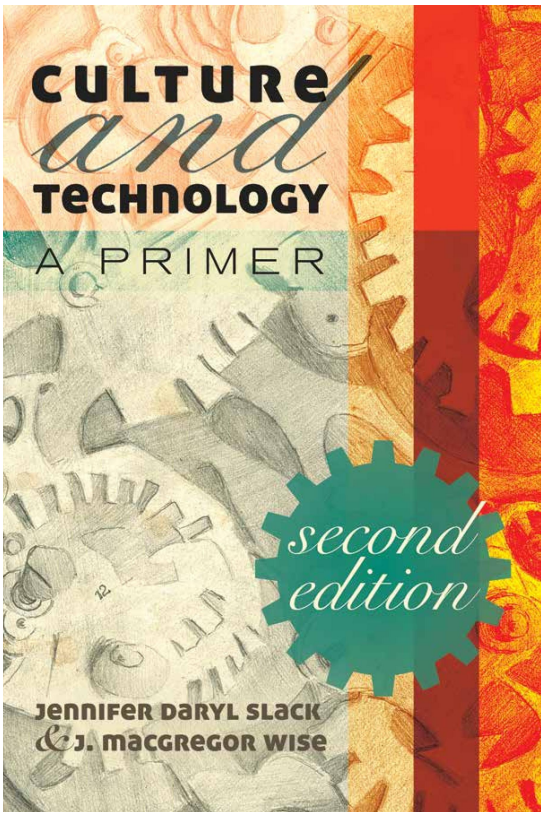
Culture and Technology

A Primer

Jennifer Daryl Slack & John Macgregor Wise



2014

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Praise for culture *and* technology

"With its disarmingly modest tone—-always attentive to the needs of the theoretically uninitiated, always ready with contemporary and captivating examples, always extending a hand to readers at every stage to join up as fellow travelers, Jennifer Daryl Slack and J. Macgregor Wise have written 'a primer' of the best sort. Their book is an open invitation to begin (or, for the initiated, to begin again with fresh eyes) an expertly mapped trek across a set of trajectories that reveals the twists and turns of the animating discourses knotted at the intersection of culture and technology. But more than this, Slack and Wise deftly show how knowledge gained can become knowledge for engaging—-from background primer to timely intervention. The task of turning its readers into practical social actors in the everyday is truly this text's great accomplishment."

Gregory Seigworth, Millersville University

"*Culture and Technology: A Primer* offers a major theoretical synthesis in the guise of an easy-to-use textbook. If you want to understand why culture matters for the study of technology and what a cultural studies approach brings to our understandings of technology, this book is essential. In clear and thoughtful prose, Jennifer Daryl Slack and J. Macgregor Wise begin with a critique of the standard assumptions about technology and culture and their dangerous political and environmental consequences. They then synthesize some of the key insights from cultural studies with work in actor-network theory, science and technology studies and the philosophy of technology. *Culture and Technology* offers a program for studying technologies as at once artifacts of human action, actors in their own right, and part of larger forces in the world. I assigned the first edition to undergraduates, placed it on Ph.D. students' comprehensive examination lists, and recommended it to senior science and technology studies scholars who wanted to understand what cultural studies can contribute to their work. The second edition includes a host of nice updates that make it an even better teaching resource. It will continue to be of great use for many years in all of the fields that it touches."

Jonathan Sterne, author of *MP3: The Meaning of a Format*
and *The Audible Past: Cultural Origins of Sound Reproduction*

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For
Lawrence Grossberg and Stuart Hall
Teachers and mentors without peer

Source: Linocut attributed to James Belvedito, 1933, Library of Congress, Harmon Foundation Inc, Records: `http://www.loc.gov/pictures/item/91783820/`

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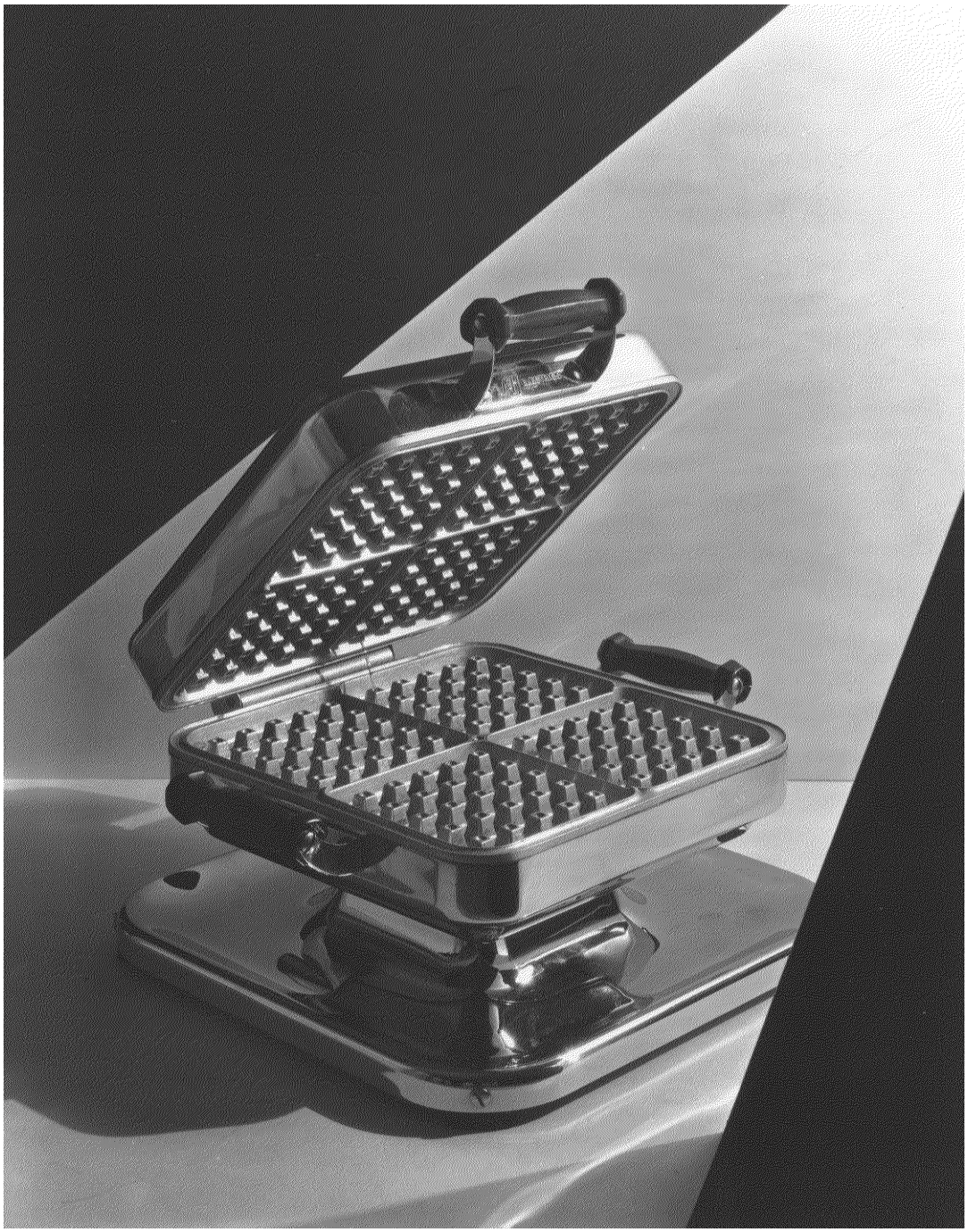

Figure 2: Potomac Electric Power Co Electric Appliances Waffle Iron

Theater West (especially Frances Smith Cohen and Susan Sealove Silverman) for being our village. In addition, Greg would like to thank Sherrie and the good folks at White Cup Coffee for letting him camp out there for long stretches of time during the final editing of this book.

Source: Painting by Jan van eyck, 1943, Wikimedia Commons, The yorck Project, ZenodotVerlagsgesellschaftmbH wikimedia.org

Figure 3: Madonna des Kanonikus Georg van der Paele, Detail: Bibel und Brille des Kanonikus

Introduction: On the Need for a Primer

TECHNOLOGICAL CULTURE HAS the power to shape attitudes and practices, but its power often goes unnoticed or is underappreciated. Every day it becomes increasingly important to understand and alter our relationship with technological culture. This is especially true when, as is so often the case, technological culture is shaping attitudes and practices that do not serve the interests of sustainability, equality, and peace. The scramble for non-renewable resources that both constitute and fuel technologies has contributed to strife, and sometimes war, of global proportions. New digital media technologies have enabled surveillance at a scale previously unimaginable. Inequitable delivery of health care is exacerbated, as expensive techniques of biotechnology are made unevenly available. Technological trash salts the earth and skies with pollution and provides toxic work for the most disadvantaged laborers on the planet. Global climate change, the fallout from all this technological madness, is widely denied in practice as the human imagination lives out the fantasy of unstoppable and infinite growth.

The stories that dominate education and the media are those that assert that technology is all good, all about progress, all about becoming superior kinds of human beings. That there is good is undeniable, but we have collectively lost perspective, lost the ability to critique the complexities of the technological culture in which we are immersed. Perhaps we haven't lost it, because we may never really have had it. But now, with the consequences so seriously global, we need desperately to acquire this skill. We offer this book as a primer for that project.

Culture and Technology is a primer in three senses: 1) it is an introduction to the contributions of many generations of scholars and engaged individuals who provide helpful guidance for understanding technological culture, 2) it is an introduction to a coherent cultural studies approach to understanding and critiquing technological culture, and 3) it is a spark to light the fire of conscious and responsible engagement with technological culture.[1]

This is a much revised and expanded second edition. A lot has happened in the world since the publication of the first edition in 2005, and we have responded accordingly.

[1] Our thanks to Glen Fuller for pointing out this third meaning of "primer" in his review of the first edition of this book. See Fuller (2006).

We, Greg and Jennifer, have also learned a lot from the students who have used the first edition and from readers from all over the world who have sent us feedback.

A new first chapter considers more explicitly how we use a cultural studies concept of culture. A new final chapter adds the concept of *the conjuncture* as a tool for analyzing technological culture, a change that results in a transformed conclusion. In addition to these new chapters, we have completely rewritten most of Part III, which lays out our approach to cultural studies as it applies to technological culture. Two glaring lacunae in the first edition have been corrected: the chapter on space has become space and time; the chapter on politics has become economics and politics. What were two chapters on identity have been reconsidered as one. And the chapter on definitions has been corrected to reflect its real intention: it is about meaning. Throughout the book, we have updated examples where newer ones were more useful for understanding contemporary experience. We have incorporated many new technological developments: new social media, cloud computing, biomedia, edward Snowden's revelations about NSA surveillance, the proliferation of e-waste, climate change, and so on. New research by remarkable scholars has been added, for example Sarah Sharma's work on time and natasha dow Schüll's work on addiction to machine gambling.

We do not profess to, or even attempt to, place before you contemporary technological culture in all its Technicolor intricacies. That isn't possible. Instead there is a fourth sense in which we offer our work here as a primer. When painting a room that that is already painted in strong colors, you begin by applying a primer, a first thin coating of paint, after which you paint with a fully new color. The primer conditions the surface so that it is receptive to the new paint. This book is meant to be such an initial coating. It engages the brightly colored stories that currently color our understanding of technology and culture. It applies the primer, on top of which you are encouraged to contribute colorful new paint: to engage technological culture in your own circumstances, whatever and wherever they are, with theory, tools, and strategies meant to make the world a better place.

Part I: Culture and Technology

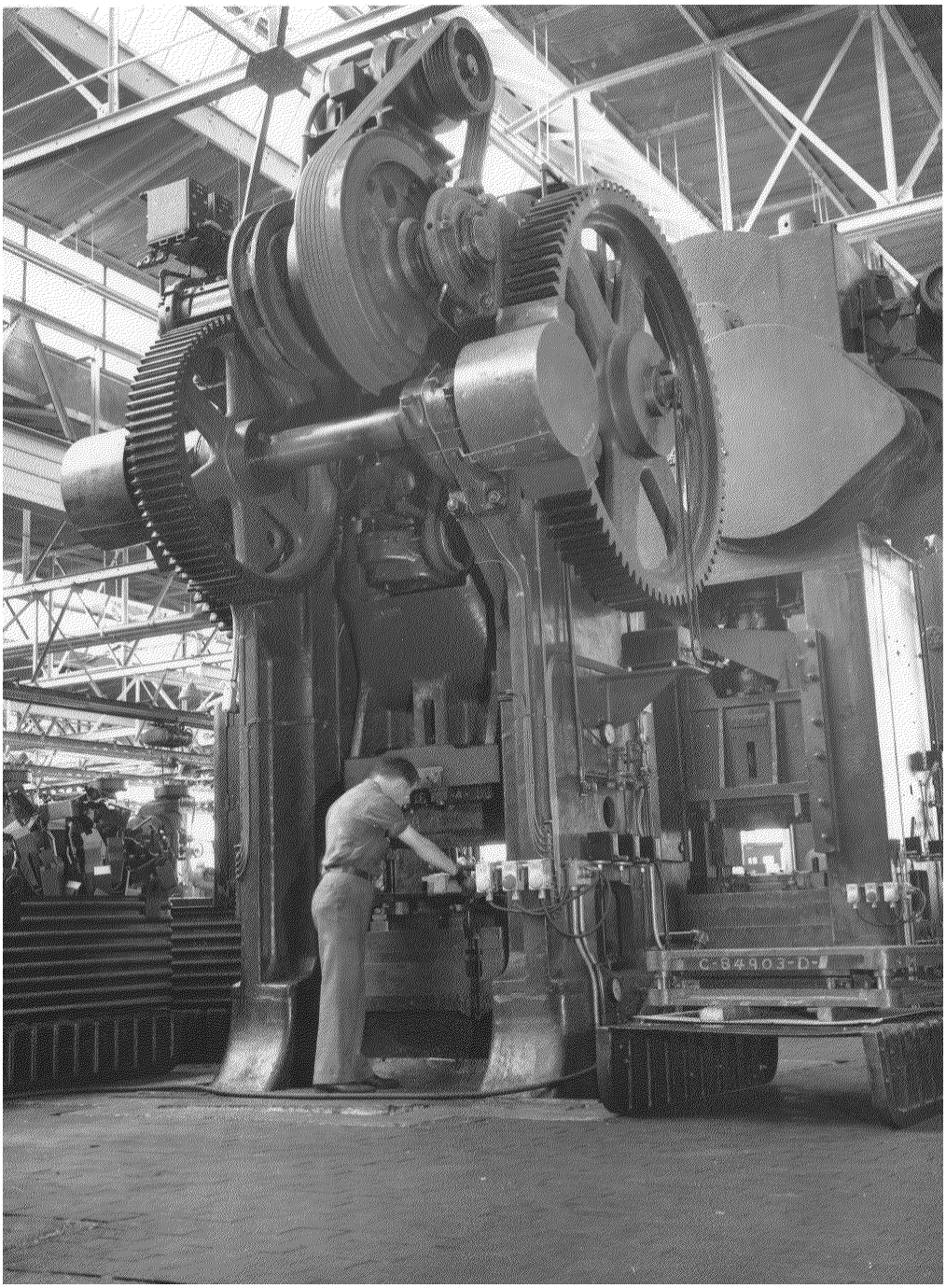

Figure 4: Chrysler Tank Arsenal

Source: Photography by alfred T. Palmer, ca. 1940–1946, Library of Congress, Farm Security administration, Office of War Information Photography Collection: `http://www.loc.gov/pictures/item/oem2002009934/PP/`

Figure 5: Compact Fluorescent

Source: Photograph by Giligone, 2008, Wikimedia Commons URL:http://commons.wikimedia.or

Chapter One : The Power and Problem of Culture, The Power and Problem of Technology

WHAT YOU KNOW TO BE TRUE MATTERS. When you know something, you act in accordance: your beliefs and actions support what you know to be true, correct, and good; your beliefs and actions resist what you know to be false, wrong, and bad. Once you really *know* something, it is difficult to shake loose from the power of those convictions that guide thinking and behavior to learn something new or different. What is true for the individual is even more pronounced at the broader cultural level. When a culture accepts that something is true, its political structure, economic structure, institutions, laws, beliefs, everyday practices, and systems of reward and punishment will be shaped in that knowledge.

Unfortunately, what is widely accepted as true does not always serve us well. When everyone *knew* that the universe was geocentric, it made good sense to arrest Galileo Galilei and repress his heliocentric cosmology. It took generations to achieve general cultural acceptance of the knowledge that the earth revolves around the sun. But before heliocentrism became widely accepted, certain religious institutions maintained power over thought and practice, and scientific enterprise was marginalized and discredited. Sometimes, in spite of broad cultural consensus, it pays to struggle with complacent knowing and "worry" your way to better stories about how the world works.

The knowledge you are least likely to question is often based on what you accept as true without question, because that knowledge is most strongly supported by the structures of culture and everyday life. The more powerfully aligned the structures and beliefs of a culture are, the more difficult the opportunities for change, even when change is, in practice, positive. Two things you probably know a lot about constitute the topic of this book: culture and technology. You know a lot about culture, and you know a lot about technology. However, we submit that much of what you know about them does not, in all likelihood, serve you—or the broader culture—well. We offer some alternatives that we believe will serve us all better.

You Know a Lot About Culture

We all use the word "culture" often and commonly, as if we understand what it means. But do we really know what we are talking about? Raymond Williams's insight ought to give us pause: "Culture is one of the two or three most complicated words in the english language."[1] In tracing the use of the term, Williams considers its many historical and contemporary meanings, including: the implication of tending or cultivating (as in agri-culture); the distinctions between human (cultural) and material realities, between symbolic (cultural) production and material production, between culture and society, between culture and structure; the attribution of having something special when one is cultured; the designation of a separate popular culture as opposed to high culture; the characterization of national differences (as in German versus French culture); and the related naming of subgroups or subcultures within a national culture (as in hipsters or rural America). Sociologists have a number of quite different definitions for culture, as do anthropologists. There is very little agreement, it seems, when it comes down to it as to what culture means.

Let's look at some aspects of Williams's definitions. Despite differences there seems general agreement that culture is the domain of human organization and activity in engaging the "rest" of reality. However, in practice we hear the occasional assertion that some animals have culture too (from complex social organization to active learning and change to artistic practice). Some definitions imply some discrimination, expressed in the differentiation of either humans from others or between human groups. And there is not only differentiation but clear hierarchies implied: there is one culture over here, another over there; or this group has culture (and power and status) and that group does not; or culture is over here and over there is something else such as something material (like a technology), a structure (like an institution), a non-human being (like an animal), or a human considered less than cultured (like a homeless person).

In cutting through the discriminatory aspects of these uses of culture (especially the dichotomy of high versus low or mass culture), while honoring its history, Williams argues for using the term culture in a way we generally subscribe to and promote in this book. Culture, he argues is "a whole way of life" and it is "ordinary."[2]

By describing culture as "a whole way of life," Williams means that it is the formation, arrangement, and organization of what we think, believe, value, feel, and do. However, culture is never static; rather, it is a process that entails changing relationships between what is old, what is new, and what is being reconfigured (the term we will introduce later is *rearticulated*). The process can be seen as driven by the interrelated work of tradition and selection. On the one hand, culture is shaped by the work of *tradition*: that is, the meanings, values, artifacts, and practices that are handed down to us, that we learn (and learn about) from families, churches, schools, and so on. These

[1] Williams (1983), p. 87

[2] Williams (1989).

include works of art and expression that are said to contain the values and worldview of a culture. On the other hand, culture is shaped by the work of *selection*: the selecting, challenging, arranging, and living of the artifacts and ideas in everyday life in the interactions with changing material conditions. Culture is thus a process whereby tradition is reconfigured in historical conditions of everyday life. Culture is both the traditions we are born into and how these are challenged (or reinforced) through our experiences of the world (and changing social, historical, and material conditions). At any particular time in the process of change, culture will express *dominant* values, feelings, beliefs, affects, and practices, but it will also carry with it *residual* features from earlier times or social formations (for example, there are still people who believe that the earth is flat) and *emergent* features that are new ideas and processes (for example, biotechnology is introducing new conceptions and practices of what it means to be human).[3] The particular formation manifest by the relationship of dominant, residual, and emergent processes at a particular point in time is what Williams means by culture as "a whole way of life."

