ce theory of the beginning and the question of agency. Instead of ewing technology generally and music technology in particular as mething separate from society, separate from individual social actors, is concluding chapter takes issue with those who are revising Mar- all McLuhan's deterministic arguments about the media to under- and digital technologies. Rather, we make machines for our own ends. am hoping instead that, like the Goa/psy trance dancers, we are stead becoming postindividuals—that is, more aware of ourselves as cial beings.

from T. Taylor, Strange Sounds: Music, Technology, and Culture, 2001.

2

MUSIC, TECHNOLOGY, AGENCY, AND PRACTICE

In direct contrast to German philosophy which descends from heaven to earth, here it is a matter of ascending from earth to heaven.

—*Karl Marx,* The German Ideology

This chapter examines the ways that digital technology shapes the three areas that have historically been so affected by technology: music production, storage/distribution, and consumption.[1] However, in keeping with my interest in the agency of everyday people and their use of everyday technologies, I will focus on distribution and consumption more than production and the practices of the music industry, which others have usefully done.[2] Following this survey, I will discuss the problem of agency in existing theories of technology and society, and offer an adaptation of an existing social science body of theory for use in the study of technology.

It may seem odd that I am insisting that a theory of technology in society take into account everyday technology and everyday users of it, but it is important to recall that, at the moment of its invention, any technological artifact does not yet have a social history or use, even though it was produced in a social setting. That is, the social production of technology is quite different from its subsequent social uses.

Raymond Williams writes that "virtually all technical study and experiment are undertaken within already existing social relations and cultural forms, typically for purposes that are already in general foreseen. Moreover, a technical invention as such has comparatively little social significance. It is only when it is selected for investment towards production, and when it is consciously developed for particular social uses—that is, when it moves from being a technical invention to what can properly be called an available *technology*—that the general significance begins."[3] It is this "general significance" of the social life of technological artifacts that interests me.

Music Production, Storage, Distribution, and Consumption

Technological changes are occurring so rapidly, and lawsuits mounted so quickly, that it would be pointless to attempt to examine every new piece of hardware and software, which would only render this book woefully out of date practically overnight. Instead, I will confine the following discussion to what I think are general trends that new technologies has helped bring about.

MP3s: The .Wav of the Future?

Digital technology is helping to challenge—even, in some instances, break down—the difference between production and consumption. Nowhere is this convergence—or confusion—of production and consumption more evident than in the rise of the MP3. Most people in the so-called developed countries are familiar with compact discs and the claims of greater fidelity and convenience. But the technology that has really changed storage and portability for consumers is the Internet. Early in the days of the World Wide Web, there were technologies available for transporting and transmitting audio, but most of these formats either sounded as though the sounds were coming over a phone line (which, of course, they were if the user had a modem); or the file sizes were so huge that they would take a long time to download over a dial-up connection, and would then be difficult to store. The advent of more affordable CD burners has changed this somewhat, but large file sizes are still a problem for dialup users. Who wants to wait for hours to download one song that is then too large to store conveniently?

The MP3 format has changed all this. MP3 (short for MPEG-1 Audio Layer 3), boasts quality approaching that of the CD but with far smaller file sizes than CD audio (though they're still large). One three- to four-minute song from a compact disc might occupy, say, 40 megabytes on a CD, but this song can be "ripped" from the CD using free and easily available software and converted to an MP3 using the same software (or other free and easily available software). The resulting MP3 file is far smaller (perhaps less than one-tenth the size of the original), which means it can be easily uploaded to the Internet and sent to any receiving computer. This is still a large file, which would deter some people with slow modems from downloading it, but more and more people have Ethernet connections (such as college students in their dorm rooms, who, with their relatively high amounts of cultural and educational capital, seem to be the biggest group of users), and these files can thus be downloaded quickly.[4]

Once downloaded, MP3s can be stored as any file is stored: on the hard disk, on a Zip disk, on a CD if the user has a CD "burner." Users with a sound card that permits a connection to a stereo can record MP3s with whatever audio equipment they have. Until recently, however, the problem was portability, but in 1998, San Jose-based Diamond Multimedia Systems released the Diamond Rio MP3 player, which easily attaches to the computer for downloading MP3s from the hard disc. In a small, portable size, it can store about sixty minutes of music, and since there are no moving parts, unlike a Walkman or Discman, it never slows or skips. Since the Diamond Rio was introduced, many similar players have hit the market. Most of these were released by small companies, but in the fall of 1999 RCA entered the fray, a possible indication that the MP3 is here to stay. Prices of the players are coming down as well; the Diamond Rio was introduced at $179, but it later sold for $89 (after a $50 rebate).[5]

This mode of storage and distribution marks the beginning of a radical change. M. William Krasilovsky and Sidney Shemel's indispensable guide to the music business offers several flowcharts that show the changes in distribution in the recording industry from the 1930s to 1990. What we see is a trend toward increasing complication, with growing numbers of middlemen and more specialized services. The earliest flowchart, the 1930s through the early 1940s, has only two intermediaries between manufacturer and consumer; the second, for the late 1940s to 1955 (marking the entry of the jukebox), has five; the

third chart, 1955 to 1957, has six intermediaries, including the then-new record clubs; the last chart, 1957 through 1990, has eleven.[6] Online downloads will not change this chart much, at least at first, except to make it possible, for the first time ever, for consumers to purchase recordings directly from the manufacturer without joining a record club.

