

Always Already New

Media, History, and the Data of Culture

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Introduction: Media as Historical Subjects

This book examines the ways that media—and particularly new media—are experienced and studied as historical subjects. It uses the examples of recorded sound (“new” between 1878 and 1910) and the World Wide Web, since the Web is a core instance or application of what are today familiarly and collectively referred to as “new media.” In pairing these examples, I begin with the truism that all media were once new as well as the assumption, widely shared by others, that looking into the novelty years, transitional states, and identity crises of different media stands to tell us much, both about the course of media history and about the broad conditions by which media and communication are and have been shaped.¹ Though presented chronologically in parts I and II, the histories of recorded sound and digital networking rendered here are intended to speak to one other. In particular, I mean to turn “The Case of Phonographs” against “The Question of the Web,” and thereby challenge readers to imagine what a meaningful history of today’s new media might eventually look like as well as to think about how accounts of media in general should be written.

This, then, is a book about the ways scholars and critics do media history, but it is more importantly about the ways that people experience meaning, how they perceive the world and communicate with each other, and how they distinguish the past and identify culture. Different versions and styles of media history do make a difference. Is the history of media first and foremost the history of technological methods and devices? Or is the history of media better understood as the story of modern ideas of communication? Or is it about modes and habits of perception? Or about political choices and structures? Should we be looking for a sequence of separate “ages” with ruptures, revolutions, or paradigm shifts in between, or should we be seeing more of an evolution? A progress? Different answers to questions like these suggest different intellectual projects, and they have practical ramifications for the ways that media history gets researched and written. Some

accounts of media history offer a sequence of inventors and machines, others trace the development of ideas or epistemologies, and still others chart a changing set of social practices, while many combine elements of several such approaches. In each case, history comes freighted with a host of assumptions about what is important and what isn't—about who is significant and who isn't—as well as about the meanings of media, qualities of human communication, and causal mechanisms that account for historical change. If there is a prevailing mode in general circulation today, I think it is a tendency to naturalize or essentialize media—in short, to cede to them a history that is more powerfully theirs than ours.

Naturalizing, essentializing, or ceding agency to media is something that happens at a lexical level every time anyone says “the media” in English, as if media were a unified natural entity, like the wind. This turn of phrase doubtlessly comes about because of widely shared perceptions that today's news and entertainment outlets together comprise a relatively unified institution. So one refers to what “the Media” is doing in the same spirit that one might refer to what “Big Oil” is up to or how the NASDAQ is performing this month. Forget that the word *media* is rightly plural, not singular. Media are. A medium is. And added to the indisputable if thus tacitly granted consolidation of their corporate ownership, there is another reason why the word *media* gets used so vaguely of late. Media are frequently identified as or with technologies, and one of the burdens of modernity seems to be the tendency to essentialize or grant agency to technology. Here is a simple example: when the Hubble Space Telescope was launched in 1990, it was found to have an incorrectly ground mirror, so that it presented a distorted view of space. My daily newspaper reported at the time that the telescope “needs glasses,” making a joke of the fact that in effect, the telescope is glasses already. It is a medium. It doesn't squint around on its own except in a metaphoric sense; it mediates between our eyes and the sites of space that it helps us to experience as sights. Other, much less obvious and less cartoony versions of the same confusion tend to crop up in works by media theorists when technology appears as a form of evidence, a matter I shall return to below.

It pays to be careful with language, and yet media seem to be hard to talk or write about with much precision. For that reason, I begin here by working out a broad definition of media before offering an introduction to both the specific case of early recorded sound, and my larger argument about media and doing media history. My purpose is to be as clear as possible in challenging the ways that I think today's new media, in particular, tend casually to be conceived of as what might be called the end of media history. In thus adapting the phrase “the end of history,” I adapt the title of an influential article and book by

Francis Fukuyama. Fukuyama proposed what he described as “a coherent and directional History of mankind that will eventually lead the greater part of humanity to liberal democracy” (1992, xii). (“Liberal” in this context means committed to an open, laissez-faire market.) With the cold war over and capitalism ascendant, Fukuyama argued, the end of that History, with a capital H, was more clearly in sight. Whatever the ultimate fate of this thesis—the controversy it sparked was both trenchant and varied—my point is that media, somewhat like Fukuyama’s “mankind,” tend unthinkingly to be regarded as heading a certain “coherent and directional” way along an inevitable path, a History, toward a specific and not-so-distant end. Today, the imagination of that end point in the United States remains uncritically replete with confidence in liberal democracy, and has been most uniquely characterized by the cheerful expectation that digital media are all converging toward some harmonious combination or global “synergy,” if not also toward some perfect reconciliation of “man” and machine. I note cheerfulness because the same view has not always been so happy. Distributed digital networks have long been described as the ultimate medium in another sense: collectively, they are the medium that can survive thermonuclear war.

This overdetermined sense of reaching the end of media history is probably what accounts for the oddly perennial newness of today’s new media. It lingers behind the notion that modernism is now “complete” and familiar temporal sensibilities are at an end.² And it accounts as well for the many popular histories and documentaries with titles like *The History of the Future*, *A Brief History of the Future*, and *Inventing the Future*. In scholarship the same sense of ending appears, for instance, in Friedrich A. Kittler’s admittedly “mournful” proposition that “the general digitization of channels and information erases the differences among individual media” so that soon, “a total media link on a digital base will erase the very concept of medium” (1999, 1–2).³ Likewise, according to Peter Lunenfeld, the digital offers “the universal solvent into which all difference of media dissolves into a pulsing stream of bits and bytes” (1999, 7), effectively suggesting “an end to the end-games of the postmodern era” (2000, xxii). By these accounts, media are the disappearing subjects of the very history they motivate.

Let me clarify: all historical subjects are certainly not alike. The histories of science and art, for instance, differ considerably in the construction of their respective subjects. The art historical object from long ago—a vase, painting, or sculpture—is still art today, however much tastes may have changed. But the scientific object from long ago—curing by leeches, the ether, a geocentric solar system, and so on—isn’t science at all. It is myth or fiction. Which kind of historical subjects are media? Are they more like nonscientific

or scientific objects? The difference between the two is less about the way different kinds of history get written than it is about a deeply held mental map that people share. A legacy of the Enlightenment, this mental map by convention separates human culture from non-human nature.⁴ Art and other nonscientific pursuits arise from or represent culture, while science represents nature (I am allowing for a lot of play in that word *represents*). All of the modern disciplines are implicated. Some branches of knowledge, like anthropology, highlight the problems of even making the distinction, since the first generations of anthropologists tended to treat culture as if it were nature. Other disciplines, like history itself, illuminate the casual force with which the distinction gets deployed, since the term *history* denotes both the thing we are doing to the past and the past we are doing it to. This linguistic fact of English is equally apparent in the “two uneven but symbolic halves” of every history book. Every history book has an outside introduction, like the one you are reading, as well as an inside or body. In the first, the author explains the plan of her research, and in the second she offers her results, the details of the past at which she has arrived.⁵ The combination becomes effective partly to the degree that the split is taken unreflectively by her readers to echo that culture/nature distinction, the outside artfully made and the inside (“just the facts”) truthfully, exactly rendered.