To claim that "culture is ordinary" is to acknowledge that these cultural processes occur within the variety of practices that constitute *everyday life*. These include the whole range of activities in which people engage and within which people make meanings in their lives: from everyday expressions and practices such as a conversation over dinner or commenting on a tweet, to institutional structures and activities such as education or the practice of designing a new technology. Everyone participates in culture, therefore, because everyone engages in the practices that constitute their lives in relation to the lives of others. Culture is not the sole purview of the "cultured," and popular culture (like reality television) is as much culture as high culture (like opera). The work of culture is thus pervasive: there is no culture over here and material reality over there. There is no culture over here and society over there. Culture is the process that connects the elements of everyday life, whether symbolic, structural, material, or affective.

The approach to culture advocated here requires sensitivity to the way in which contemporary culture has been shaped by tradition and selection. Tradition and the work of selection are powerful, in that they shape what we know to be true and influence everyday life in myriad ways. This approach also requires a willingness to recognize that culture changes. It changes in ongoing processes of selection, in the ways that tradition is challenged by our experiences, and will continue to change in directions of which we cannot be certain. The shape and direction of change are the result of individual changes of mind, of the efforts of individuals and organizations to do things differently, of structural changes in institutions, and of responses to changes in material circumstances (for example, the depletion of a natural resource).

We advocate this view of culture because it will help you see why you believe what you do about technology, why you do what you do in relationship with technology,

[3] Williams (1980).

and how culture is organized to promote particular values, feelings, beliefs, affects, and practices involving technology at the expense of others. We call this configuration of beliefs and practices the *received view*. Interrogating it will help you see that these relationships are contingent, that is, they could be otherwise, and they can be changed. Just as people once came to accept a heliocentric cosmology, we can come to accept a more complex role for technology in everyday life.

You Know a Lot About Technology

It is astonishing how much you likely know about technology that was not taught in any official way. The knowing begins in childhood, where technologies (from toys to everyday objects) are objects of desire, vehicles for play, and artifacts of value. This knowing is differentially available because, after all, not every child gets a parent's iPhone to play with. If you are rewarded for technological prowess (as a child or adult), you learn that mastery of technology is culturally valued.

Formal schooling still teaches that technologies are the spawn of genius inventors: eli Whitney invented the cotton gin, Gutenberg invented the printing press, and so on. You know you are supposed to know them, that list of often-memorized inventors. You may or may not know what a cotton gin is. You may or may not know that Gutenberg really developed a particular version of moveable type and that print technology is centuries older. The details are less important than the lesson you learned about where technology comes from: invention is the purview of individuals, geniuses for the most part.

Schooling also teaches that technology is central to what it means to be human, because it teaches that as we develop new technologies we become different kinds of human beings. You likely learned that we have moved through technological ages that produce different versions of who and what we are: Stone age, Bronze age, Iron age, Industrial age, electronic age, Information age, and now the digital age. Technology is depicted as the causal agent of these ages. The ability to craft stone produces the Stone age. The development of industrial machines produces the Industrial age. The computer produces the Information age. The cultural transformations, however, are not simply from one kind of human to another, but from an inferior to a superior kind of human culture, and thus a superior human being. We *age*. We evolve. We mature. We are currently becoming surely superior digital human beings.

Because these lessons are often combined—the desirability of the object and the belief in the technologically driven evolution of the human into a superior being—you have likely learned that, as James W. Carey once said, "Technology is the central character and actor in our social drama, an end as well as a means." He added, "at each turn of the historical cycle it appears center stage, in a different guise promising something totally new."[4]

[4] Carey (1997), p. 316.

Immersed as we all are in the contemporary "new," we are bombarded with stories and guided toward practices that elevate technology to a central role in delivering progress and the good life: STem (science, technology, engineering, math) education is highly valued, depicted as crucial for economic well being; STem-educated people are promised high salaries; advertising for new technologies is pervasive; books, magazines, films, websites, and blogs regularly feature the promise of new technology; and, really, we truly are seduced by all that new, beautiful, elegant technology. Given all this, how could you possibly not have learned that technology is the goal and driver of progress, economic well-being, the good life, and our evolution into superior human beings?

You have also likely learned, crucially, that technology and culture are two separate things. That is why, for example, this book is titled *Culture and Technology*; it's a familiar construction. In this case, however, the West's scientific orientation, with its propensity to compartmentalize things into mutually exclusive categories, renders most people ill-equipped to understand interconnections, interrelationships, and the ways that any identity, artifact, or practice can be multiply inflected. Culture and technology are not identical, but they are not independent, isolated phenomena either. Of all the arguments we make in this book, this is no doubt the most difficult to learn anew. But without understanding interconnection, what we introduce later as *articulation*, we might as well be living on a metaphorically flat earth. The challenge we set out for you as you work your way through this book is to consider the ways that technology is cultural (and culture is technological), that is, the multiple ways that they are connected—articulated—to the values, feelings, beliefs, affects, institutions, and practices that constitute everyday life. We also encourage you to consider why and how that matters and how it might be different.

Technological Culture

The stories we tell about technology, as illustrated above, matter. Stories about technology *and* culture look and feel different than stories of *technological culture*. Although the term is unfortunately clunky and inelegant, we use the term technological culture specifically to encourage resistance to compartmentalizing culture and technology. The term is meant to promote an understanding that culture has always been technological, and technologies have always been cultural. Technologies are integral to culture and not separate from it. There was no, is no, "technological age." Human culture has always existed *in relation to* what we understand to be technologies: from voice, stone, and fire, to clock, computer, and nanotechnology.

Because the stories matter, because the stories are part of the *received tradition* (our elaboration of Williams's concept of tradition), they remain powerful. Thus, if you want to understand contemporary technological culture, you have to understand the power of the received tradition (what we call in this book, the *received view of culture and technology*) as well as its problems. It is important to look at the *work* performed by

the received tradition of culture and technology. Our goal is to provide you with an alternative to these stories, an alternative called technological culture. Technological culture acknowledges interrelations and interconnections. While we wish to emphasize this alternative, we also want to leave you with an appreciation of how powerful and tenacious the stories (that is, the construction of "culture and technology") are.

This primer is divided into three parts. This first part maps the received tradition. By *mapping* we mean exploring the cultural context, that is, the interconnections and interrelationships among values, feelings, beliefs, affects, institutions, and practices that have contributed to the formation of contemporary technological culture. To do this, we locate major themes, threads, questions, and contradictions in the way our (primarily American) culture deals with technology. In particular we explore the power of conceptions and practices of progress, convenience, determinism, and control. We explore their development in relation to a changing landscape of other cultural forces. We recognize that this received tradition is extremely powerful, but it is also one that warrants resistance.

Part II illustrates the fact that there has been, and indeed there is, resistance to the received tradition. We have chosen to illustrate this through consideration of representative kinds of resistance: Luddism, appropriate Technology, and the Unabomber. In discussing each of these responses, we consider the ways they variously take up and resist the themes and practices in Part I. We point to the strengths and weaknesses of each of these forms of resistance. We also use them to "set the stage" for the intervention we propose in Part III. Some of what we learn from these forms of resistance is very useful, but some of what we learn we quite clearly dismiss as unacceptable or problematic.

Part III explores our proposed cultural studies approach to technological culture. It is an approach deeply steeped in theory that originates in cultural studies, but which has been developed by looking specifically at the concrete case of technology. We approach this task through the elaboration of key concepts in cultural studies with an emphasis on how they can be used to understand technological culture: meaning, causality, agency, articulation and assemblage, politics and economics, space and time, identity, and the conjuncture. It will be clear to the reader that throughout this book, from this first chapter on, we have been working with and building a case for the approach we advance specifically in Part III.

We conclude the primer with suggestions for engaging the future with the powerful tools which cultural studies provides. We look at issues (called problematics) which crop up across our contemporary technological culture, and discuss strategies of intervention. The goal is to better understand our contemporary conjuncture so that we may work to transform it in ways that are more just and equitable.

Source: unknown artist, ca 1470s, Photograph by Lynn White, 1968, British museum
Wikimedia Commons: commons.wikimedia.org British_museum_add._mSS_34,113,_fol._200v.j

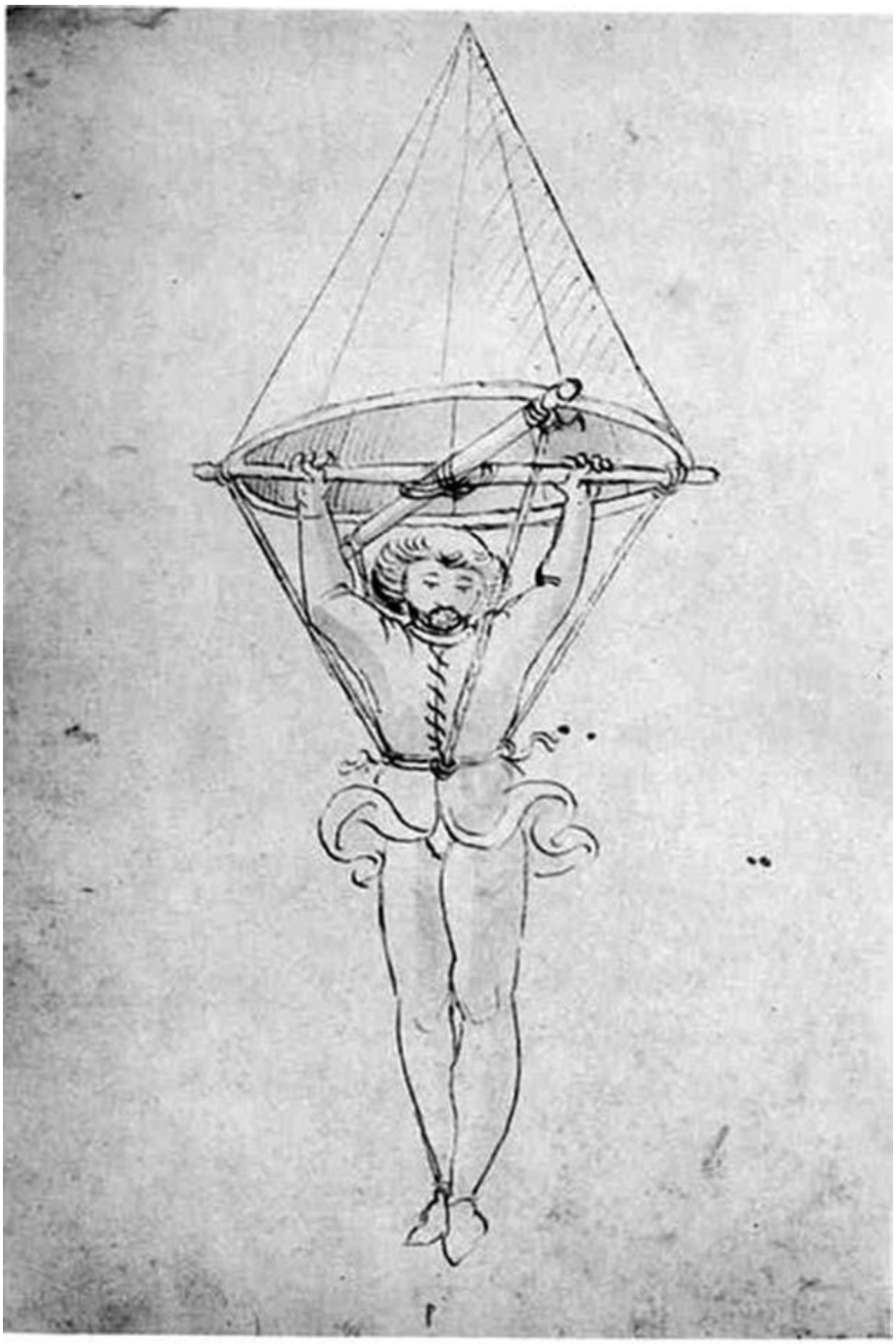

Figure 6: Conical Parachute

Chapter Two: Progress

The Meanings of Progress

IMAGINE IF YOU WILL, standing at the ribbon-cutting ceremony for the launch of a new ocean liner. This is a proud moment: a crowd is cheering, a band is playing. Why is this such an important event? Is it that the ship is the biggest ever, or the most luxurious, or the most sophisticated? Is it that the ship uses the latest instrumentation for guidance or the most efficient and powerful engines? Perhaps it is all of these things and more. But this ship launching is also an important moment because it is an example of *progress*. This new machine is evidence that the human race has moved forward, a sign that the race as a whole has improved, that life is now somehow better because this ship is in the world.

Perhaps this example of an ocean liner has reminded you of the story of the *Titanic*, which in 1912 was the biggest, fastest, most luxurious ship ever launched. It was the unsinkable ship. When the *Titanic* sank on its maiden voyage, it seemed a slap in the face of progress. Some wondered if we had overreached our place in the world and trusted technology too much.

In US culture, the idea of progress has been closely allied with the idea of technology, and vice versa: technology is progress, just as progress suggests more and new technology. But we have also begun to question this relationship between technology and progress. Is more technology always better? Is the world a better place now than it used to be? The purpose of this chapter is to examine the idea of progress: what progress means, and how technology gets involved. We will look at the story of progress that has been central to the telling of a US story (a story of the Industrial Revolution and the new frontier), and we will also look at how this story is often used as an argument to sell us new technologies, to denigrate other countries and peoples who do not share this story, and to control populations. Finally, we address the fact that it is largely seen as heresy to question the idea of progress and its relation to technology. Indeed, it is easy to dismiss ideas simply by claiming that they oppose progress, and it is easy to condemn a person simply by saying that he or she is standing in the way of progress.

Defining Progress

The dictionary definition of progress is *to move forward*. If we are walking, we're said to progress down the street. If we're beginning to accomplish a task, we are said to be making progress. When you have read the first chapter of this book, you have made progress. That is, you've done more than before and are on your way to completing the project.

The dictionary meaning is, however, only the beginning of what progress means in an everyday cultural sense. To move forward is to move in one direction: forward as opposed to backward. Consequently, movement forward implies a direction or goal. Similarly, making progress toward the completion of a task implies an end point. Progress, then, in its cultural use, is not just movement forward, but *movement toward something*: a goal or endpoint. If a patient is said to be making progress, they are moving toward the goal of health. If a disease is said to be progressing, it is advancing, presumably, toward death.

In broad cultural terms, progress is often used to underscore the belief that humankind, as a whole, moves forward. Robert nisbet, a sociologist who wrote extensively on progress, put it this way:

> Simply stated, the idea of progress holds that mankind has advanced in the past— from some aboriginal condition of primitiveness, barbarism, or even nullity—is now advancing, and will continue to advance through the foreseeable future.[1]

In addition, as nisbet sees it, this advancing is not mere movement, but a movement toward something. We aren't marching blindly into a future. Rather, we are advancing toward what we envision as a utopia on earth. Things will get better and better, and eventually we will achieve what we understand to be "the good life." Progress shows us how far we've come, what we've achieved, and how much better life is now than it used to be. It also reveals to us where we think we are going.

The Goals of Progress

The goals or endpoints of progress may be strongly felt, but they are usually unstated, left for the cultural critic to determine by carefully "reading" the culture. However, whether a goal is stated or not, it typically takes the form of what is considered to be "the good life." most people have a sense of what, for them, the good life entails. It typically involves some of the following: family, community, happiness, leisure, health, wealth, harmony, adventure, and the accumulation of things, though not necessarily in these terms or in this order. Overall, however, two types of goals are associated with

[1] nisbet (1980), pp. 4–5, italics removed.

progress: material betterment and moral betterment. Material betterment might mean that life is more comfortable, that we are healthier, and that we have more things, more conveniences perhaps, as we discuss in Chapter 3. Moral betterment might mean that spiritually we are more enlightened and that we treat each other better and with more tolerance.

The goals of progress (again, usually assumed as part of unstated cultural knowledge) usually match the fundamental values of a society. Progress at a particular moment in the development of culture could be "a chicken in every pot," indicating a democratic value of universal health and physical well-being; "a car in every garage," indicating the values of widespread personal mobility and private ownership; the absence of war or violence, indicating the value of peace and spiritual enlightenment, or a combination of all three. In any given historical context, understanding the assumed goals of progress is crucial to understanding that culture. Consequently, cultural critics who want to understand technological culture must focus on the everyday practice of culture in order to determine what people think the good life is and the role technologies play in attaining it.

In examining the contemporary relationship between culture and technology, one tendency that has been identified by cultural critics is that people often conflate or collapse the sense of progress as something merely new (merely moving) with progress as material and moral betterment (moving toward utopia). For example, using e-mail is said to be progress in relation to the postal service; that is, it is something new, a moving forward. But this newness tends to be equated—without questioning—with the sense of progress as material and moral betterment. Thus, it is assumed, life is better and we are better people with e-mail as part of our cultural experience. When we make this assumption explicit, we can see that the equation is not necessarily true. However, culturally, the tendency to equate the development of new technology with material and moral betterment typically operates without making the assumptions explicit. In part, that is how assumptions gain their power. To interrogate them explicitly is to demystify their power. To facilitate that process and untangle the confusion, we will explore two issues. First, we work to untangle the conflation of newness with material and moral betterment by examining the issue of criteria for measuring progress. Second, we explore the history of the idea of progress as it has come down to us in order to reveal the way this conflation has come about. And, finally, we explore the consequences of this tendency toward conflation.

The Importance of Criteria

How do we know if we are moving forward or not? How do we know if life is better? How do we know if we have progressed? In short, how do we measure progress? measurement always involves criteria: the standards of reference that allow you to judge. A yardstick is a standard of reference that allows you to determine if one machine

is taller than another. But finding an appropriate yardstick to measure progress is especially difficult given the qualitative nature of many of the goals of progress. How does one measure betterment? Happiness? Harmony? Spirituality? morality?

Because it is much easier to count tangible things, it became common to use the measure of more *things* as a measure of progress. For example, if we produce more grain than we used to, that's progress. Or, now that more than 80% of US households have a computer, that's progress. Sometimes a measure of more (or fewer) occurrences of something indicates progress. For example, if the Internet has more traffic, that must be progress. However, if the mortality rate declines, that is, if fewer people are dying, that too would be considered progress.

The problem with relying on the numbers of things or occurrences as a measure of progress is that doing so reduces progress to those things that can be counted, losing sight of the qualitative, moral dimensions of progress. Simply put, more is not necessarily better. For example, technology writer Kevin Kelly presents an argument for progress based almost solely on quantifiable criteria. To the objection that material advances are not meaningful and "only intangibles like meaningful happiness count," he writes: "meaningfulness is very hard to measure, which makes it very hard to optimize. So far anything we can quantify has been getting better over the long term."[2] But just because a task is difficult, like considering "meaningfulness," doesn't mean that it's not worth doing.

More technology and new technology have been widely used as the yard-sticks for progress. There are at least two reasons for this. First, because we most often think of technologies as things (as opposed to processes or practices, see Chapter 9), they are easily measured. To the degree that the culture accepts that more things equals progress, more technology is equated unproblematically with progress. Second, technologies in our culture are often identified as exhibiting and promoting still-potent key values of the European enlightenment of the eighteenth century: notably, scientific objectivity, efficiency, and rationality. When we value science and scientific objectivity, it is a small step to value its applications. More and new technologies—as applications of science—come to mean progress. When we value efficiency, it makes sense to value the technologies that allow us to produce more and to undertake new tasks more efficiently; that is, to achieve maximum output for minimum work with minimum resources. To the extent that technologies are about achieving efficiency, technology is progress. Finally, technologies are themselves seen as rational objects. They objectify the power of reason and ratiocination to order the world and achieve particular ends. These ends can be measured; we can chart their progress. As Braden allenby and daniel Sarewitz summarize: "For many, technology embodies the modern ideal of applying rationality to the betterment of humankind."[3]

[2] Kelly (2010), p. 100.

[3] allenby & Sarewitz (2011), p. 32.