MP3s aren't used solely to disseminate prerecorded compact discs; DJs, producers, and musicians send their music around the web this way as well. Unknown musicians can put their music on their own websites, or send it to such sites as MP3.com, which has thousands of different selections, organized by seventeen different genres (and many subgenres).[7] DJs are increasingly bringing a couple of laptops to gigs with hard discs full of MP3s, instead of toting their more familiar box of vinyl LPs. There are a growing number of software applications, such as Digital 1200SL by Visiosonic (the 1200 refers to the preferred turntables of DJs, the legendary Technics 1200), that allow them to cue up their MP3s just as though they are cueing up vinyl recordings.[8]

Some companies such as Music Point are also developing kiosks that allow customers to select the tracks they want and then wait while they are burned onto a CD that the listener can then take home.[9] This may not sound that similar to MP3s, but what is noteworthy, is that, with both of these technologies, listeners can pick whatever track they want from any recording. If they don't like some songs from a particular album, they don't have to get them.

Music Consumption

> [Radio, gramophone, and film have made available a] boundless surfeit of music. Here, perhaps the frightful expression "consumption of music" really does apply after all. For perhaps this continuous tinkle, regardless of whether anyone wants to hear it or not, whether anyone can take it in, whether anyone can use it, will lead to a state where all music has been consumed, worn out.
>
> —*Arnold Schoenberg,* Style and Idea[10]

Since I am concerned with the issue of agency and technology, I want to turn now to examining changing patterns of music consumption—the main way that most people today interact with music. If history is any guide, Simon Frith tells us, those technologies that catch on are ones that lead to the decentralization of music making and listening, and more flexible ways of listening, and so MP3s or their successors are here to stay.[11] This increasingly personalized nature of music consumption, made possible with digital modes of distribution, whether Internet or kiosk, is therefore worth thinking about. MP3 technology means that listeners will be able to avoid buying a prepackaged bunch of songs on CDs or cassettes and instead put together whatever combination they want.

Today's technology makes possible a greater degree of eclecticism in consumption than ever before because of purchases (or downloads) from the web of single tracks of recorded music.[12] While in the past a consumer with eclectic tastes might have cultivated an interest in several genres (it is easy to imagine someone whose record collection boasts selections of jazz, blues, rock, and world music), it is now easy to acquire, cheaply or for no cost at all, just about any kind of music one might want from the Internet.

So how do we speak of this new flexibility? David Harvey's notion of "flexible accumulation" is meant to describe the post-Fordist or disorganized capitalist mode of production today: just-in-time production, production of small batches for carefully targeted groups, with accompanying niche marketing.[13] But Harvey (as well as those who emphasize post-Fordism as the current mode of production) tend to be production oriented, which begs the question: what about changing patterns of consumption?

Scott Lash and John Urry also critique Harvey's and others' tendencies to be too concerned with production and not enough with consumption. Neither Lash and Urry nor I would go as far as some—most famously, Jean Baudrillard—have, arguing that patterns of consumption have become so flexible or confused that consumers are overwhelmed by the plethora of available signs.[14] Lash and Urry's "reflexive accumulation" is their attempt to theorize new modes of consumption that have not jettisoned the agency of the individual consumer. A subcategory of this general term is of direct interest here: "reflexive consumption," a kind of consumption made possible by the decline of social forces that once influenced, even determined to a significant extent a particular consumer's choice—family, corporate groups, and social class.[15]

Lash and Urry, however, overlook the fact that not everybody can

ford whatever they want. Credit card debt, organizations such as penders Anonymous, innumerable self-help books on how to quit pending, and other forms and symptoms of irresponsible consumer ehavior are proliferating, to be sure, but it is still the case that not veryone can afford everything (though those who can't may have to ope with heightened desires for that which they cannot afford). nother critique revolves around a more historicized reading; America as been a mass consumption society for most of the post–World War era, and identity formation has been caught up in consumption for ecades, even for the entire modern era, as some have argued.[16]

This degree of eclecticism, this notion of reflexive accumulation acilitated by the digital distribution of music, is related to the increasngly technologized social life. Today's music fan may not hang out hysically with a group of fans with similar tastes, but instead can find ellow music lovers on the Internet by visiting websites devoted to paricular musicians (some of those made by fans are incredibly detailed nd complete); newsgroups devoted to particular bands, styles, regions, r eras; or by joining similarly specialized mailing lists, which put enail messages in users' inboxes. I have seen many messages on the nailing lists to which I subscribe saying that the particular writer is lone in her tastes, how few of her friends are interested in whatever nusic to which the mailing list is devoted. It may be that the era of the Phish fan, and the Canadian Madonna fan magazine that refers to all ther musicians as NMAs ("Non-Madonna Artists"), will disappear.[17] But today's isolated fans can find like-minded friends on the Internet.

Until recently, music was pretty much used as manufactured—companies made recordings, consumers played them back. Playback situations varied hugely, of course. Yet, whereas in the past only someone with a studio could alter recorded music (the main, and important, exception being hip hop musicians scratching their LPs), with digitally recorded music and with inexpensive software or even free Internet websites, it is now possible for music fans to remake and remix somebody else's music. With an MP3, one can play the music, or one can play with it, using any one of a number of available software packages; the listener can be a DJ, a remixer, a soundscape artist, and engineer. And much of the software that makes this possible is free or cheap (by which I mean under $100). Some of this software seems to be popular; I tried many times to download Visiosonic's PCDJ Phat, a free MP3 DJ application, with no success.[18] After a week

or so, I tried again and found that Visiosonic had added two servers to handle what I take to be a far greater than anticipated demand. Their motto for this product: "Don't just play, MIX with PCDJ!" There are other such applications, such as Virtual Turntables ($42), which emulate a DJ's pair of turntables.[19]

One can remix using Mixman Studio ($34.95) or Mixman Studio Pro ($89.95), software applications that allow you to make your own remixes of prerecorded (available from Mixman) music and save them as MP3s.[20] Software that permits remixing of MP3s was slower to arrive on the scene but is quickly being developed and is already appearing.