Media muddy the map. Like old art, old media remain meaningful. Think of medieval manuscripts, eight-track tapes, and rotary phones, or semaphores, stereoscopes, and punch-card programming: only antiquarians use them, but they are all recognizable as media. Yet like old science, old media also seem unacceptably unreal. Neither silent film nor black-and-white television seems right anymore, except as a throwback. Like acoustic (nonelectronic) analog recordings, they just don’t do the job. The “job” in question is largely though not exclusively one of representation, and a lot of the muddiness of media as historical subjects arises from their entanglement with this swing term. Media are so integral to a sense of what representation itself *is*, and what counts as adequate—and thereby commodifiable—representation, that they share some of the conventional attributes of both art historical objects and scientific ones. Even media that seem less involved with representation than with transmission, like telegraphs, offer keenly persuasive representations of text, space/time, and human presence, in the form of code, connection, and what critics today call “telepresence,” that feeling that there’s someone else out there on the other end of the line.⁶ It is not just that each new medium represents its predecessors, as Marshall McLuhan noted long ago, but rather, as Rick Altman (1984, 121) elaborates, that media represent and delimit representing, so that new media provide new sites for the ongoing and vernacular experience of representation as such.

When I say that this is a book about media as historical subjects, I mean to motivate just this complexity. If *history* is a term that means both what happened in the past and the varied practices of representing that past, then media are historical at several different levels. First, media are themselves denizens of the past. Even the newest new media today come from somewhere, whether that somewhere gets described broadly as a matter of supervening social necessity, or narrowly in reference to some proverbial drawing board and a round or two of beta testing.⁷ But media are also historical because they are functionally integral to a sense of pastness. Not only do people regularly learn about the past by means of media representations—books, films, and so on—using media also involves implicit encounters with the past that produced the representations in question. These implicit encounters with the past take many forms. A photograph, for instance, offers a two-dimensional, visual representation of its subject, but it also stands uniquely as evidence, an index, because that photograph was caused in the moment of the past that it represents. Other encounters with the past can be less clear, less causal, and less indexical, as when the viewers of a television newscast are “taken live” to the outside of a building where something happened a little while ago, or when digital images recomplicate the notion of a photographic index altogether.

As my allusion to the Hubble Space Telescope suggests, one helpful way to think of media may be as the scientific instruments of a society at large. Since the late seventeenth century, scientific instruments have emerged as matters of consensus within a community of like-minded and fairly well-to-do people, eventually called scientists. If one scientist or a group of scientists invents a new instrument, they must demonstrate persuasively that the instrument does or means what they say, that it represents the kind and order of phenomena they intend. Other scientists start using the instrument, and ideally, its general acceptance soon helps to make it a transparent fact of scientific practice. Now scientists everywhere use the air pump, say, or the electrophoresis gel without thinking about it. They look through the instrument the way one looks through a telescope, without getting caught up in battles already won over whether and how it does the job. The instrument and all of its supporting protocols (norms about how and where one uses it, but also standards like units of measure) have become self-evident as the result of social processes that attend both laboratory practice and scientific publication.

Media technologies work this way too. Inventing, promoting, and using the first telephones involved lots of self-conscious attention to telephony. But today, people converse through the phone without giving it a moment's thought. The technology and all of its supporting protocols (that you answer “Hello?” and that you pay the company, but also

standards like touch-tones and twelve-volt lines) have become self-evident as the result of social processes, including the habits associated with other, related media. Self-evidence or transparency may seem less important to video games, radio programs, or pulp fiction than to telephones, yet as critics have long noted, the success of all media depends at some level on inattention or “blindness” to the media technologies themselves (and all of their supporting protocols) in favor of attention to the phenomena, “the content,” that they represent for users’ edification or enjoyment.⁸ When one uses antique media like stereoscopes, when one encounters unfamiliar protocols, like using a pay telephone abroad, or when media break down, like the Hubble Space Telescope, forgotten questions about whether and how media do the job can bubble to the surface.

When media are new, they offer a look into the different ways that their jobs get constructed as such. Of particular interest in this book are the media that variously do the job of inscription. Like other media, inscriptive media represent, but the representations they entail and circulate are crucially material as well as semiotic. Unlike radio signals, for instance, inscriptions are stable and savable. Inscriptions don’t disappear into the air the way that broadcasts do (though radio and television can of course be taped—that is, inscribed). The difference seems obvious, but it is important to note that the stability and savability of inscriptions are qualities that arise socially as well as perceptually. The defining fixity of print as a form of inscription, for example, turns out to have arisen as a social consequence of early modern print circulation as much as from any perceptual or epistemological conditions inherent to printed editions in distinction from manuscript copies. Likewise, the defining scientific or self-evident qualities of landscape photography turn out to have resulted from nineteenth-century practices of illustration and narration as much as from any precision inherent to photographs in distinction from painted panoramas or other forms.⁹ The introduction of new media, these instances suggest, is never entirely revolutionary: new media are less points of epistemic rupture than they are socially embedded sites for the ongoing negotiation of meaning as such. Comparing and contrasting new media thus stand to offer a view of negotiability in itself—a view, that is, of the contested relations of force that determine the pathways by which new media may eventually become old hat.

One of the advantages of drawing this analogy between scientific instruments and media is that it helps to locate media at the intersection of authority and amnesia. Just as science enjoys an authority by virtue of its separation from politics and the larger social sphere, media become authoritative as the social processes of their definition and dissemination are separated out or forgotten, and as the social processes of protocol forma-

tion and acceptance get ignored.¹⁰ One might even say that a supporting protocol shared by both science and media is the eventual abnegation and invisibility of supporting protocols.¹¹ Science and media become transparent when scientists and society at large forget many of the norms and standards they are heeding, and then forget that they are heeding norms and standards at all. Yet transparency is always chimerical. As much as people may converse through a telephone and forget the telephone itself, the context of telephoning makes all kinds of difference to the things they say and the way they say them. The same is also true of science: geneticists use *drosophila* (fruit flies) as a kind of instrument, and genetics itself would be substantively different if a different organism were used.¹² The particular authority of science makes this an uncomfortable claim, so crossing over to the other half of the collective mental map renders the point more clearly. Just as it makes no sense to appreciate an artwork without attending to its medium (painted in watercolors or oils? sculpted in granite or Styrofoam?), it makes no sense to think about “content” without attending to the medium that both communicates that content and represents or helps to set the limits of what that content can consist of. Even when the content in question is what has for the last century or so been termed “information,” it cannot be considered “free of” or apart from the media that help to define it. However commonplace it is to think of information as separable from, cleanly contained in, or uninformed by media, such thinking merely redoubles a structural amnesia that already pertains.¹³

I define media as socially realized structures of communication, where structures include both technological forms and their associated protocols, and where communication is a cultural practice, a ritualized collocation of different people on the same mental map, sharing or engaged with popular ontologies of representation.¹⁴ As such, media are unique and complicated historical subjects. Their histories must be social and cultural, not the stories of how one technology leads to another, or of isolated geniuses working their magic on the world. Any full accounting will require, as William Uricchio (2003, 24) puts it, “an embrace of multiplicity, complexity and even contradiction if sense is to be made of such” pervasive and dynamic cultural phenomena.

Defining media this way admittedly keeps things muddy. If media include what I am calling protocols, they include a vast clutter of normative rules and default conditions, which gather and adhere like a nebulous array around a technological nucleus. Protocols express a huge variety of social, economic, and material relationships. So telephony includes the salutation “Hello?” (for English speakers, at least), the monthly billing cycle, and the wires and cables that materially connect our phones. E-mail includes all of the elaborately layered technical protocols and interconnected service providers that constitute

the Internet, but it also includes both the QWERTY keyboards on which e-mail gets “typed” and the shared sense people have of what the e-mail genre is. Cinema includes everything from the sprocket holes that run along the sides of film to the widely shared sense of being able to wait and see “films” at home on video. Some protocols get imposed, by bodies like the National Institute of Standards and Technology or the International Organization for Standardization. Other protocols get effectively imposed, by corporate giants like Microsoft, because of the market share they enjoy. But there are many others that emerge at the grassroots level. Some seem to arrive *sui generis*, discrete and fully formed, while many, like digital genres, video rentals, and computer keyboards, emerge as complicated engagements among different media. And protocols are far from static. Although they possess extraordinary inertia, norms and standards can and do change, because they are expressive of changeable social, economic, and material relationships.