From those criteria considered above, a main criterion for measuring technological progress has been the value of efficiency, the ability to complete a task with minimal energy, effort, and expenditure. A vehicle is more efficient if it goes farther on less fuel. We work more efficiently if it takes us less effort to achieve the same results. The measurement of efficiency often takes the form of a cost/ benefit analysis and this is often related to issues of profit. Modern studies of efficiency can be traced back to the work of Frederick Taylor in the early 1900s.[4] Taylor observed, measured, and timed factory workers as they did their tasks, and then worked out ways for them to do their jobs with less effort more quickly and thereby produce more.

The focus on efficiency as the criterion of technological progress has led to complaints of the dehumanization of workers. Machines are more efficient than humans, so humans are urged to become more machinelike in order to become more efficient. Workers in factories are often taught to perform a task in a particular—efficient—way. They perform a task, and only that task, over and over throughout the day. However, humans are ultimately considered far less efficient than machines: humans require greater and less-predictable energy input in the form of food, rest, entertainment, and so on. Consequently, replacing humans with machines is often seen as embracing efficiency, that is, as progress.

Given the widespread cultural commitments to scientific objectivity, efficiency, rationality, and the ease with which one can see, measure, and count technologies, it is hardly surprising that the mere existence of more and new technology often becomes the only, or primary, yardstick of progress. It is also not in the interest of those who benefit from the production of technologies to call into question the goals of all this progress. This leads the culture to focus more on the criteria than the goal. In other words, we assume that the means of achieving progress (technology) is actually the goal itself. We say, "progress equals more technology," not "progress equals the better world created by means of technology."

When technology is seen as the driving force of progress, and this concept is linked to the position that technology shapes culture (a widely held position, as we discuss in Chapter 4), the outcome is a moral imperative on behalf of technology. Technology, and only technology, is what makes the world better. We often hear, "you can't stop progress;" but what is often meant is, "you shouldn't stop progress." To the degree that progress is measured by technology, we are told that we should not stand in the way of technology. We are thus taught to accept things in this culture in the name of progress, even if what we are accepting is harmful to ourselves. David noble provides the following example:

> A few years ago my mother lost her job to a computer. A legal secretary, she had worked for the same firm for nearly twenty years before being unceremoniously "scrapped" with two days' notice and no pension. The

[4] Taylor (1947). The practice of increasing worker efficiency utilizing time and motion studies has become known as "Taylorism."

> computer created jobs for less-skilled workers and eliminated those of the more-skilled people, like my mother, for whom "retraining" would have meant unlearning. (She was too old to "retool" anyway.) So there she was, home on a monday morning for the first time in many years, reflecting upon her all-too-familiar plight. She complained about having no job, about the way she was fired after all those years, about the new workers who do not know half of what she knows, about having no pension and the fact that she wasn't getting any younger. But, for all her anger, she was resigned. Shrugging her shoulders, she repeated to herself as if she had to convince herself, "Well, I guess that's progress."[5]

Progress and technology have become articles of near-religious faith held in the heart of north American culture. To question them, to stand in the way of progress and technology, is considered to be heresy. We will return to this notion of heresy at the end of this chapter. But first, to fully appreciate how seriously this heresy is taken, we underscore the importance of the story of progress and technology in the development of American culture.

The Story of Progress in American Culture

James Carey and John Quirk once wrote, "America was dreamed by Europeans before it was discovered by Columbus."[6] The United States was to be the place where excesses were held in balance: balance between industrial technology and nature, balance between technological betterment and moral betterment, and balance between what has been called "works" (better technology) and "days" (a better life). In this section we chart the development of this story of balance.

By the time Columbus accidentally stumbled upon the Americas, Europe had already had a long and violent history. Civilizations had grown, expanded, and collapsed into darkness again, while new empires had risen. America was seen as a place where civilization could start anew, released from the burden of wars and empires. The Americas were also seen as a new eden, untouched by the crowding and pollution of European cities. This was a pure place of nature that could redeem Europe. Though the Americas were used primarily as a source of material wealth and resources for war, industry, and empire in Europe, the idea of America as a special place has remained.

When the United States fought for independence, the struggle was seen not only as a political one, as in the creation of a new state, but as a revolution in the conditions of humankind advocating the principles of democracy, freedom, and liberty. Although these principles were echoed in the French Revolution of 1789, the American Revolution was different in that it occurred in the new World. Whereas nature had been exploited

[5] noble (1982), p. xii.

[6] Carey and Quirk (1989), p. 118.

and despoiled in Europe, the new country was to embody a balance between nature and the best of what manufacturing technology could offer. Thomas Jefferson wrote, "Let our workshops remain in Europe."[7] Historian Leo Marx famously referred to this balance as the ideal of "the machine in the garden."[8] In the new World, technology and nature would work in harmony.

US leaders such as Jefferson and Benjamin Franklin were not naive, however. They knew that this balance would not happen on its own and were well aware of the dangers and damages that industrialism could cause.[9] There were those who saw technology and industry as ends in themselves, but Jefferson knew that this viewpoint would upset the balance. He emphasized that technology was a means of achieving progress, not an end in itself. A balance had to be struck between material prosperity as the mark of progress and moral and spiritual growth as a mark of progress. The implication is that the nation needed to focus on the goals of progress rather than solely on the means. Franklin, for his part, refused to take out individual patents on his inventions, arguing that the good of society was more important than individual gain.[10] unfortunately, the idealism of these founders was diluted. The lure of profit and material wealth became too strong. As the eighteenth century turned into the nineteenth, the Industrial Revolution was heating up. Industry expanded, more goods were produced more cheaply, and soon canals and railways opened the country up to the easy movement of goods and people. Life was prosperous, and the new machines were the most obvious sign of this prosperity. In these times, the view of progress that prevailed was highly technocratic; that is, the adoption of technology was seen as inherently good. Steam engines and railways meant progress in themselves, and the country lost sight of the moral and spiritual dimensions of the term. Ralph Waldo emerson asked in 1857:

> What have these [mechanic] arts done for the character, for the worth of mankind? are men better?... 'Tis too plain that with the material power the moral progress has not kept pace. It appears that we have not made a judicious investment. Works and days were offered us, and we took works.[11]

The rapid geographical expansion of the country aided this strong sense of progress, the idea that the United States was constantly moving forward into the future. The frontier experience shaped the character of US culture in crucial ways. As it was seen at the time, civilization strode across the continent, taming nature, the landscape, and the inhabitants with a sense of manifest destiny, which is the belief that the continuing expansion of the country across the continent was ordained by God.

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[7] Quoted in Marx (1987), p. 36.
[8] Marx (1964).
[9] Smith (1985; 1994).
[10] Marx (1987).
[11] Quoted in Smith (1985), p. 7.

One of the first great symbols of this progress was the steam railroad conquering the frontier, a "machine in the garden." Historian merritt Roe Smith describes a popular allegorical painting of the 1870s titled *American Progress*. The painting depicts a beautiful woman floating across the landscape, a star on her forehead. This figure has been—and still is—used to depict liberty, as she does in the Statue of Liberty, but she was also made to stand for progress. In her right hand is a book; with her left hand she is laying telegraph wire. At her feet are stagecoaches and covered wagons. Behind her follow three railways, and back in the distance, bathed in the rising sun, are an iron bridge and a city. Before her, running away into the darkness, are native Americans, bear, and buffalo.[12] underpinning this vision of manifest destiny and progress is evangelical Protestantism. In particular, Calvinism taught the principle of predestination: that there were a chosen few who would inevitably succeed because they had been chosen by God. Applied at a national level, this meant that the United States was God's chosen land, which infused the national character with a fundamental optimism about the future.[13]

The promise of the machine in the garden was tarnished as the nineteenth century progressed, and the pollution, environmental destruction, and slums of Europe were recreated in the new World. In addition, the bloodiness and destruction of the Civil War shook the faith in the country as a place of peace and prosperity. With its brutal war and industrial machines, how could the United States be regarded as the land of progress?

In spite of setbacks the notion of technological progress remained strong, largely due to the excitement over yet another new technology as a symbol of progress: electricity. Unlike the menace of large machines, electricity appeared clean, mysterious, even supernatural. When applied to communication, first in the form of the telegraph, electricity was seen as revolutionizing the country. Prior to the telegraph, communication had been synonymous with transportation. Messages traveled at the speed of horses, carts, ships, or trains. But with the telegraph, one could communicate instantaneously with people hundreds of miles away. One became aware of a sense of simultaneity, the knowledge that others were living their lives at that moment across the nation. The telegraph also made a profound impact on the economy in that it helped to create a national market for goods and enabled arbitrage, the practice of buying low and selling high. Before the telegraph, it was difficult to find out how a crop was doing in Ohio or how production was at a factory in Pennsylvania. The telegraph provided the commodity market with more accurate and immediate information.[14] electricity transformed street lights, shop-window displays, department stores, drawing rooms, and thereby the nature of city life, both public and private.[15] Light sources changed from hazardous torches, open flames, or gas lights to relatively safe lightbulbs and

[12] Smith (1994), pp. 9–12.
[13] Smith (1985).
[14] Carey, "Technology and Ideology: The Case of the Telegraph," in Carey (1989), pp. 201–230.
[15] Schivelbusch (1988).

filaments. As we moved from the "primitiveness" of the open flame to the science of electric light, we experienced progress for which technology was deemed responsible.

Electricity continued to be the symbol of progress through the middle of the twentieth century. The electrification of more and new technologies, in particular household appliances, and the growing availability of electricity to many parts of the nation were taken as evidence of progress. Large-scale projects like the Hoover dam, completed in 1936, provided electric power to the Southwest. In 1933 President Roosevelt created the Tennessee Valley authority, a Federal corporation charged to develop the Tennessee River system to promote navigation, flood control, and the production and distribution of electricity to wide regions of the Southeast. Projects such as these can be seen as a continuation of electricity as the primary symbol for progress. Eventually, in the wake of concern over atmospheric pollution caused by coal-burning power plants and the environmental destruction caused by electricity-producing dams, electricity began to wane as a symbol of progress. Nuclear power, awesome in its own right, replaced electricity as the dominant symbol of progress and continued the tradition. Eventually, nuclear power too revealed a darker side to technological progress in the form of the nuclear bomb and the threat of radioactive contamination. The debate over the status of nuclear energy as progress (or not) is still quite obvious. For example, Japan is currently struggling over how much to rely on nuclear energy in the wake of the march 2011 Fukushima daiichi nuclear disaster.

The most recent symbol of progress is the digital computer, which has dominated the American imagination since the 1950s. The computer differentiates itself from other electrical technologies in that it, unlike technologies that mimic the physical work of humans, supposedly mimics the work of the mind.[16] The progress implicitly embodied in the digital computer is the ability to process more data and an expansion of the concept of thinking. There are people who argue that computers may some day progress so far beyond human capabilities that we could create—some say have already created—technological super-intelligences that surpass the capabilities of any human, what has been called by some the "Singularity."[17] Though this possibility is the stuff of fantasies and nightmares, as articulated in any number of science-fiction novels and films, there are those who see the surpassing of the human as a positive development. Humans are hindered from evolving or progressing further, these people argue, by the limitations of the human body. The true goal of human progress is the expansion of the mind according to some; and if we could somehow abandon the body, we would truly evolve.[18] We would become "post-human."[19]

Beyond the more fantastic images of the post-human, digital technologies allow us to progress because, as MIT professor nicholas negroponte has put it, what we used

[16] Lyon (1994), p. 46.

[17] See, for example, Kurzweil (1999); (2005) and Vinge (1993).

[18] See moravec (1988); dery (1996); Kurzweil (1999).

[19] For an assessment of transhumanism and the idea of progress, see allenby and Sarewitz (2011), Chapter Three.

to accomplish by physically moving atoms around—for example, shipping books or delivering newspapers—we can now accomplish by sending bits of electronic information instantaneously and cheaply from place to place.[20] Instead of having to work with physical models of cars, buildings, or even bodies, we can create virtual representations of them in computers and submit them to any number of virtual tests and stresses.

Two Concepts That Underpin and Help to Sustain This Story: Evolution and the Sublime

In the stories of these American revolutions, from 1776 to the information revolution of today, technology has played a principal (determining) role in our conceptions of progress, to the extent that we have confused the profusion of technologies with progress. The machines themselves, not the goals of progress, have come to play center stage. This story of progress has been given additional heft because it draws on two other powerful concepts: *evolution* and the *sublime*.

Progress and evolution are often conflated, in part due to a pervasive conflation of conflicting definitions of evolution. A pre-darwinian meaning asserts that as we evolve we are likewise progressing; that is, we are becoming better, more perfect human beings. In other words, as we progress toward something, we are evolving into something better or more advanced. Evolution is thus given a "progressivist" twist in this version, a meaning that still does linger today. But this understanding of evolution is not consistent with the darwinian theory of evolution. We think of it as the misunderstood version of evolution. Raymond Williams writes, "as the new understanding of the origin of species spread, evolution lost in biology its sense of inherent design."[21] That is, the older, progressivist version of evolution presumed that we were progressing towards a particular state of being, following an inherent design. Darwin's theory removed this sense of design or ideal future form. Evolution according to darwin is the slow adaptation of living creatures to environmental conditions over the course of generations. Groups that survive are "selected" on the basis of randomly occurring genetic mutations. Those that do not survive do not adapt to changing environmental conditions and do not pass on their particular genetic attributes to future generations and thus are not "selected." The idea of natural selection is often oversimplified to the idea of "the survival of the fittest," which purports that surviving generations are better and more advanced: stronger, faster, smarter, and more complex. But this is not necessarily the case. They are instead merely better adapted. In general, the direction of evolution has been from the simple to the complex, from single-celled organisms to multi-celled ones. However, this in no way guarantees the survival of better or even the most complex organisms in the face of changing environmental conditions. Cockroaches

[20] negroponte (1995).

[21] Williams (1983), p. 121.

are, after all, more "fit" to survive a nuclear war than humans. So even though less complex organisms might be better adapted to changing environmental conditions, we are unlikely to evolve back into single-celled creatures anytime in the near future. Consequently, evolutionary theory resists the notion that humans are necessarily better or more advanced than other species. We have merely evolved *differently.*

Evolution, in its misunderstood, pre-darwinian version, underpinned the idea of progress in the nineteenth century and beyond by providing a scientific version of the principle of manifest destiny and evangelical Protestantism. According to this version of evolution, it was "natural" that the nation would achieve greatness since it was, as was widely believed, at the forefront of technological development. Further, technological and national "might," linked to this misunderstood idea of evolution, promoted the belief that "might makes right," for only the fittest survive.

The second concept that undergirds progress is the notion of the *sublime.* The idea of the sublime involves a glimpse of perfection, the sense that one is viewing God or God's work. The sublime is awe inspiring, an overpowering combination of two seemingly contradictory affects: dread and reverence.[22] dread of overwhelming power, majesty, and perfection, and reverence for it. David nye points out that there is a particularly American turn of the concept, which concerns us here. The sublime becomes a means of bonding individuals into a greater unity. This sublime is often marked by ritualistic invocations in public life and secular pilgrimages (that is, they become vacation destinations). He writes,

> Americans have long found the sublime more necessary than Europeans, so much so that they have devised formations of the sublime appropriate to their pluralistic, technological society. Precisely because American society is so pluralistic, no single religion could perform that function. Instead, ever since the early national period the sublime has served as an element of social cohesion, an element that was already quite evident when the first canals were dug and steam engines were first harnessed to trains.[23]

The United States possesses its share of sublime wonders such as niagara Falls, the Grand Canyon, and the Rocky mountains. Leo Marx saw behind his idea of the machine in the garden another type of sublime: the technological sublime. The advance of technology at the time seemed divinely inspired, and people stood in awe of the large steam engines or of electricity itself. The technological sublime thus refers to the almost religious-like reverence paid to machines. These machines were much more powerful and majestic than individual humans and held out the promise of being able to achieve perfection. Whereas hand-made goods have irregularities and imperfections, those made by machines, potentially, do not. The technological sublime, then, carries with it a fear of being overwhelmed, an attraction to the beauty of the perfection of

[22] The discussion of the sublime draws on nye (1994).

[23] nye (1994), p. xlv.

the machine and its products, and, most of all, a reverence for the awesome power of the machine.

The technological sublime that Marx described was what we would call the "mechanical sublime," the divine nature of large, industrial machines. But when the machine began to fail as an untarnished symbol of progress after the Civil War, electricity took on the mantle of the sublime, what James Carey and John Quirk call "the electronic sublime."[24] In contrast to the smoke, soot, and grease of mechanical engines, electricity seemed pure and clean. Electricity is intangible; its nature is almost mystical. People even feared the new electrical telegraph lines that sprang up in the mid-nineteenth century. It was said that when the wind blew over the electric lines they produced an eerie moaning sound, and people went out of their way to avoid them.

More recently, as the symbols of progress have shifted yet again and electricity has become commonplace, our feelings about electric technologies have shifted. For the most part, electricity is now seen as polluting, and nuclear generators as dangerous. Where once we waxed poetic about turbines and railroads, electrical dams, dynamos, and nuclear reactors, our imaginations now soar with effusive paeans to digital technologies, especially as they relate to the Internet, smart phones, and cloud computing. We are faced with what we may call the "digital sublime."[25]

We discuss these notions of evolution and the sublime here to better understand the power of the story of progress. Why would so many people accept technology as progress without question, even if it damaged them, as it did David noble's mother in the earlier example? We are persuaded by progress because we are persuaded by the logic (*logos*) of the argument that it is better to be efficient, rational, and scientific. We are also persuaded by the ethic (*ethos*) of the argument of evolution that progress is inevitable and necessarily good, because we trust science and scientists, and believe in a misunderstood conception of evolution. And finally, we are persuaded by the deeply emotional argument (*pathos*) of the sublime; persuaded by our own feelings of fear, awe, and expectation.

The Uses of the Progress Story

Stories are not neutral. We tell stories to make a point, to educate, to persuade, to entertain. Stories have their uses. It is important to emphasize that what we have sketched above is a *story*, though it might seem like history. Culturally, we are all acclimated to accepting history as the "Truth" about the way things actually happened. But in telling history, one is telling a story. History, like any story, is always told by someone to someone else for a particular purpose. Told by someone else, the story might be different. For example, a native American, Canadian, or mexican version of American progress since the settling of the new World would be different from

[24] Carey and Quirk (1989).
[25] Cf. Mosco (2005).

what we have described. Stories are told for different reasons: to persuade us to go to war, to persuade us to buy a product, to convince us that what our ancestors did was correct and justified, or to make us feel comfortable (or uncomfortable) with our place in the world. We have told the story above as much as possible in the terms in which it is usually related; this does not mean that we agree with this story or the justifications that it provides. It is, however, a powerful story with powerful cultural uses and consequences.

The story of progress as told above has been put to four major uses in the United States: to promote a version of "a better life," to sell us things, to judge others, and to control populations.

Promoting a Better Life

Robert nisbet argues that the progress story emphasizes that change is good and that change promotes a better life. He believes that as long as we continue to tell, believe in, and live the progress story, our culture will not stagnate but will continue to strive for perfection. The progress story is essentially a revolutionary story; it promoted, and continues to promote, both political and technological change. Many positive outcomes, services, and products can be attributed to telling, believing, and living the progress story, including democracy, sanitation, education, computing, and life-saving medical advances.[26] The progress story thus promotes a particular version of a better life and underpins the affect to work toward it.

Selling Us Something

Merritt Roe Smith relates that in the mid-nineteenth century the working classes spoke out against progress because it was being used as an excuse to install new machines in the factories, thus putting them out of work. They understood that it is crucial to ask the questions: Progress for whom? Who benefits? and the answer was that it wasn't them. But at the same time that they were contesting progress in the workplace, they were eagerly buying the new products that were being produced by these new machines. By purchasing these products, not only were these people supporting the country's economy but also actively participating in what they saw as the future. In other words, they could put aside their own individual issues and participate in the broader sense of manifest destiny and progress.[27]

Technological progress is often a theme of advertising. We purchase things because they are new! advanced! Improved! We purchase new computers because they are faster than old computers. We may also purchase a technological object because of its beauty

[26] nisbet (1980).
[27] Smith (1985).

or power (hence, part of the success of apple computers). Look at advertisements for cars, smart phones, and home entertainment systems; they are replete with claims of new improvements, new possibilities, and awesome appearances.