Additionally, online companies are now springing up that allow users to make their own music on the web. Take one example, MusicHall 2000. Visiting their website results in the following message:

> Welcome to the first global online music community.
> Music is the mother tongue of all people.
> mH_20.com marks the beginning of a music evolution that will enable anyone to create, exchange, share and distribute music regardless of experience or ability. mH_20.com is the first true online music community to take full advantage of the World Wide Web's interactive potential by offering a new way to create and share the gift of music.

Such language pushes all the buttons of those inclined to "cyberlibertarianism" (Langdon Winner's term to describe conservatives who have embraced the computer[21]). Discourses of community, liberation, and democratization are combined with older notions of the "international language of music" and the imperializing assumptions of Western companies with respect to the rest of the world's music.

MusicHall 2000 asks the user to select samples from anywhere in the world by clicking on a map of a revolving globe. These samples can then be dumped into a sequencer (a kind of software that allows one to manipulate sounds, as a word processor allows users to manipulate words), Sonic Foundry's Acid DJ 2.0; samples can be edited using Sonic Foundry's Sound Forge XP 4.5. Once the music is done, one can upload it to MusicHall 2000 for others to listen to, download, sample, and remix. The same can be done to anybody's music. To accomplish all this one registers and pays a monthly fee of $3.99, or $19.99 for a

ear. Registration brings a "free" CD-ROM with the necessary soft-
vare, as well as some sound samples, messaging capability, and other
oodies. MusicHall 2000 is competing with the aforementioned Mix-
nan, a CD-ROM that comes with a few tunes that listeners can remix.
Additionally, record companies and retailers such as Virgin include a
Remix" button on their websites. Users can not only hear music
efore buying it but can also remix it, though they can't save their
emix.[22]

Classic Theories of Consumption

t has not been widely noticed that arguments concerning consump-
ion form the core of some of the most influential theories of mass and
opular culture going back to the Frankfurt school and continuing to
he present in various theories of postmodern culture. The main two
ositions historically have been essentially "top-down" and "bottom-
up": that is, that the so-called culture industries promulgate their prod-
ucts on a public that accepts them unquestioningly or, that people
make their meanings out of mass-produced and mass-mediated cul-
tural forms. Thanks to the work of the so-called Birmingham School,
in the realm of cultural studies there has been a rejection of the top-
down notion of *mass culture*, a model mainly associated with Max
Horkheimer and Theodor Adorno of the Frankfurt School, in favor of
a somewhat more bottom-up notion of *popular culture*, as if the first is
entirely malevolent and the latter only salutary.[23] If forced to make a
choice I would happily ally myself with the Birmingham School rather
than Horkheimer and Adorno, but even their position is not wholly
unusable. Horkheimer and Adorno's characterization of the "culture
industry" doesn't mean that people can't make their own meanings out
of the things they buy, even when they know that they might have been
manipulated into buying them.

There are arguments to be made on both sides: sometimes indus-
tries' desires prevail, sometimes people's do. As an example of the for-
mer, take the well-known example of Microsoft Windows versus the
Apple Macintosh operating system. Macintosh's was (and remains, at
least when I write this on my Windows machine that crashes with mad-
dening frequency) the superior system—famously more user-
friendly—but Apple's decision not to make the operating system source
code available prevented "clones" of their machines, which meant that
Windows, and thus, the IBM-compatible computer, now rules. In this

and many cases, business and/or marketing decisions trumped con-
sumer preferences—the top-down approach prevailed.

An example of the latter is the history of 8-track tape, a form of play-
back technology that didn't survive, beaten by the cassette despite the
latter's inferior sound quality—putting sound on half the amount of
tape as in 8-track, and playing the tape back at half the 8-track's speed.
Cassettes, despite the inferior sound, prevailed because blanks were
cheaper, tapes and machines smaller and thus more portable, and they
could hold more music (up to ninety minutes).[24] It was the flexibility
afforded by the cassette that made it more desirable, and flexibility, as
we have seen, is generally what has made the difference historically, as
we are seeing once again with the inferior sound of the wildly popular
MP3. Today, the 8-track tape is often mentioned as one of the more
common examples of wrongheaded technology, even though it was the
first tape format to achieve a national market.[25]

The Frankfurt and Birmingham Schools represent two poles. While
the Birmingham School seemed to prevail for a while, the rise of what
we now call globalization and new kinds of technologies such as satel-
lite television, computers, and fax machines meant that cultural forms
traveled farther and faster than ever before, a condition that in some
quarters prompted a resurrection of arguments resembling those of
the Frankfurt School. Jean Baudrillard, perhaps the most influential
theorist of consumption in the last couple of decades, is in some sense
a neo-Frankfurter. For my purposes here, what is most noteworthy
about Baudrillard on the subject of consumption is that he, like so
many authors, takes a position on what is to me the crucial theoretical
issue of structure and agency. Baudrillard, like his earlier German
forefathers, assumes a structure that dominates individuals. Rather
than the culture industry, however, the dominating structure is the
code, the system of signs that has replaced actual products (referents,
or "finalities" in Baudrillard's language, which are thought of as having
functions), which were once what people consumed. This system of
signs structures reality itself, even produces it. Objects are no longer
defined by their functions, by their relationships to people, but now
are defined by their relationships to each other in the absence of the
social that is assumed to have been effaced—and along with it, indi-
vidual agency.

