mechanically, and written texts looked like those of Rhenish scribes.

The impracticality of this faithfulness to the familiar would soon lead to a technology-driven solution (standardized, block lettering), but it took a great deal of time before printed documents were considered as "authentic" as handwritten documents. In a sense, printed materials were the vinyl siding of the sixteenth century—durable, easy to produce, and easy to maintain, but not, you know, *the real thing*.

The "real thing," of course, is very much a moving target. Today, you can go to one of the big consumer electronics chains and purchase a touch-tone phone with call-waiting and caller-id capable of reaching over a hundred and fifty million users worldwide that looks for all the world like one of the crank-controlled wall phones of a hundred years ago, the wood-grained finish meticulously reproduced with high-impact

polystyrene plastic.

That a telephone could be approached with a sense of nostalgia—that it could seem comforting and familiar—indicates the depth of our quest for authenticity, as well as the speed with which we can transform the strange and new into the authentic. The telephone has become so familiar, that it almost seems not to be a technology at all. We easily forget how utterly preposterous it must have seemed to people of the nineteenth century to transmit the human voice over a wire, and how novel that technology seemed only fifty years ago. I recently acquired a copy of an Ohio-Bell telephone user's manual from the 1960s, and was struck by the fact that the the phone companies still felt the need to remind customers of the following truth about phones: "The telephone network is designed to carry a true voice reproduction from one telephone to any other telephone. This can best be accomplished by speaking into the mouthpiece."

At some point, the act of calling your mother went from being an outlandish novelty to seeming about as homely and as pure as a handwritten letter. It is true that the phone companies have helped us to feel this way, through hundreds of thirty-second ads in which we are exhorted to "reach out and touch someone." But our own attachment to the familiar in opposition to the new assures us that even the newest technologies of today may one day seem as quaint as Birkerts's broken hoe. Even the words we use to describe this new world have a ring of the old. We open *folders* on our *desktops*. We *scroll* down web *pages*. And in this way, we comfort ourselves and ease the transition to the new with the language of the old. But there comes a day when the language of the new becomes language of the old.

Conclusion

People of the new digital society are said to have terribly brief attention spans. But if you have managed to pay attention thus far, you've noticed

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that I've been following through the main movements of Birkerts book throughout my talk. So let me end the way Birkerts ends: with an oblique reference to the devil.

Most people are surprised to hear that I was once an abysmally poor high school student. According to my parents, the ride back from dropping me off at college included a confidentially expressed anxiety that I wouldn't make it through the year. But during my freshman year of college, I took a writing course which had as its theme something grander and more broad than even the Internet: the role of the citizen in the West. We read Alexis de Tocqueville, Plato, the Federalist Papers, and also a fifth century Greek tragedy by Aeschylus: *Oresteia.*

The *Oresteia* is a dramatic trilogy that recounts the events immediately following the Trojan War. King Agamemnon, chief warlord of the Achaen army, has returned to Argos victorious with one of his captured concubines in tow. His queen, Clytaemnestra, has taken a lover in his absence (Agamemnon's own brother). The old men of Argos dread the return of Agamemnon, since all know of the curse which holds the house of Atreus in thrall. Fired by the effrontery of Agamemnon's prize, she murders her husband. In accord with the ancient custom, the eldest son, Orestes, avenges the death by murdering his own mother. Fearing retribution for such sacrilege, he flees Argos and takes refuge at the Parthenon in Athens, pleading to the goddess for his life.

It is there that the goddess holds a trial, with the gods of the old order (an army of devils known as the Furies) on one side, and the plaintiff, seeking justice according the rights of the new societal order, on the other. Will Orestes remain faithful to the old virtues, or will new virtues have to arise to meet changing circumstances?

I don't think I've ever been so smitten by the experience of reading in my life. I remember everything about that glorious epiphanic moment when I felt myself seized by an idea, bowled over by art, in the grip of a book. I remember how the book felt, how it smelled, and I remember sitting in class, breathless, listening to my professor draw me still deeper

into this rich, beguiling tale.

If technology were to destroy the possibility of that experience, I would want no part of it. It is true that I regard Birkerts's fears as alarmist, but I'm not so ready to dismiss the urge to interrogate change. With each new movement of society, we risk destroying what was good about the old. With each attempt at re-imagining the social order, we risk pulling ourselves further and further apart. Anyone who participates in change without an awareness of these possibilities proceeds at their—and our—peril whether he or she does it with a computer or without one.

But in the end, there is some truth to the platitude: "The more things change, the more they stay the same." Gutenberg could not have imagined the Internet, but the desire to re-imagine the way we relate to one another predates him as surely as it lives on in our own age. It is in this sense that Birkerts is most misguided. One only writes elegies for the dead.