Interestingly, explicit appeals to progress as a justification for buying seem to be diminishing. In fact, it would seem quaint, or old-fashioned, to defend one's purchase of a new car as "progress." However, audi recently ran a television ad showing their newest vehicles as literally the latest step in human evolution, ending with the tagline: "Progress isn't a philosophy, it's a force of nature." So the term still has a popular appeal. In general, however, appeals to progress and the sublime have taken a new form. We are now inclined to purchase technologies, not for a sense of the progress of civilization or for the appreciation of grandeur, but for their contemporary manifestation. The "cool," the "neat," the "rad," or the "awesome" (depending on your generation) are what we think of as versions of the new *mini-sublime*. Think about the stores that cater to tantalizing buyers with gadgets: from the high-tech of Sky mall catalogs to the low-tech pleasures of office-supply stores, cooking-supply stores, and hardware stores. Just think about how often, when presented with a new device, the response is simply this: "Cool!" "neat!" "Rad!" "awesome!"

In addition to the appeal of the awesome, a more considered justification for buying is frequently convenience. One might easily defend the purchase of a new car for its conveniences: air conditioning, remote starting, GPS locating, and so on. The ascendance of convenience, the topic of the next chapter, does not mean that progress is becoming passé; rather, it suggests that what constitutes progress has become closely allied with the value of convenience. While progress is still what is more, new, advanced, better, cool, neat, rad, or awesome, it is also more convenient.

Judging and Controlling Others

Civilized and Primitive: When Western European explorers first encountered the cultures of the Americas, africa, and the South Seas, they were perplexed. These cultures were so very different from their own. The people had much less technology than the Europeans. Rather than concluding that these others were simply different and leaving it at that, Western Europeans drew on the story of progress to explain the situation.

In the received view, the story of progress presents a linear view of cultural development: It moves from simple to complex, and from less technologically advanced to more technologically advanced. It also concludes that every culture must progress in this way: first because progress is universal, and second because it is divinely inspired. The assumption is that these other cultures must be at an earlier stage on the same line as Western progress. Furthermore, these cultures could be expected to progress in the same way that Europe did until they eventually reached the level of European culture. Therefore, the story goes, they were deemed primitives who would one day be

civilized; the criterion by which the progress of their civilization could be measured was, predictably, the technologies they embraced.

The progress narrative, then, was used to label cultures as either civilized or primitive. Those labeled primitive were considered less intelligent, less cultured, and beneath European culture. Colonization of primitives was not merely justified, it was considered a moral responsibility; for with assistance, primitives might be brought into the fold of a better, more evolved, civilized life. Hand in hand with colonization, labeling cultures primitive or civilized fed into the rise of nationalism on the one hand and on the forced technological development of cultures on the other.

Nationalism: a nation is a group of people recognized as having shared characteristics that unify them as a single entity. The group as a whole seems to have a unified identity. Beyond the less formal categories of membership or citizenship, being a member of a nation involves a shared identity and an emotional bond. For example, we may be citizens of the United States, but we might think of our nationality as American. Nationalism is devotion to one's nation, a pride in one's national accomplishments. Two fundamental aspects of the nation are, on the one hand, the recognition that there are thousands if not millions of others with whom you share this identity and, on the other hand, the recognition that there are millions of others who do not. Nation is not only a label indicating membership; it is a means of differentiating *us* from *them*. The progress narrative is easily used as a means to differentiate nations, particularly to denigrate some and elevate others, and levels of technology have become part of the yardstick by which to measure and compare.

The practice of measuring the progress of nations with technology is dramatically illustrated by the great industrial expositions and world's fairs of the nineteenth and early-twentieth centuries. Much like the modern Olympic Games, these events were opportunities for all nations to gather peacefully with an attitude of good will to share in the best of what each nation had to offer. But also like the Olympic Games, there was competition behind the exhibition.

The first major industrial exposition, and the model for those that followed, was the Great exhibition of the Works of Industry of all nations, which opened in London in 1851. The Great exhibition, as it was called, was held in a newly constructed building made entirely of glass and iron, which was referred to as the Crystal Palace. The Crystal Palace was an accomplishment in itself, the first building made almost entirely of prefabricated parts. Each nation was allotted a space to display inventions, innovations, machines, and the products of machines such as textiles and artwork. Because the Great exhibition was held in London, the British claimed a good portion of the floor space for their products and those of their colonies, such as India. In a didactic move, India was placed at the center of the hall, but the selection and arrangement of the display emphasized the humble nature of the inventions, innovations, machines, and products of India. The Great exhibition was thus an opportunity for Britain to show off its technological superiority. In addition it was an opportunity to show off its superior cultural character. While Europe before 1851 was characterized by violent revolution,

Britain alone was at peace with others and with its own working classes. The Crystal Palace, dubbed in the press as "The Palace of Peace," was meant to fuse the ideas of British national character, moral and cultural superiority, industrial superiority, and progress.[28]

Other international expositions followed: 1853 in New York; 1867 in Paris; the Centennial exposition in 1876 in Philadelphia; and 1889 in Paris, for which the eiffel Tower was built. However, the strongest assertion of the technological-progress story occurred at the Chicago World's Fair in 1933. The fair's guidebook stated: "Science discovers, genius invents, industry applies, and man adapts himself to, or is moulded by, new things." It summarized: "Science finds—Industry applies—man conforms."[29] across the varied exhibits of the fair were similar statements, reinforcing not only a belief in technological determinism, that is, a belief that technology drives culture, but a belief in technological progress, that is, a belief that technology drives civilization. The superiority of nations had become a matter of fusing technology, progress, national character, and moral character.

Development: The story of technological progress was not just used for national self-aggrandizement. According to the linear view of progress, these other, primitive cultures would eventually progress or develop to the levels of the industrialized countries. So why not help them along? Working under the assumption that all nations inevitably will become technologized (and want to become technologized), Westerners advanced the idea that these countries could be helped by being given or loaned advanced technologies. More technology would help these nations "leap-frog" over the intervening stages of technological development, contribute to cultural progress, and render them civilized sooner. "development" is the term that was widely used to describe this process.

The term development has much in common with the term progress. Like progress, development assumes a constant move forward toward some goal. For example, one develops into something: a boy into a man, a kitten into a cat, a pupa into a butterfly. However, the meaning of development carries with it a stronger sense of inevitability than progress. We can label the stages of development— infant, child, adolescent, adult—and be pretty certain that each person will move though these stages toward the inevitable conclusion. When this idea was applied to nations, each was depicted as located at a particular stage of development: some were developed, some were less developed, and some were undeveloped—the so-called Third World. European and north American programs designed to help nations develop were based on the assumption that all less-and undeveloped countries would eventually look like the countries of Europe or north America, and that they would want to. This is an egocentric assumption, at best.

[28] See Piggott (2004) for documentation (including visual documentation) of the life of the Crystal Palace after the Great exhibition.

[29] Quoted in Pacey (1983), p. 25.

Large development programs were put into place worldwide in the mid-twentieth century. For example, India's first Prime minister, Jawaharlal nehru, in the late 1940s and 1950s, tied his ideas of nationalist development to that of technological development, especially that of large scale projects like dams, electrification schemes, and agricultural programs. Such projects, implemented across the Third World in the 1950s and 1960s, were put in place with little regard for local cultures or social norms. Some were successful, but many were not. Across the board, however, the most prevalent result of these programs was the plunging of the Third World into incredible debt. In addition, when traditional farming practices were replaced with industrial farming practices that focused on cash crops for export—such as cotton, coffee, or bananas—many countries found it difficult to feed their own people. As a result, these countries became dependent on the West for food, resources, and technical know-how. The progress story thus discriminates among different cultures, promotes a particular version of technological development for those "less civilized," and generates problematic dependencies among nations.

Because of these problems and resulting dependencies, the term development has acquired strong negative connotations. For many, the failings of development result from its top-down approach, where decisions are made by an elite at the top of a nation's social hierarchy, or by a few technical experts from an industrialized country, and then imposed on the rest of the population without their input or consent. More recently, there has been a move to rehabilitate the term development by presenting a grassroots model of development, in which technological and cultural change is instigated at a local level with local input and consent. The grassroots model of development seeks to distance itself from the progress model, in that the final shape and character of a nation would be determined internally and not by the external imperative of technology. The grassroots model seeks to do away with the predetermined outcome of development and substitutes moral or cultural criteria, in addition to technological criteria such as efficiency, to point in a direction of desired development.[30]

Politics: We have seen in the discussion above how the technological progress narrative is used in international politics, but it is also used to influence politics within a nation. When people are willing to believe that technology drives progress and that technological change is inevitable and good, people are more willing to accept the advice of the experts, that is, the technologists who claim to know how technological change is accomplished.[31] People become geared to expect and accept technological change. When, in addition, technological progress is seen as inevitable, there is no need to shape or guide science and technology. Major technological decisions become mere technical matters that do not demand or justify the consultation of nonexperts. Consequently, the technological progress story has been used to promote more authoritarian and technocratic decision making and to suppress democratic decision making.

[30] See Rogers (2003) for an insider's analysis and critique of development.

[31] Pacey (1983), p. 26.

We will return to the ideas of technological politics later on in this book, but it is important to emphasize here that when someone begins to discuss progress, the political and cultural implications are likely to be significant and controversial.

New Technology Equals Progress: To Question This Is Heresy

"Technological progress," a term that equates the development of new technology with progress, is a powerful term with quasi-religious undertones. It should be clear how important this concept has been in the formation of the national identities of those who live in the United States, and to a considerable degree in all Western industrialized countries. However, by now it should be abundantly clear that there are serious problems with the idea of progress, especially when equated to technological development.

The term "heresy" refers to ideas or beliefs that are held in opposition to widely held, dominant beliefs of religious or quasi-religious importance. It is a powerful term: people deemed heretics have been variously burned at the stake, excommunicated, ostracized, or vilified. It is unfortunately true that in contemporary culture, ideas that are depicted as resisting progress are dismissed with scorn, and people who propose alternatives to blind adherence to the progress narrative are vilified as standing in the way of progress. Even more extreme, as David noble has pointed out, it is very nearly a heretical act just to question the equation of technological development with progress.[32] It is almost as if it is un-American, destructive, backwards, and dangerous to even ask: Is the development of new technology necessarily progress? Perhaps this is because to do so invariably raises questions about how structures of power work, how our sense of identity ties us emotionally to these same structures, what the national and international implications of this power are, who benefits from technological development and who does not, and whether the implied assumption of the "good life" is a desirable one. But question we must.

To understand the power of the equation that new technology equals progress, there are two compelling questions that merit asking any time the progress story is aired. We end this chapter by posing these two questions: Progress for whom? and progress for what?

Progress for Whom?

Who really benefits if we believe the story of technological progress as it has been told to us? The answer to this question will vary depending on circumstances, but most often those who benefit are those who control the technologies or who make a

[32] noble (1982).

direct profit from their use. The story provides popular support (more powerful than advertisers could ever hope to achieve) for the projects of science, technology, and industry. When the railroad was the symbol of progress, the railroad business was booming and fortunes were made. When electricity was the symbol of progress and projects like Hoover dam and Tennessee Valley authority were begun, power companies reaped the benefits.

Also, apart from the idea of direct benefit (power and profit), progress favors some sections of the population over others. If a computer is a mark of progress, those with the resources to own and operate the newest computers benefit. However, those without access to the newest technologies are shut out, unable to benefit from or share in the vision of the good life.

We also have to keep in mind that progress for some may mean a burden for others. For example, for some it may seem like progress that so much more and new information can be processed and accessed by computers. But how does all that information get there? Low-paying, grueling data-entry work is the price some pay in order for others to progress. And what of the secretarial jobs that are lost because every boss now has his or her own capacity to compute? What work remains open for those displaced secretaries? data entry perhaps? Online customer service? and what of the less-developed nations where increasingly data entry and customer service are being outsourced? For many of these countries development has come to mean producing sophisticated technologies and products as well as services (such as data entry and customer service) for consumption in the developed nations. Thus, the menial, low-paying work of many people in the world in often horrifying conditions supports much of the technological progress enjoyed by others.

Call center work, for example, is often highly scripted, culturally sensitive (workers in India must perfect American accents and use American vernacular), emotionally taxing (this is the affective labor of managing a customer's emotions), and physically demanding (since workers have to work night shifts to be up when customers in different time zones on the other side of the globe are up).[33] This type of labor has been called immaterial labor in that it is not about making material products but providing services to others. But conditions for more traditional material labor can be much, much worse. *The New York Times* recently set out the appalling worker conditions at electronics factories in China, like Foxconn where many apple products are manufactured.[34] Ironically for a factory that produces products with touch screens, the loss of fingertips is a common workplace injury. More serious, however, was the rash of suicides in 2010 (at least seventeen in eight months) at a Foxconn factory that brought factory conditions to international attention: substandard pay, crowded housing, and brutal, repetitive Taylorist work expectations (e.g., a worker installing 5,800

[33] See mirchandani (2008) on call centers in India. On the shame and downward mobility of call center workers in Portugal, see matos (2012).

[34] duhigg and Barboza (2012).

small screws a day).[35] Much of this labor is unskilled and unautomated, despite the high tech nature of the product, so workers can easily be replaced if they fall behind or complain. In what sense is this progress? It is thus always critical to assess who benefits from the progress narrative and who does not.

Progress for What?

It is also critical to assess the typically unexamined goals implied by the progress narrative and reassess them. What is the implied concept of the "good life" being promoted? To that end it is insufficient to simply return to the Jeffersonian balance of material and moral progress, or emerson's choice between works and days. In addition, we ought to seek out other goals that enlarge the range of options from which to choose. Such goals might focus on democracy, community, sustainability, conviviality, spirituality, and so on. We will address some of these goals later in this book, but suffice it to say here that as we change our goals, technology's role in culture changes. It is possible—perhaps necessary—to devise different ways of assessing progress.

Take, for example, a passage from Raymond Williams, writing in response to literary critics who dismiss the Industrial Revolution and valorize a romanticized agrarian past. Williams says that "at home we were glad of the Industrial Revolution, and of its consequent social and political changes" because the Industrial Revolution gave them, the agrarian working class, "one gift that was overriding, one gift which at any price we would take, the gift of power that is everything to men who have worked with their hands." In the passage that follows, note how Williams uses the term, progress.

> It was slow in coming to us, in all its effects, but steam power, the petrol engine, electricity, these and their host of products in commodities and services, we took as quickly as we could get them, and were glad. I have seen all these things being used, and I have seen the things they have replaced. I will not listen with patience to any acid listing of them—you know the sneer you can get into plumbing, baby austins, aspirin, contraceptives, canned food. But I say to these Pharisees: dirty water, an earth bucket, a four-mile walk each way to work, headaches, broken women, hunger and monotony of diet. The working people, in town and country alike, will not listen (and I support them) to any account of our society which supposed that these things are not progress: not just mechanical, external progress either, but a real service of life. Moreover, in the new conditions, there was more real freedom to dispose of our lives, more real personal grasp where it mattered, more real say. Any account of our culture which explicitly or implicitly

[35] On the new networked working class in China, see Qiu (2009), and on FoxConn in particular, see Qiu (2012).

> denies the value of an industrial society is really irrelevant: not in a million years would you make us give up this power.[36]

Progress in this passage is accompanied by explicit values: "a real service of life." There is political freedom and change in life conditions. This, for us as well, is real progress, not as rhetoric, but as careful measure of quality of life. The problem comes when the "careful measure" of the real quality of real people's lives is abandoned in favor of the unexamined affective power of the language of progress that can be used to degrade that very same quality of life.

Although the progress narrative is alive and well in cultural practice and imagination—particularly in the form of the "cool,"the "neat," the "rad," and the "awesome"—progress no longer seems to be the term of choice when thoughtfully justifying technological decisions. It is still used to dismiss troublesome thoughts about technological decisions, as in "well, that's progress," usually accompanied by a shrug and a sense of irony. But it is less likely to be used as an explicit reason for explaining technological decisions such as purchasing a new technology. For example, we aren't likely to justify the decision to purchase a cell phone by saying, "I bought a cell phone; that's progress!" The term used this way sounds more than a bit old-fashioned. Far more likely is the justification, "I bought a smart phone; it's awesome!" However, augmenting "progress," and to some degree supplanting it, the term "convenience" incorporates and in some ways refines the notion of progress. It makes good contemporary sense to justify, say, the expense of buying a smart phone by saying "I bought it because it's really convenient." We turn then in the next chapter to the concept of convenience to explore its story and its role in technological culture.

Source: Photography by Coyau, 2012, Wikimedia Commons: commons.wikimedia.org

[36] Williams (1989), p. 10.

Figure 7: Cafetière Vesuviana

Chapter Three: Convenience

Convenience Is Another Story

THE SCENE: A BEAUTIFUL SUMMER DAY in a suburb with neatly clipped hedges and grass, lots of houses close together, and no sign of people. Focus: a house with an automobile parked on a blacktop driveway. A woman emerges from the front door, walks over to the automobile, and gets in. Quickly she backs the automobile out of the driveway, drives about ten feet to the mailbox, reaches out, gets her mail, backs up, pulls back in the driveway, gets out, and returns to her house. End of scene.

This vignette, from the cult film *The Gods Must Be Crazy*, never fails to draw laughs.[1] Why, you are meant to wonder, didn't she just walk to the mailbox? It might have taken a bit more time to walk to the mailbox and back, but it might actually have taken less! Present in the laughter is recognition. People in the audience invariably recognize the woman's acts as representing their own. They see in her actions their own habitual uses of technology. Why drive the automobile to the mailbox? The answer is simple: because it is more convenient. It keeps her from having to exert energy. It allows her to move faster. It makes covering distance, however short, faster. The automobile makes life easier, and that is what it is supposed to do. Why walk when you don't have to? Furthermore, convenience has become habit. When most people have to go somewhere they habitually choose some form of mechanical transportation: private automobiles, taxis, busses, subways, airplanes, maybe a limo if they are lucky.

Is driving to the mailbox progress? The story of progress, as we discussed in the previous chapter, offers some explanation for choosing to drive to the mailbox rather than walk. Technologies are developed to do things for you that you might otherwise have to do for yourself, and that's progress. But to raise once again the difficult question we raised in the previous chapter, does it make life better? Is life better if you can take the car to the mailbox rather than walk? many people would argue that it's not. People in the medical professions might say that you need that walk, because life is better when you exercise properly. Environmentalists might say that you should walk, because life is better when you don't let automobiles use up non-renewable resources, produce harmful emissions, and contribute to global climate change. Psychologists might say that you need that walk, because life is better when you take the time to slow down and engage the world. Community activists might say that you need that walk, because life is better when you meet and interact with neighbors. If you grant credence to just

[1] uys (1980).

some of these arguments, driving to the mailbox cannot be explained solely in terms of progress. There is clearly more to your relationship with technology than the story of progress alone can account for. At least part of the relationship has to do with a deeply-felt, but largely unexamined commitment to *convenience*.

The value and practice of convenience, the story of the desire for and attainment of comfort and ease, is another story that plays an important role in technological culture. In some ways the commitment to convenience contributes to the story of progress. But because convenience tells its own story, it can also undermine progress. Progress is a grand and formal story that accompanies feelings about big events; like the feelings of pride accompanying the announcement of the human genome sequence in June 2000. But convenience is a mundane story, an everyday, garden-variety warrant for decisions involving technology at its most banal. Convenience, more often than not, is the everyday motivation that justifies ongoing choices involving the role of technology in everyday life. The woman drives to the mailbox, not because it is progress to do so, but because it is convenient. The importance of this story in everyday life obliges us to take a closer look at the meaning and practice of convenience.

What Is Convenience?

Convenience, like progress, parades itself initially in fairly uncomplicated dress. The story goes like this: Technologies make life better because they make life more convenient; that is, they save time, conquer space, and create comfort. Technologies perform tasks we might otherwise have to do for ourselves. They relieve us from drudgery, labor, and physical exertion. They make it easier to go to more places faster. They minimize the everyday struggles that were commonplace for our ancestors. In all, they make life easier.