Nor are technological nuclei as stable as I have just implied. Indeed, much of their coherence as nuclei may be heuristic. (That is, they only look that way when they get looked at.) As Walter Benjamin (1999, 476) noted about historical subjects generally, “The present determines where, in the object from the past, that object’s fore-history and after-history diverge so as to circumscribe its nucleus.” So it is as much of a mistake to write broadly of “the telephone,” “the camera,” or “the computer” as it is “the media,” and of—now, somehow, “the Internet” and “the Web”—naturalizing or essentializing technologies as if they were unchanging, “immutable objects with given, self-defining properties” around which changes swirl, and to or from which history proceeds.¹⁵ Instead, it is better to specify telephones in 1890 in the rural United States, broadcast telephones in Budapest in the 1920s, or cellular, satellite, corded, and cordless landline telephones in North America at the beginning of the twenty-first century. Specificity is key. Rather than static, blunt, and unchanging technology, every medium involves a “sequence of displacements and obsolescences, part of the delirious operations of modernization,” as Jonathan Crary puts it (1999, 13). Consider again how fast digital media are changing today. Media, it should be clear, are very particular sites for very particular, importantly social as well as historically and culturally specific experiences of meaning. For this reason, the primary mode of this book is the case study.

For all of their particularity, media frequently get lumped together by different schools of thought for overarching purposes. If media are sites for experiences of meaning—critics have pondered—to what degree are meaning and its experience determined or circumscribed by technological conditions? To what extent are they imposed or structurally

effected by a “culture industry,” the combined interests of Hollywood, Bertelsmann, AOL/Time Warner, and an ever dwindling number of multinational media conglomerates? Or are experiences of meaning more rightly produced than determined and imposed? How might production in this case include the ordinary people (who experience meanings) as well as the multinational industry, notwithstanding such a dramatic disparity in their power?¹⁶ This sort of abstract puzzling does have a practical politics. If meanings are imposed by industry, then policing media becomes a viable project: quashing violence on television and labeling offensive lyrics will protect minors from harm and lead to a decrease in violent crime. But if viewers and listeners themselves help variously, literally, to produce the meanings they enjoy, then policing media is pretty much beside the point. Viewers will make of violent content what they will. At stake are two different versions of agency. Either media audiences lack agency or they possess it. Hardly anyone would say the truth can’t lie somewhere in between these two extremely reductive positions, but legislators still have to vote either yes or no when the question comes up.

Related questions of agency are vital to media history. As I’ve already noted, there is a tendency to treat media as the self-acting agents of their own history. Thus, Jay David Bolter and Richard Grusin (1999, 15) write that new media present themselves

as refashioned and improved versions of other media. Digital media can best be understood through the ways in which they honor, rival, and revise linear-perspective painting, photography, film, television, and print. No medium . . . seems to do its cultural work in isolation from other media, any more than it works in isolation from other social and economic forces. What is new about new media comes from the particular ways in which they refashion older media and the ways in which older media refashion themselves to answer the challenges of new media.

Here, Bolter and Grusin’s identification of media as social and economic forces appears amid a lot of syntax that seems to make media into intentional agents, as if media purposefully refashion each other and “do cultural work.” However astute their readings of the ways different media compare and contrast at a formal level, Bolter and Grusin have trimmed out any mention of human agents, as if media were naturally the way they are, without authors, designers, engineers, entrepreneurs, programmers, investors, owners, or audiences. Of course Bolter and Grusin know better.¹⁷ People just write this way, Raymond Williams has suggested, because agency is so hard to specify; technological innovation appears autonomous, Williams ([1974] 1992, 129) argues, “only to the extent that we fail to identify and challenge its real agencies.”

Ironically, though, critics who do celebrate the real agency of individual inventors sometimes end up a lot like Bolter and Grusin. Kittler's media discourse analysis valorizes Thomas Edison, offering several competing versions of the inventor's agency with regard to the invention of recorded sound. "Edison's phonograph," according to Kittler (1999, 27), "was a by-product of the attempt to optimize telephony and telegraphy by saving expensive copper cables." But Edison also "developed his phonograph in an attempt to improve the processing speed of the Morse telegraph beyond human limitations," Kittler notes, and he did so when "a Willis-type machine [for synthesizing sounds] gave him the idea" and "a Scott-type machine [for drawing sound waves] pushed him towards its realization" (190). Though these statements each sound convincing, complete with human agents and human intentions, Kittler offers no evidence at all to support them. He might have cited from some thousands of pages of existing documentation, from Edison's experimental notebooks or items of correspondence from 1877. Documents from that July, for instance, indicate that Edison was struggling to improve the sibilant articulation of Alexander Graham Bell's telephone. In one technical note from July 18 titled "Speaking Telegraph," Edison (1994, 443–444) comments, "Spkg [speaking] vibrations are indented nicely" on waxed paper by "a diaphragm [*sic*] having an embossing point," so that, he reasons, he should be "able to store up & reproduce automatically at any future time the human voice perfectly." This realization could be called the invention of the phonograph, and so could a number of other related actions at Menlo Park, New Jersey, over the next few months. My point is less that Kittler overstates and undercites than that he appears to be arguing backward from what Geoffrey Winthrop-Young and Michael Wutz (1999, xiv) term an "intrinsic technological logic"—a logic Kittler reads as inherent to the phonograph once it was already invented.¹⁸ However extraordinarily rich his sense of media and the "discourse networks" they help to support, it is as if Kittler doesn't need to persuade his readers of details about why or how phonographs were invented because he already knows what phonographs are, and therefore he knows what (and particularly how) they mean. Again, that is to make a medium both evidence and cause of its own history.

In the pages that follow, I have resisted thinking of media themselves as social and economic forces and have resisted the idea of an intrinsic technological logic. Media are more properly the results of social and economic forces, so that any technological logic they possess is only apparently intrinsic. That said, I have also resisted taking a reductively antideterministic position. At certain levels, media are very influential, and their material properties do (literally and figuratively) *matter*, determining some of the local conditions of communication amid the broader circulations that at once express and constitute social relations. This "materiality" of media is one of the things that interests me most.

The advantage of offering finely grained case studies is that it allows these complexities to emerge. I have worked within narrow chronological brackets, both in treating the case of phonographs and that of digital networks, and I have further limited my scope to the cultural geography of the United States, with which I am most familiar. While such a perspective has obvious shortcomings, the detail and specificity of each case permits an account that is exacting, and at the same time broadly suggestive of the ways that new media emerge into and engage their cultural and economic contexts as well as the ways that new media are shaped by and help to shape the semiotic, perceptual, and epistemic conditions that attend and prevail.