But studies of consumption have not been ethnographic.[26]
Researchers who conduct ethnographies are not finding changes as

dramatic (or negative) as Baudrillard and others predicted. James G. Carrier and Josiah McC. Heyman, for example, argue that contemporary patterns of consumption in the United States are far more connected to household interests and needs, whereas the familiar "cultural studies" notion of consumers as individuals "who contemplate, desire and acquire commodities" describes a fairly small subset of consumers and consumption patterns.[27] They preface this empirical argument with a trenchant critique of the recent academic interest in consumption—a turn, they say, that suffers from its synchronic approach, its use of psychocultural explanations (that is, explanations that are concerned with what goes on in people's minds as reflections of collective values), arguing that the literature on consumption represents consumption and consumers unidimensionally.

Carrier and Heyman are not arguing that previous theorists of consumption are wrong, simply that, without an ethnography or at least attention to specific social groups in specific times and locations, a practice as broad and ubiquitous as consumption cannot be theorized totally as either Horkheimer and Adorno on the one side, or Stuart Hall and the other "New Times" proponents on the other.[28]

Daniel Miller, another anthropologist of consumption, has written extensively about consumption and shopping and similarly finds that, contrary to a Baudrillardian top-down argument (and, perhaps more surprisingly, also contrary to what Stuart Hall and others have said), people shop as "an expression of kinship and other relationships."[29] This helps explain the massive popularity of Napster, a program that allows users to congregate in various chat rooms devoted to specific styles and genres of music and trade MP3s; they have access to your MP3s and you have access to theirs, effectively turning everyone's computer temporarily into a server. This means that MP3 distribution can be accomplished without any need for the music industry whatsoever except in the initial production of the distributed music. There is no need for a centralized distribution system, either physical or virtual (such as MP3.com). Napster permits fans to come together to converse and share their music, unlike other websites such as Gnutella that similarly offer free exchange of files but without a centralized website or meeting place.

These arguments about consumption make sense even from a commonsense perspective (though it is interesting how theorists of consumption never discuss their own, presumably commonsense,

experiences of consumption). For me, at least, some shops are simply more fun to go into than others; some categories of items—such as books or CDs—are more fun to shop for than, say, shoes. Grocery stores with lovely displays of organic produce are far more inviting to me than shops featuring food from factory farms.

Despite the work of Carrier and Heyman and other ethnographers, the two poles, represented by the Frankfurt School (essentially top-down) and Birmingham School (more bottom-up), remain dominant. You are probably thinking I am about to propose some sort of middle ground between these two positions, but I am not. Facing facts, sometimes some consumers in some places and times are duped; sometimes some industries in some places and times fail to fool their customers. Practices of marketing and consumption, from being either top-down or bottom-up, are instead more like Stuart Hall's memorable characterization of the dynamic between dominant and subordinate cultures, "the double movement of containment and resistance" that never ends.[30]

Technology and Agency

This double movement can only happen because individuals have agency, albeit in varying degrees. And at this point I want to step back and attempt to put the foregoing into some kind of larger theoretical framework, always keeping in mind the issue of agency. There are a wide variety of writings in science and technology studies useful here that I will attempt to reconcile with social theories of practice.

The problem of top-down and bottom-up characterizations is not confined to models of consumer culture, but is much more widespread and is in fact one of the most intractable of all problems of social theory. It should thus be no surprise that technology is caught up in a similar set of debates and assumptions, with the idea of technological determinism as a kind of top-down model and voluntarism its polar opposite.

But first it is necessary to examine how this dichotomy has come to be possible in the realm of technology. The slipperiness of the term *technology* can lead to its reification, lifting it out of the social, cultural, and historical webs in which it is produced and used.[31] One would have to have been living outside our current moment not to have heard phrases such as "technology changes the way we see," as an ad for my

local television news has it, as though it were technology and not ourselves making and using various technologies in a complex series of interlocking webs.[32] Anthropologist Bryan Pfaffenberger makes a similar point, though for him, technology is usually fetishized in the classic Marxian sense, its social ties hidden.[33] Both points are useful; technology is both fetishized and reified, its social and historical existence understated or hidden entirely. But another anthropologist, Robert McC. Adams, reminds us that it is changes in the social world that have been more important in the direction of technological trends than the nature of the particular technology itself.[34] The same point may be applied to changes in technology itself: technological changes tend to occur for social and historical reasons rather than technical ones.[35]

The reification and fetishization of technology has resulted in assumptions about technology that can be characterized as usually falling on one of two poles. The first is the familiar voluntarism argument: technology is a tool that people use, nothing more, and is thus essentially neutral; it is only good or bad depending on its use. The second is the position known as technological determinism, in which technology is assumed to transform its users directly. One could add yet a third position, what Langdon Winner has named "technological somnambulism," a term that refers to the uncritical attitude toward technology that assumes that, whatever it is, technology is made by engineers and used by everyone else; it is simply a tool and as such doesn't merit serious reflection or consideration.[36]

Technological Determinism

The most pernicious of these three positions is the notion of what has become known as technological determinism, in which technology is assumed to transform its users directly.[37] Phrases such as "technology is changing our lives," which attribute agency to technology, uncover one of the most potent and durable assumptions about technology—namely, that it changes us, perhaps more than we change it. Even though historians, sociologists, and other students of technology have labored assiduously to complicate this simplistic notion of technological determinism, it is nonetheless the case that this remains a salient viewpoint outside of the academy.[38]

But even in the academy, the idea of technological determinism has found new life in some studies of technology and media, where it usually appears as some kind of McLuhanesque idea that the nature of media alters our perceptions: "the medium is the message."