There is, however, much more to the story. Thomas F. Tierney, in *The Value of Convenience: A Genealogy of Technical Culture*, lays out a richer, more complex version of the story of convenience.[2] He argues that the desire for ease, what he calls the *value of convenience*, is integral to understanding the modern self and modern technological culture.

As Tierney explains, convenience in and of itself is not undesirable. Indeed, it can be quite liberating, and it accounts for many of the improvements in the quality of life that characterize the contemporary world. Raymond Williams's impatience with those who would minimize the contributions of industrial technologies, discussed in the previous chapter, speaks to the very real improvements made in people's lives by technologies of convenience. However, convenience becomes a problem when the value of convenience and the desire to achieve convenience come to dominate technological culture. Far from being merely liberating, the effects of the quest for convenience have had widespread and disturbing effects.

[2] Tierney (1993).

The modern dominance of the value of convenience is related to a significant shift in the meaning of convenience. *Convenient*, before the seventeenth century, meant that something was in accordance with, in agreement with, suitable or appropriate to a given situation or circumstance. It also meant something was morally appropriate.[3] a convenience would thus have been something that was suitable. If something fit the circumstances, it was convenient. For example, serious winter clothing for those living in the Far north is a convenience. A board of just the right size, used to suit the requirements of a building project, is a convenience.

This notion of suitability differs dramatically from our contemporary notion of convenience. The contemporary meaning of convenience continues to denote a sense of suitability but radically redefines its connotations. Now something is convenient only if it is suitable to one's personal comfort or ease. A dictionary definition indicates that agreement, harmony, and congruity are obsolete definitions. Suitability heads the list of definitions, buts its meaning shifts—modified by additional definitions—to insist on personal ease and comfort. Those definitions include:

> Fitness or suitability for performing some action or fulfilling some requirement...a favorable or advantageous condition, state, or circumstance...something that provides comfort or advantage: something suited to one's material wants...an arrangement, appliance, device, material, or service conducive to personal ease or comfort...freedom from difficulty, discomfort, or trouble.[4]

Personal comfort obviously plays a crucial role in the connotations of convenience, and the meaning of comfort has shifted along with the meaning of convenience. Tierney points out that, before the fifteenth century, comfort referred to strength and support. To comfort, "meant to support, strengthen, or bolster, in either a physical or mental sense." In the fifteenth century, comfort also began to mean removing pain or physical discomfort. But by the nineteenth century, comfort came to mean "a state of physical and material well-being, with freedom from pain and trouble, and satisfaction of bodily needs."[5] To be comfortable, to experience ease and convenience, one must thus be free from pain and trouble and have all bodily needs satisfied. This is the current expectation most people have of technologies: make us comfortable. Make life easy. Make life pain and trouble free. Meet all bodily needs. This last point, satisfying bodily needs, is crucial for Tierney, for whom understanding the changing nature of bodily needs is key to understanding the uniqueness of the contemporary role of technology.

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[3] Tierney (1993), p. 39.

[4] Webster's (1976).

[5] Tierney (1993), p. 40. The pre-fifteenth century meaning of comfort as giving support or strength is still in use in the treasonous charge of "giving aid and comfort to the enemy."

Convenience and the Body: From Meeting the Demands of the Body to Overcoming the Limits of the Body

The changing meanings of convenience and comfort correspond to significant changes in the way people relate to their bodies. Tierney argues that between the time of the ancient Greeks and the present, the perception of what the body needs has changed dramatically. The ancient Greek household—made up of the Greek male citizen, wife, children, animals, and slaves—was organized to produce what was necessary for survival. The body made certain demands—for shelter, food, clothing, water, and so on—and it was the task of the household to meet, or satisfy, those demands. Because Greek male citizens participated in the life of the *polis*—the political arena that has come down to us as characterizing Greek life—some scholars have suggested that they did not participate much in or value the life of the household. However, the evidence, according to Tierney, points to the fact that even the male citizens placed great value on performing the activities of the household and meeting the demands of the body.

Tierney contrasts this Greek value of *meeting the demands of the body* with the contemporary value of *overcoming the limits of the body*. Where the Greek body was seen as making demands, the contemporary body is seen as having limits. Where the Greek body was more or less a given with certain requirements, the contemporary body presents problems that need to be overcome. If we think of our bodies as having limits, we see them as lacking something, as having limitations, as falling short, as having problems that demand solutions. Our bodies get tired and sore, they can't be in two places at one time, they don't move very fast, they break down, they age, and ultimately they die. Clearly Greek bodies did this too, but the difference, according to Tierney, is that the Greeks viewed this as a simple *fact* of the body, whereas we view this as a *problem*. If having these limits is a problem, then we take it as our destiny to solve the problem. We do this by attempting to overcome the limits. We strive to find ways to not get tired and sore, to be in two places at one time, to move faster, to not break down, not age, and ultimately, to not die. And we strive to do this conveniently, that is, without pain or discomfort, without unnecessary exertion.

The interesting thing about limits is that once you conceive of the body as having limits to overcome, you are doomed to never be able to overcome them. Why? Because once you overcome a limit you automatically establish a new limit. Overcome the next one and you automatically establish another. A limit, like the horizon, always lurks out there before you, no matter what you accomplish. Take sports records as an example. Once people thought that no human being could run the mile in less than four minutes. That was the limit. Roger Bannister overcame that limit in 1954. Bannister's new record of 3 minutes 59.4 seconds was then broken by John Landy, also in 1954. Landy's new record of 3 minutes 58 seconds was also eventually broken.

Currently, top male runners regularly run the mile in less than 3 minutes 50 seconds, and the record as we write is 3:34.13 (note its measurements in the tenths of a second) set by Hicham el Guerrouj in 1999. Whatever the present record, runners are out there still trying to overcome it. The current record is nothing more than a limit horizon taunting runners to overcome their imperfect bodies and exceed the limit. Once they do, however, the limit horizon will merely move its location a little further down the road and continue to taunt runners for their limitations. Whereas the Greeks satisfied bodily demands by careful household planning, we rely heavily on the development and use of technologies to overcome bodily limits. In the case of running faster, more advanced training technologies, new high-tech shoes, new high-tech running clothes, or new pharmaceuticals might be just the ticket to push past that limit. Records are meant to be broken. Limits are meant to be overcome. New technologies promise to overcome the receding limit horizon.

According to Tierney, the desire to overcome bodily limits has taken two forms primarily: *the desire to overcome the limits of space* and *the desire to overcome the limits of time*. The two are closely connected, though not identical. On the one hand, we have become increasingly frustrated with the limitations of our bodies to take us further than we have already been in a more convenient fashion (a limit of space). On the other hand, we have become increasingly frustrated with the limitations of our bodies to get us to all those places more quickly than we have been able to in a more convenient fashion (a limit of time).

Because we make space a problem, we continue to develop modes of transportation that originally were designed to exceed the limit of how far a person could walk or run in a day or a season. Now, however, the limit horizon demands that we develop technologies to take us beyond the limits of outer space. We routinely expect our transportation technologies to make it easier and more comfortable to take a quick weekend vacation on the other side of the continent, or the other side of the world. Business travel often requires people to be in one city in the morning, another in the afternoon, and perhaps a third by nightfall.

Because we make time a problem, we continue to develop technologies to get us to those places faster. Since time spent traveling is a bodily inconvenience and contemporary life demands that we get to places and back again in a limited amount of time, we have to be able to go and return quickly. Those quick weekends on the other side of the continent or world are only possible if we can do it in a weekend. We've got to be back to work on monday, after all! Perhaps one of the most resistant time-related limits to the human body is the need for sleep and the "waste" of all that time. So it is not surprising, as Jonathan Crary documents in his book, *24/7*, that there are ongoing efforts to develop (pharmaceutical) technologies that eliminate the need for sleep. It is also the case that, as humans have pushed the limit of available time back, we have adapted to living with less sleep: from ten hours in the early twentieth century, to

eight hours, and currently to approximately six and a half.[6] another limit we must contend with is one that clearly combines the limits of time and space: the need to be physically present at a particular place at a particular time. Routinely, we expect our communication technologies to make it easier and more comfortable to stay in touch with any other person or place we can imagine, regardless of where we or they might be: the bath, the car, the swimming pool, the jungle, the mountaintop, or the space station. The challenge for new technologies is to collapse space and time so that the communicator/traveler can be everywhere at once without exertion. We have come to place a high value on being somewhere without having to go there. You can sit in the comfort of your chair and go to the Library of Congress to look up a book, or go to the afriCam web site and check out the animals at your favorite watering hole in africa. You can experience both, with a split screen, and thus be in three places at once: the Library of Congress, africa, and home. By collapsing time and space in this way, technologies work toward (but never entirely succeed at) making all spaces equally and instantaneously present with complete comfort and ease.

Enter the need and desire for communication technologies to stand in as surrogates for our bodies in what has come to be known as "telepresence." again, the limits have been dramatically reconfigured. Early communication technologies were designed to detach the message from the sender and send it over the hill, as with a smoke signal, or as far as a person could walk, as with a written message sent with a messenger. Now, however, the limit horizon requires that we develop technologies that allow us to communicate with others long distance in ways that reproduce our actual presence. Some of the research that is the farthest out there, closing in on the current limit horizon, is about linking virtual bodies anywhere at any time, thus enabling a variety of human interactions without interference from either time or space. These technologies would not only allow us to communicate easily over distance but to perceive the distant place as if we were there, manipulate objects there, and, eventually, be able to touch and feel at a distance.[7]

The ultimate limit of the body is the limit of its lifetime. All living bodies, at least as we write, will die. Death is the ultimate inconvenience because there is widespread suspicion that we can do nothing that will ever allow us to overcome *that* limit. Conveniences can only band-aid our lives with ease and comfort within the limits of a lifetime of unpredictable length. The fact that this makes us pretty uncomfortable is evident in a variety of cultural venues. For example, the development and use of medical technologies are designed to prolong life. Advertisements for medicines and supplements sometimes suggest that one might live forever. In science fiction, people live forever in virtual reality. Cloning technologies are frequently talked about as if they were a means to immortality. If you can be cloned, isn't there a sense in which you can live forever? If death is the ultimate limit of the body, the ultimate technology will be the

[6] Crary (2013), pp. 1–4, 11.
[7] Goldberg (2001).

one that overcomes death. Certainly for as long as we have both been alive, there have been technological promises of immortality readily in circulation. But, perhaps, this is like the four-minute mile, and once that limit is overcome, a new limit horizon will stretch out before the inhabitants of the future.

In the meantime, we develop and use technologies to extend our lives and make us as comfortable as possible. The eyeglasses some of us wear are conveniences that allow us to negotiate the terrain with far more ease than if we went strolling around without them. Laser eye surgery offers even more convenience, because we won't have to deal with the inconveniences of eyeglasses. We won't have to feel their irritating weight, remember to clean them periodically, wrestle with them as we put on a pullover sweater, or wipe off the steam when we go skiing on a cold winter's night.

Life, most of us would agree, is definitely better with all the conveniences of transportation technology, medical technology, household technology, communication technology, farming technology, industrial technology, and so on. But is that the whole story? no, we think not. Nothing, of course, is that simple; and beyond a doubt, the role of technology in our lives is not that simple.

Wants and Needs

Convenience does not in any incontrovertible way make life better. Like the old story of the blind men led up to different parts of an elephant and asked to touch it and describe it, how you describe the role of technologies of convenience in culture depends on where you stand in relation to their many parts. The part that most people fail to see relates to the changing nature of needs that accompany the changing limit horizon of the body.

It is true that bodies have needs that absolutely must be met. Scholars in the social sciences often debate about the exact nature of basic bodily needs, but they are generally biological and include shelter, food, water, clothing, sleep, affiliation, and procreation. These are the sort of basic needs that the Greek household, according to Tierney, was organized to deliver. Surely the Greeks had wants— that is, things they desired that were not absolute necessities—but life was organized more around the needs rather than the wants.

Contemporary human beings continue to have the very same biological needs, but over time, as we began to develop a sense of bodily limits, what we needed expanded to include nonbiological, culturally produced needs. Things that formerly seemed to be wants became, in fact, needs. Air travel provides a good example. At one time in history, nobody needed to travel by air. People certainly dreamed of the possibility and longed to be able to travel by air. But it was a want, not a need. It was a tantalizing limit out there waiting to be overcome. Once the limit was overcome and travel by airplane became possible, it became a luxury. In fact, for many people, air travel still

seems like a luxury, and their survival does not seem to be connected to it. However, in several very interesting ways, air travel has become a necessity.

Earlier we mentioned that business travelers are often in one city in the morning, in another by midday, and in yet another by night. If you travel in an airplane during the week, you will likely be seated among these same business travelers doing what they must, that is, working hard to overcome the limits of time and space by flying from city to city as required. Do they have to fly? Is flying a necessity? Certainly flying is not a necessity in any simple biological sense. But, if they want to keep their jobs, if they want to feed themselves and their families, if they want to fit into the mainstream of how things are done, they have to fly. Surely, you might protest, they could quit and take a job that does not require them to fly. This is certainly true, and there are plenty of people who choose not to take jobs because they would be required to fly. Okay, so what job do they take then? Perhaps they take a job that requires them to drive. But driving is not a biological necessity either, is it? So, if they don't take that job, what is open to them? We can play this game for a long while, tracking down ways that any job they might take can make a necessity out of something that is not a biological necessity. In the end, you might say the person has the right to choose to not work! and, again, you would be correct. But what kind of life is open to a person in this culture who chooses not to work? The point is, to be a fully functioning adult member of the culture, you are likely to have accepted as necessities various technologies and technological practices that are not biological, but are rather *cultural* necessities. They are necessities, nonetheless.

In this way, wants and luxuries become necessities. They become habits deeply entrenched in the way that culture is organized. Food is doubtless a necessity, but refrigeration is not. However, once urban and rural areas are organized as geographically distinct areas with distinct tasks, and there is no space in the city to garden, and it takes a long time to get food from the country to the city, then refrigeration becomes more like a necessity than a luxury. The necessity seems cultural rather than biological, but in the end the implications are biological as well. What happens if you can't get fresh food in a hot summer in a city without the aid of refrigeration? What happens to the body as it learns to function with less sleep?

It is interesting to speculate a little further about what happens when wants and luxuries become necessities, and these necessities entail overcoming the limits of space and time. In short, culture becomes organized around the project of overcoming the limits of the body. We increasingly need to expand our sense of the spaces we maneuver in, and we increasingly need to do everything faster. Again, business travel provides a pertinent example. In an increasingly global market, business must be able to move, and move quickly (virtually or bodily), if it is to keep up with trends. For an excellent example of this imperative, we suggest flipping through Bill Gates's aptly titled *Business @ the Speed of Thought: Succeeding in the Digital Economy.*[8] almost every

[8] Gates (2000).

contemporary activity involves the need to collapse time and space by overcoming their limits. Researchers interested in eradicating viral disease must contend and compete with the speed at which diseases travel on global transportation systems. (The ebola outbreak of 2014 is an example of this.) Parents must contend and compete with the rapid-fire exposure to a nearly full array of worldly activities children encounter through television and the Internet. Employees have to contend with demands to relocate on short notice or travel long distance. Teachers must contend with pressures to offer courses online using distance-education technologies. Students and workers in high stress environments increasingly feel the need to use "smart drugs" (pharmaceutical technologies) to enhance memory, the speed of thought, and overall intelligence in order to compete better in the 24/7 world where a body's limits, whatever they might be, are simply unacceptable. What we want and need, and what we must respond to, increasingly relate to the value of convenience—to the desire to overcome the bodily limits of time and space—and technology is integral to the process.

When Convenience Isn't

The story we tell ourselves about convenience, the story built right into the meaning of the term, is that it makes life easier and more comfortable. We might think that some of the demands made on us, like having to travel by airplane or to restrict children's access to the home computer, or learning to live with less sleep, are the necessary side effects that we must accept in order to overcome bodily limits with comfort and ease. They are "the price we pay," so to speak. That's certainly a powerful story, but one that, again, sees only part of the elephant. Sometimes it makes more sense to recognize that convenience isn't always so convenient!

In a classic study of housework and household technology, one that we will return to later in this book, Ruth Schwartz Cowan looks closely at the relationship between household conveniences and the changing nature of work in the American home.[9] Her study suggests that using convenience technologies does not always mean that life is altogether easier. Modern household conveniences— washing machines, refrigerators, vacuum cleaners, dishwashers, microwaves, bread machines, and so on—certainly have been marketed as labor-saving devices, promising more leisure time and less physical exertion. Cowan concurs that these conveniences are part of an overall rise in our standard of living and that they do reduce the drudgery of particular tasks. It is, after all, physically very easy to walk over to the washing machine and throw in a load of clothes; but these technologies do not eliminate labor. In fact, as a part of a changing technological system, they contribute to an increase in women's labor.

If you look past the idea that technology is just the physical stuff—the washing machine or the bread machine—you will see that household conveniences are part of a network of connections that tell a different story, one in which, as Cowan's book title

[9] Cowan (1983).

tells us, there is actually *More Work for Mother*. Cowan describes the changing nature of household technology as a process of industrialization of the household, where both the work of production and its products change. As part of this process, men were gradually eliminated from household production, as was hired household help. Eventually, as Cowan argues, the technological systems that define the household are "built on the assumption that a full-time housewife would be operating them."[10] accompanying this shift, the standards of cleanliness and health increase and become the sole responsibility of the housewife. Guilt, embarrassment, and insecurity drive household labor. Cowan claims that:

> The hard-pressed housewife was being told that if she failed to feed her babies special foods, to scrub behind the sink with special cleaners, to reduce the spread of infection by using paper tissues, to control mouth odor by urging everyone to gargle and body odor by urging everyone to bathe, to improve her children's schoolwork by sending them off with a good breakfast, or her daughter's "social rating" by sending her off to parties with polished white shoes—then any number of woeful events would ensue and they would all be entirely her fault.[11]

Consequently, clothes have to be washed more often, more elaborate meals have to be produced, more cleaning has to be done, and more products have to be purchased. From this perspective, the conveniences no longer look so convenient.

The popularity of bread machines illustrates how more labor is demanded as part of the desire to better provide for the household with modern conveniences. If you want your family to eat healthful bread and to have it fresh and warm and lovingly presented, buy a bread machine! Oh yes, and then buy the right kind of flour, yeast, and the special ingredients for all the speciality breads that you will make if you really love your family. Oh yes, and make it fresh every day. That, after all, is what the machine is designed for. Oh yes, and clean the machine parts after use, and dust it when you clean the counters now cramped with other labor-saving conveniences. This convenience, like all household conveniences, is part of a technological system that makes us more comfortable in some senses. However, the network of connections that constitutes this technological system does not, in the end, reduce labor and save time; instead, the network of connections is part of a shifting burden in which the demands to collapse time (you can make that bread now!) and space (you can make that bread here!) become, in a sense, an inconvenience. These contemporary demands are burdens, responsibilities, and stresses that can only be called *uncomfortable*. These burdens constitute a contemporary form of *dis-ease*.

As with household technologies, so it is with transportation technologies (remember those business travelers!), communication technologies (check that e-mail or text on the

[10] Cowan (1983), p. 211.
[11] Cowan (1983), p. 188.

go, on your phone), medical technologies (take that drug to be smarter or stay awake longer), even recycling technologies (buy that special five-gallon composter designed especially for use in cities!). Increasingly, we need technologies that perform convenient tasks, and those technologies are part of technological processes that are, in turn, part of changing labor processes that actually demand considerable exertion.

Industrial production, in the more traditional sense of factory production, plays an important role in changing labor processes in three ways. First, industry constantly retools to anticipate, produce, and market new and (now) much-needed conveniences: bread makers, yogurt makers, composters, air purifiers, tablet and wearable computers, smart phones, new and fancier automobiles, artificial limbs and designer drugs. The survival of industry depends on the timely promotion of, and adaptability to, change.

Second, industrial production becomes organized internally around the value of convenience, with consequences for virtually all labor throughout the culture. In particular the practice of *scientific management*, sometimes called *Taylorism* after Frederick Winslow Taylor, began to transform the workplace in the early 1900s. Speed and efficiency are the key concepts in scientific management. Its goal, according to Taylor, is to train each individual "so that he can do (at his fastest pace and with the maximum of efficiency) the highest class of work for which his natural abilities fit him."[12] efficiency, for scientific managers, means completing a desired task with the minimum input of energy, time, materials, and money. With this goal in mind, the results of time and motion studies of particular tasks were used to redesign production processes to maximize the output of human energy at the fastest pace sustainable. The production process itself thus became organized around the ideal of convenience: overcoming the limits of space and time with maximum comfort and minimum effort.