By amplifying two specific case studies, one past and one more present, the shape of this book resembles and appreciates the “media archaeologies” produced by a number of recent critics. As Geert Lovink (2003, 11) generalizes the archaeological perspective, “Media archaeology is first and foremost a methodology, a hermeneutic reading of the ‘new’ against the grain of the past, rather than a telling of the histories of technologies from past to present.” By reading digital media “into history, not the other way around,” Lovink suggests, the media archaeologist seeks a built-in refusal of teleology, of narrative explanations that smack structurally of the impositions of metahistory.¹⁹ Since telling a story imposes a logic retrospectively onto events, that is, these critics seek to avoid and thereby critique storytelling. (Just as—and at the same time that—no one in cultural studies wants to admit of technological determinism, no one in cultural studies seems to want to be historicist according to any but a “new” historicist paradigm.) This helps to explain Lev Manovich’s (2001) “parallels” between Russian constructivist cinema and today’s new media. It explains why Alan Liu’s (2004b, 72) brilliant comparison of the paper forms used in Taylorist scientific management and today’s “encoded discourse” reveals a “surprising bandwidth of connection,” in which the past serves only as “an index or placeholder (rather than cause or antecedent) of the future.” In short, the impulse to resist historical narrative redraws criticism as a form of “aesthetic” or “literary” undertaking at the same time that it tends to impose a temporal asymmetry.²⁰ The past is often represented discretely, formally, in isolation—as or by means of anecdote—while the present retains a highly nuanced or lived periodicity, as when Lovink’s (2003, 43–44) criticism parses so carefully the mid-1990s’ “mythological-libertarian techno-imagination of *Mondo 2000* and *Wired*; the massification of the medium, accompanied by the dotcom craze; [and] the consolidation during the 2000–2002 depression,” and the networking of today.²¹

I want to distinguish my method from media archaeology and related cultural studies in several respects. Media archaeology is rightly and productively mindful of historical narrative as a cultural production of the present. The two case studies that follow seek further

to pick out related forms of mindfulness in as well as with regard to the past. Why these two cases? Both describe—even, yes, narrate—moments when the future narratability of contemporary events was called into question by widely shared apprehensions of technological and social change as well as by varied engagements—tacit as well as knowing—with what I refer to as “the data of culture”: records and documents, the archivable bits or irreducible pieces of modern culture that seem archivable under prevailing and evolving knowledge structures, and that thus suggest, demand, or defy preservation. History in this sense is no less of a cultural production in the past than it is in the present. My first case concerns events that occurred during the extended moment at the end of the nineteenth century when the humanities emerged in something like their present form, both institutionally and epistemologically, becoming what Lawrence Veysey (1999, 52) terms the “special [bulwark] of an orientation toward the past.” (The humanities are our past-oriented disciplines: history, English, classics, philosophy, art history, comparative literature.) My second case concerns events that occurred during the extended moment at the end of the twentieth century when the humanities in the United States may have enjoyed the possibility of centralization, in the form of state sponsorship, yet entered what is widely perceived as a period of ongoing “crisis.”²² I offer two case studies in order to benefit from contrast and comparison, not to refine one at the expense of the other. The chronological gap between them has helped me keep “one eye focused on historical variability and the other on [elements of] epistemological constancy” that underwrite the humanities still, and that like all protocols, can be difficult to see without seeking or contriving some penumbra of discontinuity, such as the joint discontinuousness of time frames and newness of new media rendered in these pages.²³

In chapter 1 I describe the medium of recorded sound as it was first introduced to the U.S. public. During the spring and summer of 1878, audiences could pay to see and hear recordings made and replayed on Edison’s initially crude device. A series of lyceum demonstrations across the United States, together with the many newspaper accounts they stimulated, helped to identify the new medium. Then in 1889–1893, audiences got a second look and listen. This time they paid for encounters with an improved version of Edison’s machine, adapted to play prerecorded musical selections in public places. Neither endeavor lasted or was profitable for very long. While it is easy to reason in hindsight that these initial endeavors eventually failed because neither the technology nor its supporting protocols had successfully been defined yet, one might also argue that neither the lyceum demonstrations nor the public amusement trade successfully located the U.S.

public that they supposed. Media and their publics coevolve. Because the demonstrations of 1878 have never been studied before in any detail, it has never been clear the extent to which—far from possessing an intrinsic logic of its own—the new medium was experienced as party to the existing, dynamic (and extrinsic) logics of writing, print media, and public speech. Audiences experienced and helped to construct a coincident yet contravening logic for recorded sound, responding to material features of the new medium as well as the contexts of its introduction and ongoing reception and development.

As Jürgen Habermas first proposed and subsequent scholars have elaborated, the extrinsic or cultural logics of print media and public speech are particularly important historically because beginning sometime in the seventeenth century, they doubled as the cultural logic of the bourgeois public sphere. That is, the same assumptions that lay behind the commonsense intelligibility of publication and public speaking *as such* also helped to “determine how the political arena operates,” locating an abstract social space for public discussion and opinion, in which some voices, some expressions, were legitimate—and legitimated—while others were constrained.²⁴ On one level, Edison’s phonograph stumbled hard against this public sphere: by intruding on experiences of printedness and public speaking, the phonograph records of 1878 and 1889–1893 abruptly called its commonsense parameters into question, begging a mutual redefinition of print, speech, and public. On another level, however, Edison and his phonographs were themselves part of much larger versions of the same questions already being broached. Though Edison would not, of course, have expressed it this way, he and his invention were part of an ongoing industrialization of communication. (Here’s where his telegraphs and telephones fit in too, along with a massive growth and diversification of print media.) The industrialization of communication resulted from as well as abetted new social and economic structures. These new structures served—anything but abruptly—to jeopardize the very commonness and sensibleness of the commonsense intelligibility of publication, and also the boundaries and operations of the political arena. By this account, Edison and the first phonographs didn’t stumble against the public sphere as much as they encountered it stumbling. The new medium with its emergent norms and standards at this level actually helped to steady and partly reconstruct a common or normative sense of publicness and an abstract public, one for which recording and playback were intelligible, and for which the logic of phonographs and phonograph records might seem to be intrinsic.

The vague, new “social and economic structures” of the previous paragraph deserve a word of elaboration, since I have described them as causal (if also reciprocal) agents of media history in the nineteenth century. These new social and economic structures

included things like modern corporations and the “visible hand” of an emergent managerial class as well as modern markets with centralized trading in securities and commodity futures—familiar characters all, in histories of industrialized communication or “the control revolution,” as James Beniger (1986) has called it.²⁵ Less frequently noted in the same accounts but equally pertinent were concomitant social and economic structures like an emergent class of wage laborers, the emergent demographics of increased immigration and U.S. imperial expansion, and the related emergence of new, urban mass audiences for print media and public spectacle. If the industrialization of communication broadly attended social and economic structures such as these, then the new medium of recorded sound consisted in part of protocols expressive of the relationships they entailed. This is not to suggest that early phonographs were in some respect either managerial or proletarian. Rather, the commonsense intelligibility of the new medium emerged in keeping with a dialectic between control and differentiation, between the traditional public sphere and its potential new constituents. Predictably, the potential new constituents most important to the definition of the new medium were also in some respects the least “other” or alien. Chapter 2 demonstrates in detail that the new medium of recorded sound was deeply defined by women, generally middle-class women, who helped to make it a new, newly intelligible medium for home entertainment.

Chapter 2 follows the new medium out of public places and into private homes. That transit, accomplished with such success around 1895 to 1900, scuttled the expectations of Edison and others who thought of phonographs as business machines for taking dictation. Playback not recording emerged as the primary function of the medium and a commercial bonanza for its corporate owners, although dictation phonographs (Dictaphone was one trade name) would remain continuously available for sale in the United States until the eventual success of magnetic tape recorders after the Second World War. This switch in primary function from dictation to amusement has been popularly explained as both an example of Edison’s “accidental genius” (*Wired* 2002, 92) and the inventor Emile Berliner’s “killer application” (Naughton 2000, 245), since Berliner envisioned his version of recorded sound, the gramophone, as an amusement device from its first unveiling in 1888.²⁶ The switch has also been explained as an industrial design triumph: a better power source, cheaper machines, and mass-produced musical recordings. And it has likewise been explained as a culture industry coup: star performers, hit records, major labels, and seductive advertising campaigns. Most accounts agree that consumer demand played a decisive role in making the new medium of recorded sound into a mass medium—one that by 1910 was helping to restructure the ways that Americans experienced music and

helping (along with movies, magazines, comics, vaudeville circuits, and the like) to re-orient U.S. social life toward ever-increasing leisure consumption.