We are, perhaps not surprisingly, in the midst of renewed interested in the writings of Marshall McLuhan, whose work never strayed far from a fairly strict determinist idea of the effects of media. The Canadian scholar's works are being cited again and again in the face of new digital technology; a collection of his writings has recently been published, as well as a book by Paul Levinson called *Digital McLuhan*, in which the author posits that McLuhan's contemporaries thought he was talking about television when he was in fact presciently talking about the Internet.[39]

Despite Levinson's attempts to soften some of McLuhan's more extreme language, McLuhan's technological deterministic attitudes are unmistakable. For example, take the well-known statement that "the medium . . . shapes and controls the scale and form of human association and action."[40] "Shapes and controls"—there is little room for maneuvering or agency here. McLuhan's clearly deterministic language is not mitigated by later statements, only amplified: "The effects of technology do not occur at the level of opinions or concepts, but alter sense ratios or patterns of perception steadily and without any resistance."[41] All of this is not to say that McLuhan was entirely wrong, simply that he overstated the case.[42]

Since music is part of this "media" it is important to take McLuhan's and his revivalists' ideas apart a little bit. Friedrich A. Kittler's *Gramophone, Film, Typewriter* provides a recent example. Kittler is a Foucauldian-Lacanian, or Lacanian-Foucauldian, and in this conjunction ends up in or near McLuhanville. At one point, Kittler offers an argument about the decreasing necessity for human memory with the improvement in modes of storage: " 'The more complicated the technology, the simpler,' that is, the more forgetful, 'we can live.' Records turn and turn until phonographic inscriptions inscribe themselves into brain physiology. We all know hits and rock songs by heart precisely because there is no reason to memorize them anymore." Kittler goes on to quote Siegfried Kracauer about a typist he knows, " 'for whom it is characteristic that she cannot hear a piece of music in a dance hall or a suburban café without chirping along with its text. But it is not as if she knows all the hits; rather, the hits know her, they catch up with her, killing her softly.' "[43] Now, there is some truth to this. We have all had the experience of being reminded of a song or lyric, which seems

almost to trigger our singing or humming it. But Kittler is unconcerned with whether or not Kracauer's secretary likes singing the hits, whether she derives some pleasure from doing so. To argue that the songs sing her is a defensible position, but it is not defensible to omit the possibility that she makes her own complex and personal meanings of them. I suspect, also, that if this secretary could hum along with Johannes Brahms she would have invited Kracauer's—and perhaps Kittler's—approbation instead of disdain.

Music Marketing

Arturo Escobar reminds us that the role of capital must be considered in the face of new technologies.[44] As a way of examining these changes while keeping an eye on the issue of determinism and agency, particularly the ways that technological/media determinism intersect with theories of consumption discussed above, I want to turn now to another brief discussion of the music industry. The flexibility afforded listeners by digital distribution, licit and illicit, isn't theirs alone. They may be agents in the ways that they listen, but the music industry has increased its own flexibility as well. Many music listeners are quite sophisticated about obtaining and even manipulating music found on the Internet, and the music industry, for its part, is learning to be just as sophisticated in the way that it brings this music to the fans' attention. When RCA Records—a division of BMG, one of the "majors" (that is, a handful of the biggest record companies in the world)—wanted to promote its new star Christina Aguilera, it hired an Internet marketing company to promote Aguilera's 1999 eponymous debut album. Electric Artists of New York City formulated a plan. Stage one consisted of surfing the web to ascertain the current buzz on Aguilera. There was some discussion already, for Aguilera had released a single that was getting some radio airplay. Most fans didn't know, however, that one of her songs, "Reflection," had appeared in a hit Disney film, *Mulan* (1998). Leaving what they had called stage one, information gathering, for stage two, information disseminating, Electric Artists passed that information around in messages such as: "Does anyone remember Christina Aguilera—she sang the song from 'Mulan,' 'Reflection'? I heard she has a new song out called 'Genie in a Bottle.' "[45]

Electric Artists sent out pleas to encourage fans to ask their local radio stations to request the song in mid-July 1999. "Genie" went to the top of the singles charts, but the full album wasn't due out for another six weeks. Electric Artists continued their campaign, sending out information on Aguilera's television appearances and other information.

The album was scheduled for release on August 24, 1999, and earlier that month Electric Artists stepped up its efforts. They posted song snippets on a fan website. RCA also hired a direct-marketing firm to compose an electronic postcard containing song excerpts and biographical information, which was mailed on August 23 to 50,000 web addresses of prospective buyers, identified from their previous album purchases. When the album was eventually released, it debuted at number 1 and reached double platinum (two million albums shipped) in record time; it remained in the top 5 for weeks after its release; by the end of November 1999 it had sold four million copies.[46] Early in 2000, Aguilera won the Grammy award for Best New Artist.

Officials from Electric Artists claimed in a *Wall Street Journal* article that their cybersurfer hirelings identified themselves as employees of Electric Artists, though this doesn't appear to be true; one of their marketers (whose job title is "Grassroots/Community Marketing") wrote in messages from earthlink.net (not electricartists.com), where, according to the firm's website, he has an e-mail address.[47] As of this writing, there has been only one online post about this marketing strategy in any Usenet group—at alt.fan.hanson.