Third, industrial production is significantly transformed by *Fordism*, named after Henry Ford. Fordism utilized innovations in mechanization, combined mechanism with Taylorism, and instituted the continuous assembly line. As Tierney discusses this phenomenon, Fordism has significant implications for the value of convenience and for the consumption of conveniences.[13] The most significant implication is that, by rationalizing the pace of work, industry was able to increase production, generate capital quicker, and therefore retool quickly when necessary to respond to and capture a changing market. In other words, industry too could offer more, newer conveniences by operating more conveniently. Further, by demanding a steady and intense work pace throughout the workday, workers need to recuperate at home, rendering them more likely to rely on conveniences to get through to the next day. Overall, the changing nature of industrial work creates a ready market for the conveniences that industry is increasingly geared up to produce.

Neither the material things themselves nor some essential truth about human beings has determined that these conveniences should become needs. Rather, they are part

[12] Taylor (1947), p. 12.

[13] Tierney (1993), pp. 53–57.

of a changing configuration of contingent connections, which suggests that life could be otherwise, given other choices. Cowan argues, for example, that "[t]echnological systems that might have truly eliminated the labor of housewives could have been built...but such systems would have eliminated the [single-family] home as well—a result that...most Americans were consistently and insistently unwilling to accept."[14] alternative technological systems that would have eliminated the need for the single-family home, privately owned tools, and the servitude of the housewife include commercial or communal housekeeping arrangements, kitchens, food delivery services, laundries, child care, gardens, boarding houses, and apartment hotels: all with appropriately designed and sized technologies to perform the necessary supportive tasks. Many of these—and other—alternative technological systems have been variously promoted, instituted, and largely rejected.[15] The issue of choice is not always obvious. Does giving up the single-family home, with its excess of privately owned tools, seem like a choice? It is, but because it has become a cultural habit, it doesn't seem like a choice. When cultural habits become ingrained, when media offer up versions of what life should be like, when everyday economic circumstances encourage certain choices, when peer expectations exert pressure, and when political rhetoric and political practices assume one direction and not another, the chosen path may seem like the only way to go.

The Time and Space of Consumption

The path we continue to take with fervor—the path of convenience—has had monumental implications for the nature of private and public spaces and on the role of consumption. Both Tierney's and Cowan's treatments of the changing nature of household production and its relationship to technology reveal some of these changes. The household becomes a very private space; it becomes the production site for the work of the housewife, who in turn becomes a consumer of convenience technologies to help her carry on her productive tasks. Public spaces become dedicated to performing specialized tasks that are no longer part of the household. Factory workers produce clothes, prepared foods, modes of transportation, tools, lumber, machines, industrial household technologies, and pharmaceuticals, many of which are designed for private consumption. Retail operations, which are increasingly centralized, sell the goods produced by industry. Public schools educate children. Public utilities deliver power and collect garbage. Mass media deliver news and entertainment.

Another way to look at this is to see it as part of a process of moving away from a culture organized around subsistence and toward a culture organized around interlocking dependency. As part of the relations of dependence, one of our major tasks as citizens in the process is consumption. This is especially true of the household, which becomes a primary, privatized site of consumption. But let's unpack this claim.

[14] Cowan (1983), p. 101.

[15] See Cowan's (1997) chapter on "alternative approaches to Housework," pp. 102–150.

At first blush, it seems obvious that we have moved from a subsistence economy to a market economy. However, for a very long time, people have bartered goods and services. The north American Indian peoples, often popularly thought of as living a subsistence life, had extensive trade routes throughout the continent long before the arrival of Europeans. Coastal tribes traded fish for buffalo meat. Tribes from the area now known as the upper Peninsula of michigan bartered copper for products from the South. Throughout the continent, ivory, bone, and medicinal plants were traded. In popular myth as well, the American colonists lived a subsistence life, but that too is overstated. Cowan, in *A Social History of American Technology*, maintains that while self-sufficiency was a highly regarded value even in colonial America, "no colonial family could have produced all that it needed for its own sustenance."[16] These observations should be taken as cautionary notes. A move away from self-sufficiency is not simply a feature of contemporary technological culture. Humans, after all, are social animals, and it is probably a rare case in any era for a lone individual to have had no contact and exchange with any other human. If, however, we envision a sliding scale rather than a simple binary distinction between subsistence culture and a trade or market culture, we can appreciate the magnitude of what has changed. Specifically, what has changed is that limit horizon. Expectations about what technologies are supposed to do for us have become increasingly more demanding, with enormous consequences for the nature and quality of cultural life. It is as though we are no longer trying to run the four-minute mile, but a three-and-a-half–minute mile.

In some of the most compelling arguments in his book, Tierney describes the changing configuration of public and private spaces and the role of consumption in a discussion of the changing nature and role of agricultural technologies in the settlement of the western United States. The settlement of the West was largely controlled by government land sales. While the acreage requirements varied, minimum plot size was quite large: 640 acres in 1789; 320 acres in 1800; and 150 acres in 1804. A settler-farmer interested in living more toward the subsistence end of the scale would probably want about five acres of good land; but if they wanted to buy land, they had to buy the larger amount. Prices varied, but in 1789 the cost was $1 plus $1 per acre, for a total of $641. This was a substantial amount of money, and very likely it was borrowed, with interest due. That meant settler-farmers had to make the land productive fast in order to repay their debt. They did this primarily by purchasing, again on loan, farm equipment designed to handle a lot of ground fast.[17] already, at this early point in the story, farming had moved far away from the subsistence end of the scale. It is "quaint" to think of early-American farmers as living subsistence lives; but they were already debtors and major consumers of farm equipment.

The situation continued to develop away from the subsistence end of the scale. Farm equipment continued to get more specialized, bigger, and more expensive. It was

[16] Cowan (1997), p. 43.
[17] Tierney (1993), p. 75.

designed to cover more ground faster and more comfortably, that is, more conveniently. This, in conjunction with the dependence on and cost of rail transport to get goods to market, the vagaries of the market's ups and downs, inevitable crop failures, and increasing land taxes, moved farming further from the subsistence end of the scale. It is a rare family farm in contemporary America that does not have at least one member working as a wage earner outside the home— most likely the "housewife," who, as Cowan points out in *More Work for Mother*, would still be primarily responsible for the housework. In this situation, the need for more convenience technologies increases. It makes sense in these circumstances to purchase a dishwasher, a microwave oven, and factory-made clothes. Who has time to do otherwise?

The trend has continued in the direction of transforming farmers into consumers. In fact, most farmland is now in corporate hands. Farming has become predominantly industrial, and most of those who would be farmers have become consumers of factory-farmed food. The shift in the population away from farms is staggering:

1910–1920 32 million farmers living on farms

1950 23 million

1991 4.6 million

In 1993 the United States Census Bureau announced that it would no longer count the number of people who lived on farms. Clearly for some this is "progress," but for others it is an enormous loss. As Wendell Berry argues, "Good farmers, like good musicians, must be raised to the trade." eventually, he argues, consumers will feel and pay the price.[18] as it goes with farming, so it goes with many of the technological skills we depend on. Few carpenters anymore know how to do more than install mass-produced factory-made units. Far fewer home and apartment dwellers know how to fix anything that goes wrong. When it comes to conveniences, the reasonable choice seems to be to toss it and consume something new. Fewer people sew their own clothes, and fabric stores are going the way of the full-service gas station. People who work at retail stores and gas stations typically know very little about the products they sell. Fewer people make their own music anymore; most depend largely on consuming mass-mediated, highly manipulated music produced in a competitive "star" system. Even in the dIy ("do It yourself") Internet music environment, few small independent musicians succeed by traditional economic measures. For some this kind of progress delivers wonders that we could not produce on our own, and that is certainly true; it also represents an enormous loss of community interaction, skill, and talent. The individual talents that do remain have become focused on learning to become good and canny consumers of convenience. As Tierney and others have argued, the household in general is transformed from being a site of production to a site of consumption. What we do in our homes, indeed in our lives overall, is consume rather than create. Arguably, this is changing with web 2.0, which we will discuss in Part III.

[18] Berry (1995), pp. 8, 4.

A Perpetual State of Dissatisfaction

A perpetual state of dissatisfaction with who and what we are is a final consequence of conceiving of the body as having limits to overcome. We can never get to where we are going fast enough. We can never go everywhere there is to go. We can never be healthy enough, beautiful enough, smart enough, or rich enough. We can never own enough stuff. We can never have enough technology. And we can never be satisfied with the fact that we die. This perpetual state of dissatisfaction fuels, and is fueled by, the production and marketing of conveniences of all kinds. Technologies of beauty promise improved textures, odors, colors, sizes, and shapes of various body parts. Medical technologies not only replace aging hip joints, but reshape noses, enhance breast size, and promise to make us smarter and more alert. Exercise technologies promise trimmer, healthier, more beautiful bodies, without the stigma of exercise we might get through work. Educational technologies promise to make people smarter with less effort on the part of the learner. Money-generating technologies promise wealth without work. Isn't this, after all, the promise held out by playing the stock market or the lottery? Science fiction offers us fantastic images of escaping the body and the inevitability of its death. Convenience, in the extreme forms we encounter in contemporary culture, offers the ultimate quick fix that is doomed to leave us needing yet another. Our technologies are shaped in part by that desire; they hold out promise, and they inevitably, in some form or another, fail us. There is always the next limit horizon to reach for.

What the Future Holds

It is an interesting situation to be in, isn't it: to be committed to conveniences that aren't always convenient, and to strive for what is perpetually out of reach? Why, we have to wonder, do we persist in our commitment to this contradiction? It might be because yet another cultural value is slowly replacing both progress and convenience as the dominant explanatory value behind the cultural commitment to technological development. Rosalind Williams in *Retooling* argues that the "progress talk" that once dominated technological discussions has been replaced by what she calls "change talk."[19] The simple, primary value of change renders irrelevant any expectation that change is supposed to get us something: the good life as progress would have it, or ease as convenience would have it. Instead, the "change journey," a journey with no reason or end other than itself, is what matters. To change, in this view, is the point, pure and simple. The value of change can also be seen as merely the imperative to move, to act, where the goal of the good life is entirely supplanted by the means. In *The New Spirit of Capitalism*, Luc Boltanski and eve Chiapello suggest that this is exactly what is happening. Movement for its own sake is what matters: "To always be doing something, to move, to change—this is what enjoys prestige, as against stability, which

[19] Rosalind Williams (2002), p, 17.

is often synonymous with inaction."[20] To the degree that the commitment to change rearticulates both progress and convenience, we are likely to witness a culture investing heavily in technological development with rampant disregard for any ill effects in its wake.

Source: Illustration by SiGarb, 2009, Wikimedia Commons: commons.wikimedia.org

[20] Boltanski and Chiapello (2007), p. 155.

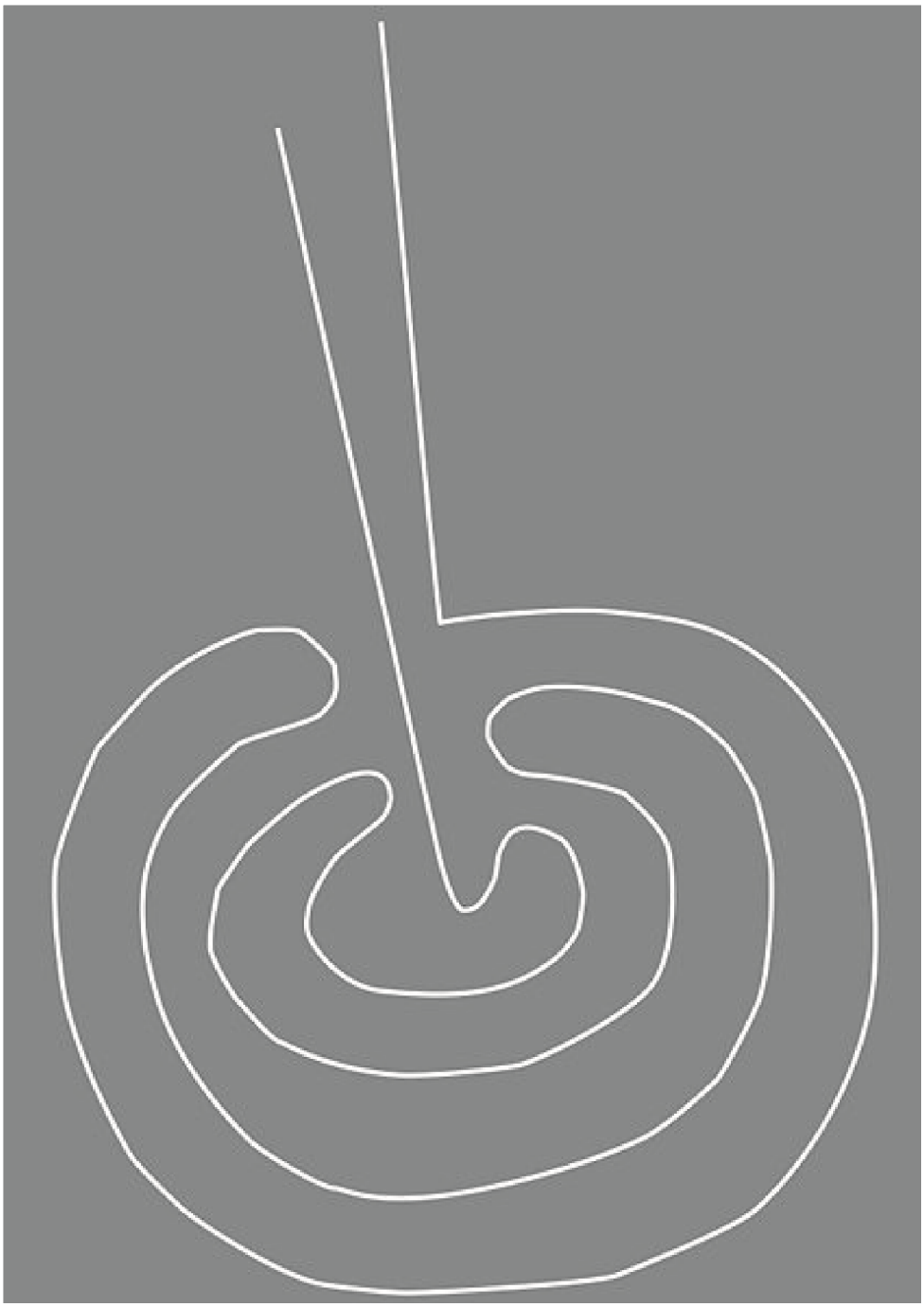

Figure 8: Nazca Lines Labyrinth

Chapter Four: Determinism

IN HIS COMEDY ROUTINE, British comedian Eddie Izzard carries on a running gag about the national Rifle association's attacks on gun control. In response to the nRa's claim that "guns don't kill people, people do," Izzard quips, "but I think...the gun helps, you know? I think it helps... Just standing there going 'bang!'.... That's not going to kill too many people, is it?"[1] Izzard takes the ribbing even further when he asks, what if you gave a gun to a monkey? What would happen then? The nRa would have to amend the argument to say that "guns don't kill people, people and monkeys kill people."[2] In yet another flight of Izzard antics, he points to the fact that it isn't really even guns, or people, or monkeys presumably, that kill people, but bullets ripping through flesh![3] Izzard has a point: The gun makes a particular kind of killing possible; and it is a lot easier to kill someone with a gun than with an icy glare or even with your bare hands. But so too does the nRa have a point: Guns don't go roaming around the world on their own killing people. People use them. They pick them up, aim them, pull their triggers, and, if their aim is good or if they are just lucky (or unlucky), they kill someone. On the other hand, Izzard has yet another valid point: Guns are often involved in killings where there was no intention to kill. You have to wonder if children, like monkeys, would be considered responsible for the deaths they might cause with a gun in their hands? also, who or what is responsible if a gun falls over, fires, and kills someone? nobody, in this case, even pulled the trigger. With regard to guns, how do you sort out these questions: What causes what? Who or what is responsible?

It is unfortunate that people sometimes think that simple slogans, like "guns don't kill people—people do," provide answers to these complex questions. Slogans like these get used—like weapons—as though they settled everything. If you talk about gun control with someone who is opposed to it, they will often offer up the slogan, "guns don't kill people, people do," as though it ended the argument. Like magic, slogans conceal the complexity of the arguments buried deep within these serious and sometimes humorous exchanges.

In fact, the issues raised by Izzard's imagined exchange with the nRa reveal a lot about how most people understand the relationship between culture and technology. Most significantly, it reveals the degree to which *questions of causality* dominate what matters in this relationship. First, something causes (or determines) something else: Guns kill people (a pro gun-control position). Or people kill people using neutral

[1] Izzard (1999).
[2] Izzard (2000).
[3] Izzard (1999).

instruments like guns (the nRa position). Or a kind of partnership between the gun and humans kills people (the Izzard position). Second, the attribution of causal power is what permits the distribution of blame or praise: Guns are to blame. Or people are to blame. Or the gun/people nexus is to blame.

Regardless of these differences in the attribution of the causal agent, and in the distribution of blame or praise, the fact remains that understanding technology in terms of such attribution and distribution is the predominant way that the relationship between culture and technology is understood. As Langdon Winner wrote in his classic work on technology, *Autonomous Technology*: "In a fundamental sense, of course, determining things is what technology is all about."[4] This is as true for guns as it is for any other technology. All technologies are widely understood as being significant in terms of the effects that they have, or in terms of being effects themselves. For example, automobiles are associated with a range of effects worthy of both praise and blame: shortening travel time, increasing mobility, causing accidents, creating pollution, and so on. Alternatively, automobiles can be seen as the effect of the expansion of the cities, the movement of populations to suburbs, and the isolation of the individual in capitalism. Televisions are associated with providing access to information, educating children, entertaining the population, encouraging violence and promiscuity, lowering standards of taste and intellect, and contributing to the isolation of the population. Alternatively, televisions can be seen as the effect of increased leisure time, the need to create a national identity, and the industrialized production of communication technologies.

In *Metaphors We Live By*, George Lakoff and mark Johnson argue that causation, the idea that there are causes and effects, is one of those basic human concepts "most used by people to organize their cultural and physical realities."[5] This is certainly confirmed by the prevailing tendency to think of the relationship between culture and technology in terms of causality. While it is simply *not* the case that determining things is *necessarily* what technology is *all* about, conceiving of the relationship between culture and technology in causal terms plays such a powerful cultural role that it deserves careful scrutiny.

In this chapter, then, we look at the commitment our culture has made to think of and respond to technology in causal terms: to the questions of what causes what, and who or what is responsible. First, we look at the dominant variant of the causal relationship between technology and culture: that technology causes effects. This approach is sometimes called *technological determinism*. Second, we consider the flip side of that commitment: the variant that holds that culture causes technology. This approach is sometimes called *cultural determinism*, sometimes *instrumentalism* or (in a particular variant) *social constructivism*. We conclude with a critique of the limitations

[4] Winner (1977), p. 75.

[5] Lakoff and Johnson (1980), p. 69.

of thinking in these particular causal terms as we work toward an enriched sense of technological culture.

Technology as Cause: Technological Determinism

As stated above, thinking in terms of causation is a widespread cultural practice. So it is not surprising that thinking about technology usually invokes causal thinking. The most common form it takes is called *technological determinism*, which means that technology is understood to have effects and that technological change is the principal determinant of cultural change. It stands to reason that if you think that technology is central to an understanding of culture, as we discussed in the introduction to Part One of this book, technological change will be seen as the major determinant of cultural change. Langdon Winner explains that technological determinism is a belief that depends on two hypotheses:

1. that the technical base of a society is the fundamental condition affecting all patterns of social existence and
2. that changes in technology are the single most important source of change in society.[6]

The first hypothesis asserts the strongly held cultural belief that technology is central to defining what culture is. The second hypothesis asserts the strongly held cultural belief that technologies cause effects and that technological change is the primary cause of cultural change. From a technological determinist position, certain key technologies are even considered to be "revolutionary." They define culture and have the power to completely change it. We've seen this belief demonstrated in reporting on the "arab Spring" uprisings of 2010–2011 in Tunisia, egypt, Libya, and elsewhere, in arguments that these revolutions were caused by Twitter, Facebook, youTube and other social media. Social media, then, are considered "revolutionary" in and of themselves. Their mere presence guarantees, ultimately, certain effects (like democracy).