Consumer demand was decisive, I agree, but part of my argument is that the very categories of consumer and producer are inadequate to explain fully the deep definition of new media. When media are new, when their protocols are still emerging and the social, economic, and material relationships they will eventually express are still in formation, consumption and production can be notably indistinct. The new medium of recorded sound became intelligible as a form of home entertainment according to ongoing constructions of home and public—constructions that relied centrally during the late nineteenth century on changing roles for women, and further, changing experiences of gender and cultural difference. The same broad social contexts have been described as equally, if differently, defining for telephones, monthly magazines, and motion pictures in the same period.²⁷ Women helped to engender a new mutual logic for media and public life. Protocols and indeed the primary function of the new medium of recorded sound emerged in part according to contexts involving practices as varied as mimicry by vaudevillian comedienues and parlor piano playing by ladylike amateurs, shaped by potentially gendered constructions of work and leisure as well as of production and consumption. Even the technical protocols of the medium, like the hardness of recording surfaces and the design of recording styli, emerged partly in response to the timbre of women's voices, which proved tricky to record well (and thus to make public), and therefore informed emerging commonsense norms for A&R (artists and repertory) and emerging commonsense standards of acoustic fidelity.

In short, the definition of new media depends intricately on the whole social context within which production and consumption get defined—and defined as distinct—rather than merely on producers and consumers themselves. This is not to diminish the role of human agents but only to describe more thoroughly where more of them stand in order to resist, as much as possible, the disavowal of underlying economic structures or cultural politics. At the end of the nineteenth century in the United States, the medium of recorded sound helped both to destabilize and to steady or partly reconstruct an abstract sense of publicness, one that increasingly included women, immigrants, and workers—increasingly included “others”—as constitutive members. Of course, rather like Groucho Marx not belonging to any club that would have him as a member, the new sense of public that emerged was different or other than the old, in the least because the new public sphere was increasingly experienced as collective of consumers rather than citizens, increasingly restructured, as Habermas (1989) has indicated, by a cultural premium on publicity and

public taste. Not that I wish to romanticize the Habermasian bourgeois public sphere or overstate its debatable explanatory power. The public is a “practical fiction,” in Michael Warner’s (2002, 8) terms, based in the United States on whiteness and masculinity. Its conception, however, “is unthinkable,” Michael Geisler (1999, 99) explains, “without the centripetal power of media to offset the centrifugal force” of social differentiation.²⁸

This dialectic between control and differentiation, between existing media publics and their potential new constituents, has emerged in a slightly different form today as a central device in the growing literature on globalization. Intuitively, worldwide digital and satellite communications pull people together, and in doing so they moderate differences and homogenize cultures. In this literature, media serve as instruments of Western cultural imperialism and mature finance capital, creating a global village of increasingly Americanized consumers. Culturally, globalization is a process involving worldwide transfers of technology and translocations of people—migrations, diasporas, and displacements—that is resisted hopelessly, if at all, by the centrifugal pressures of localism. However apposite this dark picture may be, it is painted with a broad brush, the wide strokes of which threaten to blur away the very localism they purport to show in decline and at the same time exaggerate the ways in which today’s new media are distinctively new.

It will pay to remember that at the beginning of the twentieth century, the medium of recorded sound formed part of an increasingly global economy marked by flows of capital and commodities on an unprecedented scale—flows that would dwindle abruptly with the First World War and then remain unmatched in magnitude until the end of the century.²⁹ The new medium depended on a worldwide trade in materials—like German chemicals and Indian lac (the insect secretion required to make the shellac for records)—as well as recording artists, recording studios, and phonograph and gramophone dealers around the world. As Andrew Jones (2001, 54) puts it, “This new (and immensely profitable) industry was—from its very inception—transnational in character.” The British Gramophone Company established subsidiaries in India in 1901, Russia in 1902, and Iran in 1906. In 1907, Edison’s National Phonograph Company (never more than a bit player on the international scene) had subsidiaries in Europe, Australia, Argentina, and Mexico. By then, mass-produced musical records were available to consumers in Budapest and Sydney, Santiago and Beijing, Johannesburg and Jersey City. Although capitalization and manufacturing remained based primarily in the United States, Britain, France, and Germany, record-pressing plants opened in India in 1908 and China in 1914, and similar efforts were made with varying success in Australia in 1907 and Japan in 1911.³⁰

Record labels soon succeeded around the globe, including the Lebanese Baidaphone label, for instance, which supplied customers across the Middle East, but had its records

manufactured in Berlin from master disks produced in Beirut. By 1913, the Argentinean Discos Nacional label had its own studio and factory, and was selling millions of records a year in Argentina, while many of its tango recordings were also being issued in Europe under other labels.³¹ The result was as much a matter of negotiating and circulating cultural difference as it was of homogenizing cultures or consumption. The popular success of recording helped to foster “a vast range of new urban popular musics” (A. Jones 2001, 54), adaptive indigenous expressions that flourished amid cultural politics at once local *and* global. By some accounts, the American Columbia label issued more “foreign” titles within the United States than it did other ones, so successful were its efforts to supply the nation’s immigrant audiences and niche markets between 1908 and 1923 (Gronow 1982, 5).³² Meanwhile, the Gramophone Company in India issued catalogs in Punjabi, Urdu, Hindi, Bengali, Tamil, Telegu, and Malayalam, at the same time that it employed at least one popular artist who recorded in English, Arabic, Kutchi, Turkish, Sanskrit, and Pushtu.³³

What these examples suggest about media is far more interesting and complicated than the homogenization or Americanization of cultures, or the unparalleled purchase of the globalizing postmodern. Media help to “*organize and reorganize popular perceptions of difference within a global economic order*,” so that increasingly “one’s place is not so much a matter of authentic location or rootedness but one’s relationship to economic, political, technological, and cultural flows” (Curtin, 2001, 338). Increasingly, in other words, global media help to create a world in which people are not local only because of where they are or are from but also because of their relationships to media representations of localism and its fate. Even before the First World War, the experience of playing records and consuming the varied conventions of recording—including the varied patterns of commodification—turned the new medium of recorded sound into “something like the first global vernacular” (Hansen 1999, 68).³⁴ Here, I am drawing on Michael Curtin’s description of television today and Miriam Hansen’s account of Hollywood films in the “classical” period, but their points do hold nicely for early recorded sound and first-wave globalization.