"Leverage" seems to be Electric Artists' favorite verb, judging from their website, for it appears in the first and last sentences of their introduction of themselves on their homepage: "Leveraging the Internet and new technologies, Electric Artists is remarkably re-defining the way music is marketed and consumed." And, "If your business involves music, or if your company is looking to leverage music to help strengthen your brand, you've come to the right place."[48]

Doubtless some future fans of Aguilera became fans when they picked up on the phony buzz created by Electric Artists. But, like Kracauer's secretary, this does not mean that they haven't found their own reasons to enjoy Aguilera's music.

Raymond Williams wrote over twenty-five years ago that the two positions of technological determinism on the one hand and voluntarism on the other "are so deeply established . . . that it is very difficult to think beyond them," a statement even more applicable today.[49] Still, it is clear that to some extent the various media and technologies we use to disseminate and store information change our perceptions;

something like determinism does happen sometimes. I am just unwilling to go as far as the technological determinists in saying that our perceptions are *directly* or *wholly* changed or determined by them. The theoretical and methodological problem, however, concerns ways of navigating between the historically well-established poles of technological determinism (or the controlling nature of any structure) and individual voluntarism. Williams used the phrase "symptomatic technology" to refer to the opposite position of technological determinism, but it is clear that his term labels what I am calling here voluntarism. Technology, he writes, is seen as "either a self-acting force which creates new ways of life, or it is a self-acting force which provides materials for new ways of life."[50] Williams rightly rejects these positions, however, for both, he says, isolate technology from society. Thus, we must also take issue with definitions of technology forwarded by Jon Frederickson and also employed by Paul Théberge in their studies of music and technology, for they adopt a notion of what they call "social technology" (technologies with specific uses and social formations) and "machine technology."[51]

In attempting to modify or obviate the voluntarism/determinism dichotomy, however, I think some have gone too far. For example, Michael Menser and Stanley Aronowitz write, "Technology does not *determine* social organization nor does it *cause* the rise of global capitalism. . . . We claim that, although technology and science may be everywhere, there is no determinism anywhere, if by determinism we signify a one-to-one correspondence between the causal agent and its effects; rather technology *permeates*, or inheres in, all these regions, practices, and ideologies."[52] But there are ways, as we shall see, that technological determinism happens. It is simply not an accurate description of the way that technology works in culture.

Instead of the foregoing uses or reuses of the concept of technological determinism, I prefer to follow those historians, sociologists, philosophers, and other students of technology and media in science and technology studies who view technology as neither voluntaristic nor deterministic but as caught up in a complex, fluid, variable dynamic of each. This relatively recent perspective was first forwarded, albeit obliquely, by Martin Heidegger in "The Question Concerning Technology." Heidegger's argument continues the somewhat pessimistic view of Lewis Mumford and José Ortega y Gasset—that technology, while neutral in and of itself, runs the risk of decreasing our

humanity or creating a rift between our creative sides and our scientific sides (as Mumford wrote in *Art and Technics*).[53] For Heidegger, technology is not technical, not a tool or machine, but rather, a process, a dynamic of "revealing."[54]

Agency in Theories of Technology in Society

In debates over determinism and voluntarism, it is clearly agency that makes the difference: people are either agents in the face of technology, or they are unagentic. But this is clearly not the case with the users of MP3s, the remixers of MP3s, and the DJs. A technological determinist argument would hold that the advent of the MP3 (which I am using here as an example, not as the only kind of new digital technology) in real ways *determines* how listeners use it, that MP3 technology is actively changing music itself. It seems, however, that hardly a day goes by without a new use of MP3s cropping up or a new software application being devised. MP3s are being used in ways that were inconceivable with the advent of this particular technology. So a theory that provides for some degree of agency is clearly necessary.

In several writings, Wiebe E. Bijker has identified three current modes of analysis that begin from a sociotechnical systems, or what he calls "sociotechnical ensembles," approach. (These approaches have been widely characterized and summarized and there is no need to rehearse them here except to introduce them to readers who might not know them).[55] The operating assumption is congenial: technology is never simply an artifact, but always caught up in social, historical, and institutional webs, an idea whose recent success Bijker credits to Donald A. MacKenzie and Judy Wajcman's *The Social Shaping of Technology*, first published in 1985 and since updated.[56]

But this assumption does not prescribe a particular method of study. There are three main approaches that Bijker labels: the "systems approach," in which large technological systems are the main focal point of analysis; the "actor-network" approach, which attempts to analyze any sociotechnical ensemble with the same analytical framework for both human and nonhuman actors, in a sense granting some degree of agency to objects; and, finally, Bijker's own approach, formulated with Trevor Pinch, called the "social construction of technology," or SCOT, which starts first by examining what Pinch and Bijker call "relevant social groups"—that is, those groups responsible for

developing a technology.[57] This last approach has also been called the "social construction" perspective.[58]

While all of these approaches are useful, I think they have similar limitations. In attempting to get around, or minimize, the problem of technological determinism, which is a more complex and intractable problem than voluntarism, most of these theories sidestep the question of agency. Also, while it would be wrong to assume that there is no determinism or voluntarism, most agree that we need a way of building determinism into any theory so that it can be considered in the moments that it does happen, instead of resorting to a vague and slippery position somewhere in a putative continuum of "hard" or "strong" technological determinism at the one pole and "soft" or "weak" at the other.