Belief in technological determinism is widely held in Western culture. For a very long time, in fact for as long as there has been recorded history, people have been thinking about technology as primarily responsible for major cultural change. As long ago as the fourth century BC, when Greece was shifting from a culture based on oral communication to a culture based on writing, Plato expressed concern that writing might cause people to lose their memories. He wrote: "If men learn this [writing technology], it will implant forgetfulness in their souls: they will cease to exercise memory because they rely on that which is written, calling things to remembrance no longer from within themselves, but by means of external marks."[7] The argument unfolds thus:

[6] Winner (1977), p. 76.
[7] Plato (360 BC/1952), p. 157.

When people no longer practice their memory skills, they will no longer be able to rely on their memories to make judgments about the world. Instead, they will be forced to rely on external marks (such as writing) and the arguments of others to develop judgments. This situation renders them vulnerable to the persuasive techniques (either written or spoken) of unscrupulous individuals. Plato feared that writing technology, as a form of persuasion, would change Greek culture significantly and for the worse.

Notice the construction: It (writing technology) is the cause of major cultural change. Writing technology implants forgetfulness, it makes people mentally lazy, it causes people to cease using their memories, it makes people susceptible to persuasion, and finally, it causes major shifts in the way culture is organized and in the quality of cultural life. Eric Havelock, writing in the 1980s about the introduction of the Greek alphabet during Plato's time, claims that the alphabet was revolutionary in its effects on human culture: "The Greek alphabet...impinges on the Greek scene, as a piece of explosive technology, revolutionary in its effects on human culture." The Greek alphabet, for Havelock, caused people to have a completely "new state of mind," and thus a whole new way of life.[8]

The list of technologies that have supposedly caused revolutionary change of this magnitude is almost as long as the number of technologies you can name. Here are just a few of the more obvious examples:

> *Printing press*: Elizabeth L. Eisenstein, in *The Printing Press as an Agent of Change*, traces the effects of printing technology. In more than 700 pages of text, she depicts the printing press as having "left no field of human enterprise untouched."[9]
>
> *Industrial technology*: That the term "Industrial Revolution" is so common is testament to the fact that people have thoroughly internalized the belief that industrial technology transformed the world, forever affecting the shape, pace, and quality of life.
>
> *Computers*: People claim that computer technologies are in the process of revolutionizing every aspect of culture. This revolution has produced an industry in prophesying the effects of the new technologies.
>
> *Social media*: We hear often of the democratizing tendency of computer mediated communication, mobile devices, and other social media.

It is interesting, however, that it is not just the really big technologies (writing, automobiles, industrial technology, computers, nanotechnology, biotechnology, and so on) that tend to be understood in terms of technological determinism. Highly significant cultural effects are often attributed to lesser technologies. A student in one of

[8] Havelock (1982), pp. 6, 7.
[9] eisenstein (1979), p. 7.

Jennifer's classes insisted passionately that even the toothpaste pump was revolutionary in its effects (does anybody even use them anymore?). It is as though our habits of mind have become technologically determinist to such an extent that all technologies are seen as inherently world-changing.

What is important here are less the details of the specific effects new technologies are said to produce, but that the significance of these technologies tends to be understood in terms of the effects that they have. Whether the technologies in question are writing technologies, printing presses, automobiles, computers, electronic technologies, medical technologies, industrial technologies, biotechnologies, or nanotechnologies, they are understood as changing the culture in highly significant ways. The culture changes from one kind to another, pushed and prodded by changing technologies.

If you bring this discussion back to the gun, you can see that from a technological determinist position, the gun is indeed responsible for massive cultural effects. The gun introduced revolutionary new ways to kill: quickly, with minimal effort or skill, and from a safe distance. This changed the face of combat: It is more likely to be mortal combat. This changed the way that differences are settled: There is always the reasonably accessible possibility of threatening to kill. From a technological deterministic position, it is almost as though the gun does roam about in the world on its own, affecting culture in such a way that killing with the gun is inevitable. Countless times, people have told us that the important thing to know about technology is that "once you have it, you have to use it." There is "no going back," "no regressing," "no going back to the cave." People have no power to change or control things; only technology changes and controls things. If this is the case, if technological determinism is right, then guns do kill people, pure and simple.

Technological determinism is a belief that may feel true in our contemporary experience; but it is hardly fact. Technologies do not, in and of themselves, determine effects. People create and use technologies. Effects are not imposed on us by the technologies themselves. Automobiles did not drop from the sky and force people to drive them. Televisions did not simply appear and make people watch them. Microwaves do not force people to change their eating habits. Rather, technologies do require various forms of involvement or participation of people at various stages of their development and use. There may be, as Thomas Hughes argues, a feeling of "technological momentum," that is, a powerful sense of inertia when technologies are developed and deployed that shapes, guides, or even pushes the further development and use of technology.[10] The sense of technological momentum is real: Technologies, once in place, do seem to encourage the alignment of all sorts of possibilities. But this feeling of and tendency toward momentum fall far short of the belief in a hard-and-fast technological determinism.

That being said, it is important to note how often technological determinist statements are expressed in popular discourse. Think how often you hear statements such as

[10] Hughes (1994), pp. 101–113.

"computers are revolutionizing culture" or "Google is making us stupid"[11] or "computers are changing what it means to be human" or "television is causing violence" or "genetic engineering will create a better world." Thus, despite its inadequacies, technological determinism often organizes the way people understand and act in the relationship between technology and culture.

Technology as Effect: Cultural Determinism

Cultural determinism reverses the attribution of causal agency, so that culture is understood to be the cause and technology to be the effect. Although it is perhaps less evident in popular discourse than technological determinism, cultural determinism is also quite prevalent in the ways that people understand and act in the relationship between culture and technology.

Cultural determinism depends on assumptions that are almost exactly opposite to those of technological determinism:

1. that the values, feelings, beliefs, and practices of the culture cause particular technologies to be developed and used;

2. that changes in culture result in changes in technology.

According to this understanding, as culture changes, it needs and develops new technologies to accomplish its goals. The nature of the technology thus necessarily responds to and reflects the nature of the culture.

For example, from a cultural determinist understanding, the culture is clearly responsible for both the appearance of the gun and the effects of the gun. The gun is understood to have been developed because there was, and is, a need, a desire, a value that necessitates developing a technology to kill quickly and conveniently. The gun was invented and is used in response to that need and desire. The effects of the gun—that is, killing and/or violence—follow directly from that cultural need and desire. People kill people.

An effect of thinking as a cultural determinist is the displacement of responsibility totally away from the technology. Whereas from the technological determinist position, technology is totally to blame or credit and culture is let entirely off the hook, the cultural determinist position blames or credits culture and lets technology totally off the hook. In this position, then, people, not guns, kill people. The technology is almost incidental, the mere instrument of a cultural need and desire. When people believe in this position, they often argue that it wouldn't matter if you eliminated a particular technology (like the gun) because the culture would come up with an alternative to accomplish the same end. If not the gun, then some other instrument to kill conveniently.

[11] Carr (2008).

Critiquing the cultural determinist position is a little more complicated than refuting technological determinism. At the most rudimentary level, clearly, the technology can't be let off the hook entirely. As Izzard suggests, the gun "helps." It is possible to kill with the gun in ways that are unique and can't be replicated with some other technology. Killing with a gun is different than killing with a sword, slingshot, or nuclear bomb. Thus, when someone kills with a gun, the gun bears some responsibility. So, as with technological determinism, there is an important relationship between people and technology that the cultural determinist position is ill equipped to understand.

In addition, it is possible to critique the cultural determinist position by challenging the assumption that technologies, in any straightforward manner, reflect the needs and desires of the culture. As the cultural determinist position implies, the effects of technologies ought to fall completely within the range of our intentions. They do, after all, reflect needs or desires. To put it bluntly, this is all too obviously not the case. Setting aside the problem of whether or not it is even possible to identify real intentions, technologies always surprise an unprepared populace with effects that were not purported to be intended. Did anyone intend automobiles to produce greenhouse gasses, or nuclear power plants to blow up in our faces, or computer keyboards to produce carpal tunnel syndrome? How can these effects be explained from a cultural determinist position?

Indeed, a cultural determinist has difficulty explaining these problematic effects. To account for these rogue effects, people have developed complex causal categories. Foreseen effects are called *intended effects*, *primary effects*, or simply *effects*. But those other effects, unforeseen and sometimes undesirable, are called *unintended effects*, *secondary effects*, *side effects*, or even *revenge effects*. Edward Tenner, in his humorously titled book, *Why Things Bite Back*, makes very fine distinctions between different kinds of unintended effects. Side effects, according to Tenner, are effects that are unrelated to the intended effects of the technology. Side effects are trade-offs. Revenge effects, which might be desirable or undesirable, are unforeseen consequences that are directly linked to the intended effects. These are not exactly trade-offs but "ironic" effects that almost always sneak in the back door with the successful implementation of the technology. He gives the example of a chemotherapy treatment for cancer. If, on the one hand, the treatment produces baldness, that is a side effect, a trade-off for a cure. If, on the other hand, the treatment causes another, lethal cancer, that is a revenge effect. Tenner breaks down revenge effects even further to capture an imaginative range of ironic effects. These include rearranging effects, repeating effects, recomplicating effects, regenerating effects, and recongesting effects.[12]

The meticulous, imaginative, dedicated effort to classify differences among intended and unintended effects directs the focus away from the decisive assumption that operates in making that initial distinction between intended and unintended effects: that the culture fundamentally, though imperfectly, gives shape to these technologies, which

[12] Tenner (1997), pp. 8–11.

in turn do our bidding. It is as though the "real," "significant," or "primary" effects are the intended effects. The unintended effects are somehow less real, a sort of irritating excess of the real. This is an odd contradiction, however; for aren't those unintended effects just as real? effects are all equally effects, whether you like them or not, whether you intended them or not. And if some effects aren't intended, then the culture no longer seems to be in complete control of technologies and their effects. Thus, the proclivity to differentiate between effects and side effects tells us less about the cultural work performed by technologies than it does about our own cultural desire to believe in cultural determinism at the same time that we acknowledge its failure.

A final problem with cultural determinism is that it discourages any response except optimism regarding technological change, no matter the unintended effects. Indeed, as Tenner argues, "Optimists welcome [crisis] as an injection of innovatory stimulus."[13] The trick, for Tenner, is to learn to "practice the ability to recognize bad surprises early enough to do something about them."[14] Responding creatively to revenge effects stimulates further technological development, and that, if undertaken thoughtfully, can only be good, since it is a further reflection of the potential to give shape to the world. "In the long run," he concludes, revenge effects "are going to be good for us."[15] We are, in the end, only always moving ahead. Differentiating between effects and side effects thus has the power to minimize whatever is undesirable about technology by favoring and highlighting the potential for positive change.

Technological versus Cultural Determinism

It is interesting that very few people will maintain a purely technological determinist position if you can get them thinking about it at least a little bit. On a theoretical level, most people will acknowledge that in most cases somebody has to pick up and use the gun for it to do anything. If you find a gun and put it in a closet, you might keep it from doing something. You know that the gun does not have a completely independent will. You know that the nRa is in a way correct to say, "Guns don't kill people." Similarly you know, at some level, that even though the computer seems to be changing cultural life rather dramatically, there are places that it cannot touch without your participation. For example, provided that you choose to do so, you can retain spiritual beliefs that are unaffected by the computer.

Similarly, very few people will maintain a purely cultural determinist position if you can get them thinking about it at least a little bit. Doesn't the theoretical distinction between intended and unintended effects really undermine the very notion that technology is merely an instrument of cultural intentions? Technologies do seem to participate in changes in our lives, whether those changes were intended or not. It doesn't

[13] Tenner (1997), p. 327.
[14] Tenner (1997), p. 353.
[15] Tenner (1997), p. 348.

matter whether you call an effect an unintended effect, a side effect, or a revenge effect. Equally, they are all effects. Both intended and unintended effects make demands on, and reconfigure, cultural life. The gun in the hand of a child can kill unintentionally, but what difference does the distinction make? The gun certainly doesn't care if it was intentional or not; and the intentions of the one pulling the trigger don't alter the fact that the person killed is dead either way.

Further, the fact that unintended effects can only be identified in retrospect suggests that the cultural imagination and its goals are hopelessly limited. No technology can ever be purely a response to easily identifiable, straightforward cultural intentions. Technologies are not mere tools fashioned just to serve culturally acknowledged needs and goals. Nowhere is that more obvious than in the myriad examples of unintended effects.

In spite of the fact that most people would be willing to admit to these observations on a theoretical level, most people still live as though one or the other—technological determinism or cultural determinism—were true. There is a tendency to see technology as either pushing culture along or responding to our cultural will. And for the most part, people come down on the side of technological determinism. But the very forced choice between technological determinism and cultural determinism is, we think, a sort of "Hobson's choice," meaning that a person must choose between options whose difference is superficial.[16] In making the choice, you've been forced into an undesirable position. You may be forced to make a choice, whether you like it or not, but in the absence of meaningful alternatives, both choices are equally bad. For example, in the movie *Sophie's Choice*, a woman is forced to choose which of her two children will be put to death.[17] In this Hobson's choice, the superficial appearance of choice is meaningless: either choice is equally horrible; her alternatives do not make a *real* choice possible.

If technological determinism and cultural determinism are the only choices open to you, you have no real alternatives. Both of these positions rely on a simple determinism that quickly fails to provide the nuances required by responses to real-life situations. What choice do you have if you must decide whether guns kill people or people kill people? This Hobson's choice leaves no way to understand how it is that people come to develop and use guns or how guns and people play roles in a struggle to define what it means to kill, or for that matter, what it means to own a gun. To put this very concretely, technological determinism and cultural determinism would not help you parse out responsibility in the 2012 Sandy Hook elementary School massacre in newtown, Connecticut, where a lone gunman besieged the school and killed—with guns—twenty children and six staff members, in addition to killing his mother and himself. Is the culture the cause and therefore responsible? are the guns the cause and

[16] The term *Hobson's choice* is said to originate with Thomas Hobson (*ca* 1544–1631), of Cambridge, England, who kept a livery stable and required every customer to take either the horse nearest the stable door or none at all.

[17] Pakula (1982).

therefore responsible? neither of these choices seems entirely satisfactory. We submit that thinking so restrictively—in terms of simple cause and effect—is an insufficient way to understand the complex processes within which guns (or any other technology) play a cultural role. Determinism is, simply put, not a helpful way to get at the questions that matter about technological culture.

So the good news is you don't have to decide between technological determinism and cultural determinism. This is not to say, however, that you can simply vacillate between the two positions based on the argument you want to make at a particular moment. Many people do this in everyday life without acknowledging the incommensurable nature of their positions. The challenge for us is to provide you with a better way of understanding the role of technology in culture so that you no longer need to resort to the determinisms. We introduce this option in Part III of this book. Nonetheless, it is important to realize and observe how pervasive are the assertions of these two positions. Both technological and cultural determinism are prevalent in everyday discourse, and when they are, questions of who or what is in control dominate concerns about technology. In the next chapter, then, we turn to the issue of control, to highlight the workings of the widely held commitment to determinist discourses.

Source: Photograph by Bureau of Land management, 2013, Wikimedia Commons: commons.wikimedia.org% 29.jpg

Figure 9: Anchor Chain for Brush Control

Chapter Five: Control

VICTOR FRANKENSTEIN HAS A PROBLEM—several problems actually. He is being shunned at school, his health is failing, his fiancée of many years wants him to come home, and then there's his work. Frankenstein has created a monster, literally, out of pieced-together corpses, and he has managed to breathe life into it. The creature, however, is not what he expected, and he has fled in horror, leaving the creature to perish. It hasn't perished. Rather, it has survived and thrived, and now it promises to wreak vengeance on its creator, to be there on Frankenstein's wedding night and destroy his family.

It's a familiar story, told again and again through films and popular culture over the last two centuries. We often mistakenly think that Frankenstein is the name of the monster; but in this perhaps we are not far off. The Frankenstein story, written by mary Shelley and published in 1818, has become emblematic of a particular problem: the belief that we have no control over the things we create.[1] We learn this lesson first with children, of course, who refuse to obey us ("How sharper than a serpent's tooth it is to have a thankless child!" complained King Lear). But this analogy is carried further to other creations of humankind. *Frankenstein* was not the first such story. Fables about magically conjured creatures, such as golems, stretch back into mythology. The Frankenstein story has stuck with us for almost two hundred years, partly because the creature in question is the creation of science, not magic. It is a fable about the ethics of science and the control of technology. The irony here is that modern science and technology often intend to control nature or culture. Thus, to lose control of the very things that promise control seems dire.

In this chapter we discuss both halves of this argument: how technologies are perceived as the means of controlling nature and culture and how technologies are perceived as escaping human control. After setting out the groundwork with these two positions, we visit a particularly potent metaphor for our relationship with technology: the master and the Slave. Through this metaphor we discuss the ideas of *technological autonomy*, *technological dependence*, and *trust*. Even in an era of new technology—of artificial intelligence, expert systems, nano-technology, and biotechnology—the ghost of Frankenstein rears its head.

The popular version of the Frankenstein story conveyed by dozens of films (including James Whale's elegant films of the 1930s, the Hammer horror films of the 1950s and 1960s, Mel Brooks' comedic yet impassioned and surprisingly respectful parody,

[1] Shelley (1985), although the lesson of Shelley's story is different; see below.

and Kenneth Branagh's torrid version) is a simple monsteron-the-loose or revenge story.[2] But Shelley's book (and Branagh's film touches on this) is more significantly about the question of humans' responsibility for their creations. After his "birth," the creature confronts Frankenstein to request information about his existence. He asks Frankenstein to show compassion and create a companion to assuage his loneliness, but Frankenstein will have none of it. The havoc that occurs is not entirely the creature's fault, but neither is it entirely the creator's fault. The lesson to be learned is that we cannot disown the things we create. Langdon Winner crystallizes the lesson of *Frankenstein* with this statement: "the invention of something powerful and novel is not enough. Thought and care must be given to its place in the sphere of human relationships."[3] Technologies, the fable teaches, are never neutral or autonomous objects. They are, instead, more like creatures themselves. Only by (incorrectly and naively) viewing technology as neutral and autonomous can the creator be let off the hook. Only, for example, if the gun is neutral and autonomous, can gun manufacturers be considered completely innocent of what people do with their products. If we consider technology to be culturally embedded, we cannot so easily wash the blood off our hands.

Yes, We Have Mastery of Our Tools

Writing in the 1960s, marshall mcLuhan argued that technologies are extensions of human faculties. He argued that "the wheel is an extension of the foot, the book is an extension of the eye... clothing an extension of the skin... and electric circuitry, an extension of the central nervous system."[4] Technology becomes a means—a medium, in mcLuhan's phraseology—to carry out that faculty. The technologies of the world become a means of carrying out human will. McLuhan's fundamental point is how technologies—media in particular—extend our influence on the world around us.

We typically think of technologies as being key to early human survival, for they allowed humans to gain control, first over their environment, and, second, over one another. Weapons helped humans kill game, and digging implements helped humans find roots to eat. Eventually tools helped humans systematize their food production: growing crops instead of finding them, and herding animals instead of hunting them. Construction of houses and buildings and the domestication of fire helped humans to shape the spaces in which they lived. In these ways technologies have given humans an advantage in the basic struggle against nature. Once the initial battle against nature was reasonably under control, humans began to devise ways to control each other. The

[2] See, for example, Whale (1931; 1935); Brooks (1974); Branagh (1994); and from England's Hammer Studios: Fisher (1957; 1958); Francis (1964).

[3] Winner (1977), p. 310.