Recorded sound remained new in the first years of the twentieth century in something of the same sense that digital communications remain new at the beginning of the twenty-first: widely perceived as technologically advanced and advancing, globally connected amid intense competition, unstinting hype, and increasingly open and extensive markets. Of course, there are differences between globalization now and globalization then as well as between different constructions of the new. The comparative study of media must be exactly contrastive. Yet there are obvious parallels to be drawn too, and I think—it may be clear by now—that the early history of recorded sound holds a particular resonance

for envisioning what can today be called the early history of digital media. Part of this resonance is superficial, but part of it involves the idea of history itself—what it means to experience a sense of history or historical fact, what it means to write the early history of anything, and what the histories of media specifically involve. In part because recorded sound developed in ways that its earliest promoters and audiences did not expect, and because digital networks have likewise developed in unanticipated ways, both cases offer a chance to cut across the technological determinism of popular accounts while at the same time allowing a more nuanced sense of how the material features of media and the social circulation of material things help variously to shape both meaning and communication. Media histories that lack this conjoined interest in the material and the historiographical have tended to dismiss or diminish the importance of phonographs in favor of electronic contemporaries, particularly telegraph and telephone networks, which so intuitively began to “dematerialize” communication along the trajectory that distributed digital networking today extends.³⁵

At the broadest level, the initial development of recorded sound for improved business communications and its eventual incarnation as (at least primarily) a domestic amusement do suggest a number of immediate parallels to digital media. Like the transition from mainframe computers to PCs, the new medium became less centralized and expensive to use as well as more “personal” with better storage capacity. Like the text-based World Wide Web developed at the European Organization for Nuclear Research (CERN) and then transformed by the success of a more image-inclusive browser, Mosaic, written by programmers at the University of Illinois, the new medium of recorded sound was stripped of its research and development (R & D) past and became broadly commercialized. And like MP3 files and file-sharing technology for downloading music, the new medium distributed music in a new format, challenging existing market structures and provoking the bitter disputes over intellectual property that I have analyzed elsewhere.

Though suggestive, comparisons like these can also be pretty glib, and I want to dwell instead on another kind of parallel between recorded sound and digital media. This is a book less about sound than about text, less about the political economy of music than about the social experience of meaning as a material fact. Edison’s phonograph inscribed in a new way, one that many of its first users evidently found mysterious. The inscriptions that Edison’s phonograph made were tangible, portable, and immutable: records. But unlike more familiar inscriptions, they were also illegible. No person could read recordings the way a person reads handwritten scrawls, printed pages, or musical notes, or even the way a person examines a photograph or drawing to glean its meaning. Only machines

could “read” (that is, “play”) those delicately incised grooves. To top it off, Edison’s phonograph seemed to inscribe or “capture” sound indiscriminately, capaciously—anything from noise to music—without regard for the speaker or the source. And it seemed to inscribe directly, without using ears, eyes, hands, a pencil, or an alphabet. The accounts rendered here of 1878 and 1889–1893 (chapter 1) and 1895–1910 (chapter 2) are in part a cultural history of the ways these new inscriptions were apprehended and commodified—that is, the ways these new inscriptions became gradually less mysterious as inscriptions and more transparent as forms of or aids to cultural memory, part of and party to the data of culture.

Digital media inscribe too, and they do so in what are mysterious new ways. (Mysterious to me, at least, and anyone else without an engineering background.) I see words written on my computer screen, for instance, and I know its operating system and other programs have been written by programmers, but the only related inscriptions of which I can be fully confident are the ones that come rolling out of the attached printer, and possibly the ones that I am told were literally printed onto chips that have been installed somewhere inside. At least inscriptions like printer output and microprocessor circuits share the properties of tangibility, portability, and immutability. The others? Who knows? I execute commands to save my data files—texts, graphics, sounds—but in saving them, I have no absolute sense of digital savability as a quality that is familiarly material. I have tended to chalk this up to the difference between the virtual and the real, without stopping to ponder what virtual inscriptions (N. Katherine Hayles [1999, 30–31] calls them “flickering signifiers”) could possibly be.³⁶ Like the mysteries surrounding the inscription of recorded sound onto surfaces of tinfoil and then wax at the end of the nineteenth century, the mysteries surrounding the virtual inscription of digital documents are part of the ongoing definition of these new media in and as they relate to history. History “is written,” Steve Jones (1999, 23) imagines, for instance, “in the electrons, generally, or [the] magnetic particles or pits and valleys that make up” different storage media. Like so many casual appeals to itty-bitty ones and zeros, there is an element of practical fantasy or useful fiction here that makes a difference to the emergent meanings of digital media.

Different inscriptions do make a difference. The sociologist Bruno Latour (1990) has demonstrated just how powerful inscriptions (his “immutable mobiles”) are in the work of science. Scientists collect and circulate inscriptions, using some inscriptions—like electron micrographs, data sheets, lab notes, and cited articles—to produce others—such as grant applications and scientific papers for refereed journals. Other disciplines or types of inquiry work this way too. Classicists, for instance, work partly with inscribed archaeological

artifacts (stone tablets, coins, and so on) and inscribed archival ones (papyrus, vellum, and paper; manuscripts, print editions, concordances, and monographs). And of course, society at large depends on oodles of different inscriptions, everything from street signs, newspapers, and videos, to medical charts, price tags, and paperbacks. The relative functions or merits of different sorts of inscriptions can be difficult to parse, particularly if one is unfamiliar with the social contexts in which they circulate. There are inscriptions that make sense in broad contexts (any adult knows how a ten-dollar bill works, for example) and others that make sense only in exactly narrow contexts (like a baby picture, a dry-cleaning ticket, or the tiny accession numbers painted by a museum curator onto a rare specimen). Whole new modes of inscription—such as capturing sounds by phonograph in 1878, or creating and saving digital files today—make sense as a result of social processes that define their efficacy as simultaneously material and semiotic. A computer engineer can explain how digital files really are created and saved, but I would insist that the vernacular experience of this creatability and savability makes at least as much difference to the ongoing social definition (that is, the uses) of new, digital media.

Because they are at some level material, one important quality that all inscriptions share is a relationship with the past. Whether scribbled down just a second ago or chiseled into stone during the sixth millennium BCE, whether captured in the blink of a shutter or accumulated over months and years of bookkeeping, inscriptions attest to the moments of their own inscription in the past. In this sense, they instantiate the history that produced them, and thus help to direct any retrospective sense of what history in general is.³⁷ For example, the history of the Salem witch trials is known largely because people at the time wrote about them. These documents contain legible information, but they also carry plenty of other data by virtue of their materiality—their material existence and material or forensic properties. Historians today read the Salem documents, of course, yet they also “read the background”; they analyze the written words, but they also assess the look, feel, and smell of the paper, sometimes without even realizing they’re doing so.³⁸ A shared sense of writing, of what can be written down and what cannot, also helps make them comprehensible in a lot of subtle ways. A whole social context for and of writing existed then in Massachusetts, and a related context presently exists, although today’s tacit knowledge of writing includes influential details about what writing isn’t: it isn’t like photography; it isn’t like sound recording. Modes of inscription that Salem witches and divines could never have imagined in the seventeenth century are now subtly and unavoidably part of the way that seventeenth-century inscriptions are understood.

This means that media are reflexive historical subjects. Inscriptive media in particular are so bound up in the operations of history that historicizing *them* is devilishly difficult.

There's no getting all of the way "outside" them to perform the work of historical description or analysis.³⁹ Our sense of history—of facticity in relation to the past—is inextricable from our experience of inscription, of writing, print, photography, sound recording, cinema, and now (one must wonder) digital media that save text, image, and sound. The chapters that follow are in one sense argumentative examples of exactly this. They demonstrate how new modes of inscription are complicated within the meaning and practice of history, the subjects, items, instruments, and workings of public memory. Inquiring into the history of a medium that helped to construct that inquiring itself is sort of like attempting to stand in the same river twice: impossible, but it is important to try, at least so the (historicity of the) grounds of inquiry become clear.