Of the major approaches currently available, actor-network theory takes this into account, though in a problematic way. Actor-network theory, associated mainly with Madeleine Akrich, Michel Callon, Bruno Latour, and John Law, argues that human subjects and technological artifacts should be studied with the same methods; that is, no analytical distinction should be made between subjects and objects, which in effect ascribes agency, or potential agency, to artifacts. This is accomplished by acts of "translation," in which various engineers' ideas about design are thrown up against one another, and the resulting design is "inscribed" into artifacts, which then act on human users who are in effect objects of that artifact.

In the words of Bruno Latour, "actor-network theory (hence AT) has very little to do with the study of social networks. These studies no matter how interesting concerns [*sic*] themselves with the *social* relations of *individual human* actors—their frequency, distribution, homogeneity, proximity. It was devised as a reaction to the often too global concepts like those of institutions, organizations, states and nations, adding to them more realistic and smaller set of associations. Although AT shares this distrust for such vague all encompassing sociological terms it aims at describing also the very nature of societies. But to do so it does not limit itself to human individual actors but extend [*sic*] the word actor—or actant—to *non-human, non individual* entities."[59]

Agency thus becomes a kind of discrete, transferable entity, which in actor-network theory means that human agents are always already somewhat diminished; actor-network theorists therefore tend to prefer the term *actant* to the more common social science term *actor* in

describing the human agent, a shift that demonstrates the ways that, in this theory, the agent, even when he is an agent, is less than an agent. The issue here is, first, that to ascribe agency to nonhumans is highly problematic; only humans can be agents in any meaningful social science sense. In attempting to permit some degree of technological determinism, or, at least, material effect, into their theory, these and other actor-network proponents seem to assume that determinism and agency are all-or-nothing propositions, but the real world of people and things is characterized by a dynamism and a variability that their theory fails to capture adequately.

What Latour and most theorists in science and technology studies (STS) accomplish by focusing on actors/actants and ascribing some degree of agency to objects is that they tend to evade that entity entailed by agency: structure. Structures act on agents, not objects. I will discuss this theoretical problem in depth shortly but here simply want to note the way that, in attempting to account for the actions of social actors with respect to technology, it is the *objects* that are appealed to, not *structure* in the classic social science usage of the term.[60]

In recent studies of information technology, a few researchers have forwarded an adaptation of Anthony Giddens's theory of structuration. Some of the familiar problems occur here, however, for as the name implies, structuration theory is more about structuration than agency, and the way that it has been used by most researchers has continued this bias toward structure. In the absence of an ethnographic perspective, most such studies—which appear mostly in the realm of the study of information technology—reduce agents to cogs in a structural wheel.[61] Rob Hagendijk, however, has argued that structuration theory provides some important answers that elude what he calls constructivist theories (which include actor-network, the main theory he argues against).[62] The reluctance of constructivists such as Latour and others to accept that there is a structure that exists independently of what a given set of actor/agents can make of it means that constructivists cannot satisfactorily explain why certain scientific ideas are accepted rather than others, for example.[63]

It could be said that I am focusing too much on agents and not enough on the technology. But my goal here is not to forward some kind of putative "balanced" approach to the study of technology in society; one could argue that that is what actor-network theory is, or

at least is attempting, to be. Rather, I am simply more interested in people and music than gadgets. The people I am interested in, however, are not necessarily the innovators, the inventors, the engineers, or the agents of change—the usual focus of STS. I am interested in everyday people and how they use everyday objects of technology, new or old, to make, disseminate, and listen to music. And it is precisely they who are omitted from the established STS theories, actor-network theory in particular. Bruno Latour and the others who advocate the actor-network approach do write about everyday technology, such as door closers and European hotel keys, and it could be argued that it doesn't matter who uses these objects, or to what end; these objects are designed to have one function, and it is for that function that most users employ them.[64] But what about more complex technology? What about a typewriter, a camera, an automobile? Things quickly become much more complicated.

Toward a Practice Theory of Technology

In a field already littered with theories—some still in use, others moribund, and still others, no doubt, nascent—I am nonetheless proposing another way of looking at technology in society that takes the most useful aspects of actor-network theory and Anthony Giddens's (and others') ideas about structure and agency. There is an existing body of theory that one could turn to (though to my knowledge it has scarcely been used to examine technology), and that is practice theory. Sherry B. Ortner writes that "studies of the ways in which some set of 'texts' . . . 'constructs' categories, identities, or subject positions, are incomplete and misleading unless they ask to what degree those texts successfully impose themselves on real people (and *which people*) in real time."[65] Texts—and technologies.

For Ortner, practice theory constitutes the one body of theory that can grapple adequately with the problem of structures and individual agency, though Ortner is careful to note that practice theory is less a theory than a founding argument—"that human action is made by 'structure,' and at the same time always makes and potentially unmakes it."[66] Practice theory provides a way of avoiding the traps of theorizing the subject and agency in the face of technology without falling back into the polarized positions of voluntarism on the one hand and some kind of structural determinism on the other, which seem to be the only two available points from which to argue. Agency, for my purposes here, refers to an individual actor's or collective capacity to move within a structure, even alter it to some extent. "The challenge," Ortner writes, "is to picture indissoluble formations of structurally embedded agency and intention-filled structures, to recognize the ways in which the subject is part of larger social and cultural webs, and in which social and cultural 'systems' are predicated upon human desires and projects."[67]

Ortner proposes the idea of "serious games" as a way of indicating the part conscious, part intentional, part scripted nature of social relations and human activities: "The idea of the game is on the one hand drawn from a variety of past social theories . . . as a way of getting past the free agency question, and theorizing a picture of people-in-(power)-relationships-in-projects as the relatively irreducible unit of 'practice.' "[68]

Still, calling technology a "structure" in the classic social theoretical sense may seem to be problematic. Whatever technology is, it is clearly always changing, whereas the term *structure* seems to imply something that is comparatively static. I thus want to spend some time outlining the ways that technology can be considered a structure in the classic sense in which Ortner and other social theorists use the concept, and why calling it a structure helps us make sense of it as a social and historical phenomenon. (I should also note here that anthropologist Bryan Pfaffenberger argues that his idea of the sociotechnical system is harmonious with Giddens's conception of structure as discussed in *Central Problems of Social Theory*, though he doesn't pursue this.[69])

William H. Sewell offers a particularly cogent argument concerning the nature of structure. Pointing out that "structure" in Giddens's theory (or anyone's, for that matter) is notoriously ill-defined, Sewell undertakes to clarify what the term might mean, carefully critiquing Giddens's usage of the concept. This usage is quite similar to Ortner's in that structure is seen not as a monolithic entity, but always dual; that is, structure both makes and is made by people. Structure, thus, does not preclude agency, but rather, structure and agency presuppose each other.

Still, it is a long way from structure to technology. Or is it? Sewell tackles Giddens's murky definition of structure and carefully sorts through meanings and implications in it. Structures are rules, according to Giddens, which means that they are not patterned social prac-

tices themselves, but the principles that pattern social practices, patterns that are difficult, if not impossible, to perceive; they are "virtual," they exist as "memory traces" rather than as concrete entities.[70]

Giddens argues that structures are also resources. Sewell explicates this to argue that resources can be both human and nonhuman, which includes "objects, animate or inanimate, naturally occurring or manufactured, that can be used to enhance or maintain power."[71] It is possible to excise resources from the conception of structure, and argue that structures are only rules or schemas, and then posit that resources are an effect of structures.

This means we are assuming that technology, as a resource, is also an effect of rules or schemas. Is this tenable? Sewell does not consider technology in his article, instead confining his discussion to resources in an everyday use of the term; he discusses (for just one example) the resources generated by a factory and the ends to which these resources can be put, but does not consider the factory and its technologies as resources themselves. Whether or not technology is included in this formulation, Sewell would probably find the idea that technology is the product of schemas to be problematic, for it implies a causal relationship between schemas and resources. Schemas, in this usage tantamount to structure itself, produce resources, which means we have failed to get around the problem of causality in structure and agency.

So structure should be thought of as "schemas, which are virtual, and of resources, which are actual," which means that each is an effect of the other.[72] And, Sewell continues, "Sets of schemas and resources may properly be said to constitute *structures* only when they mutually imply and sustain each other over time."[73]

Since the term *structure* can connote stasis, Sewell is careful to argue that structures are not fixed, but are mutable by agents. Agency entails knowledge of schemas; schemas are less the "memory traces" as Giddens would have it, or invisible and unspoken, as in Pfaffenberger.[74] Agents, however—and thus, agency—are not all the same. "Structures, and the 'human agencies they endow, are laden with differences in power."[75]

Technology, I rather think, is a special kind of structure. It is both a schema or set of schemas, and a resource or set of resources. It is no accident that some have interpreted "technology" to refer both to tools and machines, as well as techniques and kinds of knowledge. Bryan Pfaffenberger uses the term *technique* to refer to "the system of material

resources, tools, operational sequences and skills, verbal and nonverbal knowledge, and *specific* modes of work coordination that come into play in the fabrication of material artifacts."[76] It is possible to incorporate arguments by Heidegger and others who concentrate on schemas—that is, the intangibles—as well as those who prefer to think of technology as tools, as material objects. Technology is a peculiar kind of structure that is made up of both schemas and resources, in which the schemas are those rules that are largely unspoken by technology's users, thereby allowing for some degree of determinism, while technology as a resource refers to what we do with it—that is, what is voluntaristic.

While adopting a notion of technology as a peculiar kind of structure, and structure as something that entails agency, is a way of moving beyond the poles of technological determinism and voluntarism, it is nonetheless the case that some sociotechnical systems provide for greater and varying degrees of agency compared to others. That is, I am not rejecting the notions of technological determinism or voluntarism out of hand, but am instead saying that both positions are overtotalized and falsely binarized, and that opposing them masks the ways that some sociotechnical systems are more deterministic than others (though never wholly deterministic), that some provide for more voluntarism than others (though never total voluntarism), and that social actors do not have the same experiences with any sociotechnical system. Experiences vary in the familiar ways—based on social class, age, geographical location, gender, sexual orientation, religion, race, ethnicity, cultural capital, and so on. In short, while I am insisting that technology is a kind of structure, and that everyone is an agent, the positionality of any individual agent matters. As we shall see in chapter 7, sometimes actors *voluntarily* behave in ways that seem to be determined by the technology with which they have contact.

What a practice theory notion of structure—and, more generally, practice theory itself—forces us to keep in mind, then, is not only the founding argument, "that human action is made by 'structure,' and at the same time always makes and potentially unmakes it," but also the central question: what are these social actors doing in this time and place, and why?[77] By putting practice theory in the foreground of one's considerations, individual subjects and subjects-as-agents are always important, though never central, just as the structures that act on them are always important but never central.

Any music technology, then, both acts on its users and is continually acted on by them; MP3s—or any software or hardware—have designed into them specific uses, which are followed by listeners, but at the same time, listeners through their practices undermine, add to, and modify those uses in a never-ending process.

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