How does the same sort of reflexivity complicate today's new media? How is doing a history of the World Wide Web, for instance, already structured by the Web itself? How is digital inscription, with its mysteriously virtual pages and files, part of an emergent, new sense of history for the digital age? Chapters 3 and 4 pursue questions like these in different yet complementary ways. Chapter 3 looks at some of the earliest instances of digitally networked text. It asks how creators and users of the ARPANET, the precursor to the Internet, experienced computer networks as requiring or related to inscription. What was the larger economy of inscription and inscriptiveness within which they experienced digitally networked text? What were the documents amid and against which digital ones might have been defined? Like chapter 1 in its focus on 1878 and 1889–1893, chapter 3 opens a narrow window, 1968–1972, in order to glimpse a new medium at its newest. Then, like chapter 2, chapter 4 broadens this prospect by focusing on later, more popular uses of still-emergent digital media. It asks how history is represented on the World Wide Web and how the Web is being used to represent its own history. Further, it asks how using the Web may be prompting users to underlying assumptions about the new and the old, about a sense of time, a sense of present and past, and even a sense of ending. My idea is that this last question, about using the Web, is the one that reveals just how linked the first two are: history *on* the Web and history *of* the Web. These are not identical, of course, but they are inextricable.⁴⁰

Like the missionaries who wrote histories of the Americas seemingly moments after stepping off their ships from Europe in the sixteenth and seventeenth centuries, a good number of people have already written histories of the Internet and the World Wide Web. Although the first Web server only went online in 1990, for instance, "The orthodox accounts ([Vannevar] Bush to [Doug] Engelbart to [Ted] Nelson to everything else)," admits Michael Joyce (2001, 211), have already taken "on the old testamentary feel of the Book of Numbers: 'Of the children of Manasseh by their generations, after their families, by

the house of their fathers.”⁴¹ The Moses or Edison of these patrilineal accounts tends to be Timothy Berners-Lee, the computer scientist at CERN who wrote and released the Web’s basic architecture, prompted the first generation of browsers, and now heads the World Wide Web Consortium (W3C) based at MIT.⁴² He and his colleague, Robert Cailliau, pitched the Web to their employer as an information management tool for CERN’s own continued work in particle physics. Chapter 4 will look further into how this history of the Web is being told, as well as how the Web appears in some respects to resist history.

Beyond CERN, the broader physics community made early use of the World Wide Web. For instance, the library at the Stanford Linear Accelerator Center (SLAC) soon offered Web-based access to “preprints”—articles that are on their way through the peer-review process, but that haven’t appeared in print or electronically yet with the final imprimatur of a refereed journal. The new accessibility of preprints made them not more authoritative but certainly more integral to the work of physicists. The practice of doing physics (like doing classics, as it happens) changed in keeping with the accessibility and abundance of what had before been inscriptions that circulated slowly and in narrow contexts.⁴³ Elsewhere on the disciplinary map, doing art history has also changed in similar ways, but it changed first in the early twentieth century with the advent of slide lectures as a defining pedagogical practice. As Robert Nelson (2000, 417, 422) explains, the slide in an art history lecture gets referred to and treated not as a “copy of an original, but as the object itself,” so that “arguments based upon slides alone are persuasive, even if the evidence only exists within the rhetorical/technological parameters of the lecture itself” (as, for instance, “when objects of greatly different sizes and from unrelated cultures are regarded as comparable because they appear side by side in the slide lecture”). According to Nelson, the result was a gradually more inductive and positivistic discipline; because or as part of the widespread adoption of slides in lecturing, artworks became self-evident facts in a new way.

There is an anachronistic or before-the-fact echo of Hayles’s flickering signifier here in the lecture hall, with new layers of semiotic process between art students and their subjects. But what these thumbnail histories of disciplines help to suggest more broadly is that the properties, accessibility, and abundance of inscriptions matter to their facticity, not what’s true or false but rather what counts as knowledge and what doesn’t, what questions seem interesting and important to ask.⁴⁴ And if the facticity and practices of doing physics and doing art history have changed in accordance with changing modes of inscription, it seems reasonable to think that the disciplinary practice of doing media history is changing with the media that it does history to.

Notes

Introduction

1. See Pingree and Gitelman (2003) for more on this perspective. “Identity crisis” is Altman’s (2004) wording, while “transition” is the term favored at MIT and The MIT Press. See Uricchio (2003); Marvin (1988).
2. See Jameson (2003) for a discussion of this point. Jameson wants to leave “aside the question of technological determinism” and yet recognize a symptomatic “projection out of the new media of a whole new set of ideologies appropriate” to the logic of globalized finance capital (705); postmodernism is complete modernism because instantaneous communications have evened out the experience of temporality across the globe as well as between colony and colonizer.
3. On German media studies in general, see Geisler (1999).
4. Here, I am drawing on Latour (1993, 2000). This is Latour’s point about anthropology (in this paragraph) and, later, something of his emphasis on the portability of inscriptions. It will be clear, I hope, that I’m not arguing for or against the epistemic conditions I describe (that nature and culture are assiduously kept separate); I am saying that these conditions are vernacular.
5. See de Certeau (1988, 21, 38, *passim*).
6. On telepresence, see, for instance, Sconce (2000). Admittedly, it has been less common in recent historiography to focus on media as representational than as epistemological, cognitive, and perceptual. Part of the reason for this is again deterministic. Geisler notes how German media studies has no interest in “actual *textuality*” (1999, 79), and explains that this (“programmatic” [88]) avoidance is really an artifact of both technological determinism (“the great advantage of dealing with the media as paradigm-forming technologies is that one need not concern oneself with representation” [104]) and the unadmitted baggage of the high/low assumptions (106–107) that form one legacy of the Frankfurt school.
7. On supervening necessity, see Winston (1998).

8. As McLuhan put it, “It is only too typical that the ‘content’ of any medium blinds us to the character of the medium” (1964, 9).
9. This comment on the fixity of print is Johns’s (1998) point, in a tiny nutshell. On photography, I am drawing on Sandweiss (2002).
10. It’s conventional to think of science as bounded and apolitical, but as Shapin and Schaffer (1985, 341–342) show in their account of Robert Boyle, Thomas Hobbes, and the air pump, that conventional boundary itself turns out to have been an artifact of the deeply political socialness from amid which modern science emerged.
11. I have been influenced here by the first chapter of Bowker and Star (1999).
12. Genetics would be different in “the pacing of research and the ways [its] questions may be framed” (Bowker and Star 1999, 36). Similarly, see Lenoir (1994); Clarke and Fujimura (1992); Hankins and Silverman (1995).
13. On the etymology of information, see Nunberg (1996, 111–114). On the reification of information, see Nunberg (1996, 116–123). Hayles writes provocatively about “information losing its body” (1999, 2); for the beginning of this process (the study of information as such), see Day (2000).
14. For the cultural (and rather Geertzian) side of this definition, which moves beyond a more purely semiotic model of communication, see Carey (1989, 13–36). For the technological forms plus protocols side of the definition, I have adapted the discussion of infrastructure in Bowker and Star (1999, chapter 1). The “ontology of representation” points away, I hope, from a purely perceptual account of media forms and toward an unabashedly humanistic sociology of knowledge. I want to get to—if not exactly below—what Mark Hansen calls “the ‘threshold’ of representation” (2000, 4), because I think that his “holist” approach and the “culturalist” approach can be closer together than he makes out.
15. This is from Lastra (2000, 13), a critique of what he calls “the camera’s click” version of media history.
16. Readers may recognize writ large in these questions the determinism of McLuhan-styled media studies (somewhat like Kittler), the Frankfurt school’s take on the culture industry (like most of Adorno), and a cultural studies sensibility with which I am admittedly sympathetic, if also leery of its “affirmative” stripe; see Budd, Entman, and Steinman (1990).
17. Bolter and Grusin (1999, 78) make this same observation about their own writing, and I am grateful to Jonathan Auerbach for pointing that out.
18. I have never seen a shred of evidence to suggest that Edison invented the phonograph to save the expense of copper or in thinking of a “Willis-type machine.”
19. Geert Lovink, “Interview with Wolfgang Ernst: Archive Rumbblings,” February 2002, <<http://www.perlentaucher.de/buch/10397.html>> (accessed May 2005 via <<http://laudanum.net/>

geert>). I'm drawing on Lovink here because of his superior knowledge of German- and English-language sources.

20. This is Lovink's (2003, 14) "aesthetic undertaking," and Clayton's (2003, 39) "literary" citation of the nineteenth century into postmodernism.
21. For a similarly nuanced periodicity, see Liu (2004b, 63; 2004a).
22. Also helpful here have been Rosenberg (1979), and Manoff's (2004) recent synthesis.
23. Chandler, Davidson, and Johns 2004, 3. I prefer genealogy to archaeology, as it were, or if the label is more Baconian than Foucauldian, this book pursues the "arts of transmission" as recently described in this introduction to a special issue of *Critical Inquiry*.
24. Warner (1993, 9) and Solomon (1993) and Nerone (1993) have also been helpful to my thinking here.
25. See also A. D. Chandler (1997). Both of these accounts tend toward technological determinism, and in my shorthand here, I admittedly run the risk of merely making their cause into my effect and their effect into my cause without sufficiently altering the terms of discussion.
26. Gramophones and phonographs worked in different ways, and could not play the same records.
27. I am thinking particularly of Garvey (1996) and Rabinovitz (1998), but also Miriam Hansen (1991), Rakow (1992), and Fischer (1991, 1992).
28. See Warner (2002) for an insightful elaboration of the Habermasian project. Geisler is describing the work of Helmut Winkler, who has introduced this perspective in German media studies. The centripetal power of media lies behind Anderson's (1991) influential notion of "imagined communities," for one, though again I think there is a danger in conceiving of media as *inherently* centripetal. For a wonderful, teachable example of a community torn apart by reading, see Sarris (1993).
29. There is a growing literature on this first-wave globalization. See, for example, Harold (2001).
30. See Manuel (1993, 37–39); A. Jones (2001, 53); Racy (1977, 97–99); Laird (1999, 18–19); Talking Machine Trade (1911).
31. On Lebanon, see Racy (1977). On Argentina, see Gronow and Saunio (1998, 31).
32. Gronow (1982, 12) estimates that "between 1900 and the 1950s, American companies issued at least 30,000 records aimed at the non-English-speaking communities in the United States," though many titles may only have had issues of one thousand or so.
33. See Farrell (1998, 67), who notes that the regional diversity of the Indian popular music industry was short-lived, and would reappear only with the dissemination of cassette tapes in the 1970s.
34. Recorded sound is easy to overlook as a precedent, I think, because it *offers* no visual idiom.

35. See, for example, Levinson (1997, xii); Starr (2004, 298–299). The “materiality” of digital media has been the subject of considerable comment among critics—for instance, in Hayles (1999)—though the term itself has developed a range of meanings that make synthesis particularly difficult—an issue I will return to in chapters 3 and 4.
36. As Hayles explained to me in an e-mail in April 2002, “When I coined the phrase ‘flickering signifier,’ I had in mind a reconfigured relation between the signifier and signified than had been previously articulated in critical and literary theory. As I argue in that piece, the signifier as conceptualized by [Ferdinand de] Saussure and others was conceived as unitary in its composition and flat in its structure. It had no internal structure, whether seen as oral articulation or written mark, that could properly enter into the discourse of semiotics. When signifiers appear on the computer screen, however, they are only the top layer of a complex system of interrelated processes, which MANIFEST themselves as marks to a user, but are properly understood as processes when seen in the context of the digital machine. I hoped to convey this processural quality by the gerund ‘flickering,’ to distinguish it from the flat durable mark of print or the blast of air associated with oral speech.”
37. There is a lot packed into this claim, I know; helpful to this formulation has been J. Chandler’s (1998, 60) reflections on (Paul Veyne and) history, as well as Poster’s (2001, 73–74) reflections on (Jacques Derrida, Judith Butler, and) the performativity of the trace.
38. “Reading the Background” is the title of a chapter by Brown and Duguid (2000) that elegantly makes this point.
39. A number of scholars have made related assertions. (Reflexivity, as Hayles [1999, 9] observes, is one of the—reflexive—characteristics of contemporary critical theory.) I am thinking of Raymond Williams’s (1976) observation about vocabulary in *Keywords*, de Grazia’s (1992) observation about the Enlightenment logic of textual authenticity, and J. Chandler’s (1998) observation about romantic literary history.
40. Critics who work on film and television make similar observations about “history on” as “history of” with varying degrees of self-consciousness. See, for example, Sobchack (1999–2000); Hanke (2001).
41. Joyce is thinking of hypertext and networked culture generally.
42. See particularly Gillies and Cailliau (2000). Cailliau calls himself (in the third person) “the self-appointed evangelist of the World Wide Web” (324). The Edison/Berners-Lee comparison is from Naughton (2000, 245). The Edison/Moses comparison is from Carlson and Gorman (1990), who call Edison the Moses of mass culture because Moses led the children of Israel to the promised land but did not enter.
43. See Gillies and Cailliau (2000, 218, 226–227); L. Addis, “Brief and Biased History of Pre-print and Database Activities at the SLAC Library, 1962–1994,” January 2002, <<http://>

www.slac.stanford.edu/~addis/history.html>. With regard to the classics, I'm thinking of the Perseus project (<<http://www.perseus.tufts.edu>>) and the *Thesaurus Linguae Graecae*; see Ruhleder (1995).

44. In thinking about disciplines as such, I have been prompted by Ruhleder (1995), and influenced by Lenoir (1997), especially chapter 3.

Chapter 1

1. The portion of this chapter on nickel-in-the-slot phonographs initially was a contribution to a conference at the Dibner Institute at MIT, and I am thankful to Paul Israel and Robert Friedel for their invitation to participate. The material on tinfoil phonographs has occupied me for a long time; different and much more partial versions have appeared as “First Phonographs: Writing and Reading with Sound” and “Souvenir Foils.”
2. *Scientific American* 37 (December 1877): 384.
3. Lastra's (2000) first chapter, “Inscriptions and Simulations,” is an account of the ways in which modern media were first imagined according to these tropes.
4. There is a widespread misapprehension that magnetic tape was the first medium for amateur recording. Actually, phonographs and graphophones (but not gramophones) could all record sound until electrical recording became the norm around 1920. See Morton (2000).
5. These are claims adapted from the work of Anderson (1991), Habermas (1989), and Warner (1990). On circulation, see also Henkin (1998); John (1995).
6. On public speech, for instance, see Looby (1996); Fliegelman (1993); Grasso (1999); Ruttenburg (1999).
7. The most notable exception is Cmiel (1990).
8. Secord (2000, 523) supposes that “relative stability in print reemerged from the mid- and later 1840s” in Britain, “with the laying of a groundwork for a liberal nation-state, based on imperial free trade and an economic future clearly within the factory system,” though this was clearly not the case in the Victorian United States. Another factor unattended here, as in Secord, is electric telegraphy.
9. For the number of papers, see *Centennial Newspaper Exhibition* (1876), where the data were compiled in part from the 1870 census, and in the course of collecting a “monster reading room and an exchange for newspaper men” at the Centennial Exposition in Philadelphia, known as the Newspaper Pavilion, with collected issues from across the United States. According to the *U.S. Census of Manufactures*, in the twenty years between 1880 and 1900, the amount of capital involved in U.S. newspapers and periodicals rose by an estimated 400 percent, and the amount of paper consumed rose by 650 percent.