[4] McLuhan and Fiore (1967), pp. 31–40. This book, *The Medium Is the Massage*, is the classic statement of mcLuhan's position.

following sections describe how the practice and perception of the control over nature and over one another continues to play out in relation to mastery over our tools.

Control over Nature and the Environment

Early in the twentieth century, the philosopher max Scheler pointed out that science and technology were not exempt from a will to power, and that a will to power was connected to the fundamental values of that society. In the feudal period, he said, the power-drive was focused on other people (as we shall see below), but in the modern era the power-drive is focused on nature. The domination of nature, he argued, is a fundamental value of Western culture.[5] This value is deeply embedded in the idea of progress, which we discussed in Chapter 2. This is made clear in ideas such as manifest destiny and in images such as that of Progress striding across the landscape bringing light, order, and technology to the wilds of nature.

The examples of the technological domination of nature are numerous. We will begin with the largest, the reshaping of the landscape, and turn to the smallest, genetic manipulation. The control of nature is no more evident than in the building of large dams. The great rivers of the world—the nile, the mississippi, and so on—have been brought "under control." unpredictable floods are mainly a thing of the past, rates of flow are carefully controlled, and the paths the rivers take are carefully managed. Even one of the natural wonders of the United States, niagara Falls (a key example of the sublime: visitors flock to it to experience awe), can be shut off like a faucet. Other examples of the technological control of nature include agricultural technologies, forestry, and mining. At the smallest level, the mapping of the human genome and the capabilities of genetic manipulation have opened the possibility of instigating and controlling genetic mutation, allowing one, for example, to eliminate genetically transmitted disorders. It is predicted that nano-sized robots, about the size of a few molecules, will be able to enter bodies and cure and rebuild us cell by cell.[6]

What aided this view was the *objectification of nature*. Rational, scientific methods made it seem possible to turn nature into an object of study. The task of objective science was to unlock the secrets of nature—the nature of life and death, how things work, how things are related—by systematizing information and carrying out carefully planned and recorded experiments. Scientific observation requires that we set something at a physical distance (even if it is the distance in a microscope) and a psychological distance. By observing nature and other humans in this way, they become mere objects to be manipulated and understood, and not agents in their own right. It also separates humans from nature, which, supported by Judeo-Christian religion,

[5] Scheler's position is discussed in Tierney (1993), pp. 4–5.

[6] See, for example, drexler's (1986) influential predictions for the future of nanotechnology.

progress stories, and economics, facilitates the view that nature is intended for human use.[7]

When we think of nature as a resource, we participate in this view. The term "natural resources"—meaning oil, lumber, ore, and so on—belies a view that is both economic and utilitarian. Utilitarianism focuses on the use-value of objects (and people) and asks what profit can be made from something, or how something can be useful. We ignore things we think are use-less—things that don't have a specific purpose or function for that society. When we think of the use value of nature we are likely to ask economic questions: How much is it worth? How can it be used to generate wealth? many contemporary environmental struggles are over just this view. One group looks at a forest and sees it as so much lumber (a useful object) that can be sold for a particular profit. Another group sees a forest as being a home for wildlife or as a producer of oxygen to keep the earth in balance. These are very different value systems.

Typically, the rational application of scientific principles, often cited as the definition of technology, is based on the idea of the domination of nature although not necessarily as a natural resource. Technology as a product of scientific principles is assumed to be a rational system of domination and control. This was Frankenstein's view as a scientist: He figured out scientifically how to re-animate a human body. The supposed infallibility of his view—his faith in science as producer of true, rational knowledge, his logical deductions about the nature of the being he was to create—kept him from considering the possibility that the creature he created might be something other than what he envisioned, and that it might not obey.

Social Control

The scientific framework for viewing the world encourages and allows us to organize and control nature rationally: to classify nature into categories such as genus and species, to manipulate its raw materials into all manner of synthetic structures, and to exert control over other organisms with reckless abandon. It also allows us to control each other. Historian Lewis Mumford has argued that we should think of early cultures as a type of machine to do just that:

> Now to call these collective entities machines is no idle play on words. If a machine be defined, more or less in accord with the classic definition of Franz Reuleaux, as a combination of resistant parts, each specialized in function, operating under human control, to utilize energy and to perform work, then the great labor machine was in every aspect a genuine machine: all the more because its components, though made of human bone, nerve, and muscle, were reduced to their bare mechanical elements and rigidly

[7] For a fascinating cultural studies perspective on this issue, see Sterne's (2003) analysis of the ways that the scientific objectification of nature and the body crystallize in the development of sound-reproduction technologies.

> standardized for the performance of their limited tasks. The taskmaster's lash ensured conformity. Such machines had already been assembled if not invented by kings in the early part of the Pyramid age, from the end of the Fourth millennium.[8]

The coordination of populations in the accomplishment of a task (for example, building a pyramid) is an example of what Mumford would call a megamachine. The model for this kind of control was the military, where ranks of soldiers work together, like an efficient machine, toward one task. Mumford writes, "[T]hrough the army, in fact, the standard model of the megamachine was transmitted from culture to culture."[9] To aid in the function of this megamachine, each element in it (each person) was given a particular position and function. A rigid hierarchy was put in place, and each level was given different responsibilities. Units specialized in particular tasks and were trained to perform their duties efficiently.

The connection of the military to control is much more than an historical aside. Technologies of destruction allow leaders to intimidate and threaten populations into submission. State organizations like the military and police take advantage of these technologies for maintaining control. It is not a coincidence that great technological strides are often made during times of war. Standardized production, the practice of triaging patients in medical care, and the development of penicillin are all indebted to war.

Less corporeal means of controlling the population were developed toward the end of the eighteenth century, when control was established through the means of surveillance. We often think of surveillance as simply watching someone, which in itself can be an effective means of control. But it can also refer to the gathering of information on people through means other than direct observation.

In order to better control their workers, who often worked on their own time in their own homes, capitalists created the factory, which brought all the workers under one roof. In this way workers and the work process could be regulated and controlled. Distractions could be minimized and workers could be required to put in their time under constant observation. The ultimate expression of this kind of control is the panopticon designed by Jeremy Bentham. Inspired by the plans of a relative's new workshop, Bentham created what he felt would be the perfect machine of social control. He designed a unique prison, which he called the *panopticon* (meaning *all seeing*). The prison was designed as a circle or semicircle with the cells lining the walls. In the middle of the building was a central guard tower. The interior of each cell was readily observable from the central guard tower; and by means of reflectors and lights, each cell could be immediately illuminated. At the same time it was impossible for the cells' occupants to see into the central tower. The prisoners knew that they could be watched at any moment of the day or night, but they could never be sure when they were being

[8] Mumford (1967), p. 191.
[9] Mumford (1967), p. 192.

observed. The threat of inspection rather than the threat of direct violence was thus the means of control. Constant illumination and the threat of constant inspection meant that prisoners would have to behave correctly at all times and that these behaviors would have to become habit. The prisoners would internalize the control and discipline themselves.

Bentham believed that the idea of the panopticon applied beyond the walls of a prison. He believed his machine would ensure social control in workshops, schools, and virtually every other institution or setting. He even devised plans for a series of panoptic villages. French philosopher michel Foucault, commenting on Bentham's invention, writes, "Whenever one is dealing with a multiplicity of individuals on whom a task or a particular form of behaviour must be imposed, the panoptic schema may be used."[10]

Sociologist max Weber described a further development in the technologies of social control: bureaucracy.[11] There are two primary elements of bureaucracy: the rational organization of an institution and the collection of information. Both involve technology in significant ways. Like the rational organization of the military, bureaucracies strive to organize their workforces according to the principles of rationality and efficiency. Rigid hierarchies are maintained, each employee has a particular task or set of tasks, and work proceeds in an ordered manner. A particularly potent variation on rational bureaucracy is Frederick Taylor's notion of scientific management, introduced in Chapters 2 and 3, which focused on the organization and division of labor and the observation and training of laborers. Scientific management, or *Taylorism*, is, in short, an attempt by management to control what workers do. One of its fundamental principles is the removal of decision-making abilities from the shop floor. Only managers make decisions; laborers only carry out their orders. The reasoning is this: a worker will only work at maximum efficiency if constantly observed and if not interrupted by the need to make decisions.

By removing decision-making powers, management engages in what is called the *deskilling* of the workforce. A knowledgeable, decision-making skilled worker is never fully under management's control. Therefore it is in management's interests to learn the worker's skills, train others in those skills, or, better yet, create a machine to replicate those skills. The most dramatic examples of deskilling workers as a means of controlling the workforce involve the introduction of machinery in the workplace, especially more modern introductions of computer-driven robotic machines.[12] Langdon Winner tells the story of the mcCormick Reaper manufacturing Plant, which installed expensive manufacturing machines on the shop floor so it could fire key workers and break the influence of the workers' union. Once the union was destroyed and management regained control over the workers, the machines were removed, because they were

[10] Foucault (1977), p. 205. Bentham's conception of the panopticon is considered at length by Foucault, especially pp. 195–228.

[11] See, for example, Lyon's (1994) discussion of Weber's ideas.

[12] See, for example, noble (1986).

too expensive to run and produced a product inferior to what the workers produced. Although the cost was great, gaining control must have been considered worth it.[13]

What is collectively referred to as "paperwork" is another significant aspect of bureaucratic control and entails principles of rationality and efficiency in the collection of information. Paperwork refers to the records and information collected by an organization, which is designed to make it function more efficiently. Information, whether gathered through panoptic inspection or through the careful accrual of bureaucratic dossiers, must be collected, stored, and made (selectively) accessible if it is to serve a control function. This means that information technologies—including filing cabinets, recording devices, and the computer— are in another way the tools of social control.

As extensions of our human faculties and as tools of social control used in the interest of surveillance and bureaucracy, technologies seem to do our bidding. They seem, for better or for worse, to give us control over nature and society. Yes, it seems that we have mastery of our tools.

No, Our Tools Are Out of Control

For almost every example of how technologies have allowed humans to gain control of nature and each other, we can think of counter-examples where technologies seem to have moved out of the control of individuals, sometimes creating disastrous unintended consequences. Whenever we've thought we understood nature, nature comes roaring back. For example, all our dams and flood-control technologies have not eliminated disastrous flooding, as the occasional, disastrous flooding of the mississippi river illustrates. Indeed, often flood-control measures—once they fail—exacerbate floods. Also, whenever we feel that we have established sufficient social control, people rebel. Finally, our tools themselves sometimes seem to have lives of their own, suggesting that they are out of control. Who among us has not at some point complained about our computers giving us a hard time?

Both perceptions—that technology is firmly in our control and that it is slipping out of our control—are widespread in our culture. We may even feel both ways at the same time, or feel differently in different contexts. Speaking metaphorically, when we feel in control we sometimes say that we are "in the driver's seat," and mean that the machine is under our control. To continue the metaphor, however, don't we occasionally get the feeling that though we are in the driver's seat, none of the pedals seems to work very well (the brakes are soft, the steering is loose) and the car seems to be driving itself? at other times don't we feel like our cars are out to get us?

One way to understand this is by utilizing Mumford's idea of *megatechnics*, the notion that society can be viewed as a well-integrated megamachine. Recall from our earlier discussion of megatechnics that society as megamachine is a means of controlling

[13] Winner (1986), p. 24.

a population; however, like the military, it is not a democratic means. The individual subjects who work in the megamachine, those who carry out its specific tasks and play its specific roles, don't always have a say in what those tasks or roles entail. For the majority of the population, the megamachine is a way of being controlled, not of controlling. Technology is in someone else's hands. Often it seems as if the system is running itself. Just as with modern bureaucracies, we cannot always identify the individuals on whose shoulders decision-making lies. The decisions are the result of the system itself, and it is difficult to argue with a system.

We've shifted language here to use the more recent term "system" to describe both Mumford's megamachine and modern bureaucracy. A system is a complex organization composed of interrelated, interdependent parts. As systems become more complex and more parts are added, it becomes harder to keep track of, and therefore keep control of, the work that it does. For example, as a corporation gets larger and adds employees and divisions, it becomes more difficult to keep track of who is doing what and how all the parts are connected. To use the example of a car engine, as more parts are added—fuel injectors, computerized monitoring, catalytic converters, and so on—the engine becomes more complex, and it becomes more difficult to keep track of what all the pieces are for and how they interact. If something happens to one part of a system, other parts are frequently affected; but it is often difficult to predict or track those effects. In a very complex system, it is often impossible to predict what effects a small change might have throughout the system.[14] Complex technologies—including missile defense systems, computer systems, and bureaucratic structures—function beyond the immediate knowledge and control of, except perhaps for a few experts, any one person. If the experts, commonly called technocrats, are the only ones who understand the system, there is less opportunity and less willingness for others to influence decisions made regarding those technologies. This makes the system still more authoritarian and even less democratic.

As the system becomes more complex, new technologies have to be invented to control the megamachine. With the Industrial Revolution and the harnessing of steam power, machines literally began moving beyond human control. They were stronger and faster and capable of increasing destruction if control was lost. The railroad offers an illuminating example. The steam engine could propel a train faster than the fastest horses and for a longer period of time. So amazing was its power, it was considered the symbol of progress, as we discussed in Chapter 2. But once at full speed, a steam engine was almost impossible to catch up with to warn it of impending collisions. This situation created what has been called a *crisis of control*, where control over the technology seems lost.[15] To win back control, a faster technology was needed to help coordinate and communicate with the trains, or at least with stations ahead of the train. Around this time, the development of the telegraph (originally a military invention

[14] Tenner (1997), p. 20.

[15] See Beniger (1986), especially Part II, on the crisis of control.

for coordinating multiple distant armies) served this purpose. Other technologies of accounting were needed simply to keep track of where all the trains were at a given time, because the plethora of trains, tracks, and schedules contributed to the crisis of control. Historian James Beniger cites examples of perfectly good train cars sitting idle for months at a time because they had been lost by the system.[16] Modern technologies of management, communication, and information processing have become crucial in solving (at least to some extent) the ongoing crisis of control. With the recent growth in the Internet, World Wide Web, and information technologies, we are threatened with being swamped with more information than we can possibly process or judge. This too creates a crisis of control. To win back control, new information-filtering technologies, such as intelligent-agent software of the personalized algorithms of Google searches, are created to sort this information and give us just what we think we need. Again, these technologies are meant to solve (at least to some extent) this crisis of control which is increasingly being described as a problem of Big data. Another way to understand our sense that technologies are no longer in our control is to focus on what edward Tenner has called "the revenge of unintended consequences," which occurs when technologies cause more problems than they solve, or when they solve the problem they were meant to solve but create new ones.[17] For example, as we discussed in Chapter 3, the results of Ruth Schwartz Cowan's research demonstrate that domestic technologies—designed to save labor in the household—actually increased the amount of time women spent on housework.[18] Other examples raised by Tenner (his book is filled with fascinating examples) include the so-called paperless office,[19] the idea that with the introduction of networked computers, all documents—memos, letters, forms, and so on— would be electronic and distributed electronically. There would be no need for the great piles of forms and papers that accumulate in the traditional office. However, Tenner points out that offices which have become computerized use more paper, not less. Why? Because computers and copying technologies have made it easier to produce multiple copies and multiple versions of paperwork, and the reconfigured systems demand their production. Another example involves the intent to make work more convenient by telecommuting. Computers and the Internet make it possible for workers to work at home by dialing in to the office. Because there is no commuting involved and the worker is allowed to work at home (or elsewhere), the worker can manage time and resources better, work without direct supervision in relative comfort, and regulate their work schedule accordingly. However, research suggests that telecommuters end up spending significantly more time on work-related tasks than do people who go to the office. Rather than being a convenience (see Chapter 3) the new technologies make it easier—sometimes imperative—to continue to work on evenings and weekends.[20] One

[16] Beniger (1986), p. 227.
[17] Tenner (1997).
[18] Cowan (1983).
[19] Tenner (1997).
[20] See Gregg (2011), for an account of the blending of work and home.

final classic example of unintended consequences is the story of kudzu, a Japanese vine that grows rapidly and is excellent for shoring up poor soil. The US army Corps of engineers thought that this plant would help greatly with a soil-erosion problem in the southern United States, especially along roadsides where the clay soil washes away; so they planted kudzu across the South. The problem is, kudzu has no natural predators in the United States; and because of its rapid growth and hardiness (the qualities for which it was chosen), it has overtaken millions of acres of woods and fields. It is tenacious and very hard to kill: nature's revenge!

Just as the previous section highlighted the argument that we do have control over our technologies, here we have highlighted the opposite: that our technologies have control over us. There is no simple resolution to the conundrum of control, no way to decide once and for all which is true, because to do so would depend on the misguided belief that technology and culture are separate from one another and that one or the other can exert complete domination over the other. Rather, as the metaphor of master and Slave illustrates, the attempt to assign the status of dominant (autonomous) master or subservient (dependent) Slave to either technology or culture, while a wide-spread and powerful cultural habit, is, in the end, futile.

Master and Slave: Trust and the Machine

Autonomy

When you have a complex system that uses machines to control machines, the human is "once removed" (sometimes several steps removed) from direct control of a technology. For workers in the factories of the nineteenth century especially, the big machines seemed well out of their control. Workers often felt helpless in the face of those machines. In the terms of Karl Marx, these workers were *alienated* from the means of production, meaning that they had ultimately no sense of ownership or control over their own labor, over the machines or tools that they were using, or over the products they were producing. The labor, the tools, and the products were all owned by someone else and the workers were just like tools or machines themselves. Marx describes the overwhelming sense that the machines were out of worker control:

> An organized system of machines, to which motion is communicated by the transmitting mechanism from a central automaton, is the most developed form of production machinery. Here we have, in the place of the isolated machine, a mechanical monster whose body fills whole factory floors, and whose demon power, at first veiled under the slow and measured motions of his giant limbs, at length breaks out into the fast and furious whirl of his countless working organs.[21]

[21] Karl Marx is cited here by Winner (1977), pp. 36–37.

It almost seems as if technology here has become autonomous: that it moves on its own, develops on its own, and controls itself. It is not only Marx who had this view. The idea of autonomous technology has a long history in the West. Langdon Winner, who has traced this history, argues that a sense of technological determinism, and the sense that technology is out of control, has played a prominent role in modern political thought.[22] For many, the issue of control has shifted. Where once we felt that we were masters of our machines—we made them to work for us, machines were slaves—the continuing crisis of control makes it seem as though it is we who have become enslaved. We have become far too dependent on our machines.

Dependence

The idea of technological dependence is fairly simple: It is the belief that we rely on technologies in so many aspects of our lives that we cannot function or even survive without them. A fairly clear statement of technological dependence was made by Theodore Kaczynski, the Unabomber (more on him in Chapter 8), who wrote: "What we do suggest is that the human race might easily permit itself to drift into a position of such dependence on the machines that it would have no practical choice but to accept all of the machines' decisions."[23]

The panic around the so-called y2K (or millennium) Computer Bug is an example of this drift into dependence. The Bug was a software glitch produced because old software programs only recorded the date using the last two digits of the year (1987 became 87), which worked fine as long as the first two digits remained constant. With the turn of the last century, the old software programs could not distinguish between 2000 and 1900. Prior to the turn of the century, people were concerned that this glitch would cause errors, crashes, and even destruction: failed nuclear power stations, accidentally launched missiles, disappearing bank records, and so on. To combat the problem, almost every computer and software program had to be checked for the fault and then corrected. Some of these programs and computers were decades old, and the last programmers who understood them had long since moved on or died. In addition, the complexity of these programs often foiled attempts to fix them. Despite our assumptions about the logic and organization of engineering, modern software programs are written as millions of lines of code that are not always well organized. These programs are so complex that no one person understands how the whole program functions or how changes made in one part will affect the rest (a classic problem of a complex system). The result was that one could not quickly put one's finger on the "date" section of the program to fix it.

There was a great deal of press attention to the problem in the years leading up to 2000, and considerable worry on the part of the population. Some even went so

[22] Winner (1977).

[23] "Industrial Society and Its Future" (1995), p. 6.

far as to purchase survival gear, guns, food, gas generators, and so forth. Part of the general cultural anxiety about the y2K bug entailed a realization on the part of the population of just how much their lives depended on technologies, how many of these technologies had computers in them, and how far out of their control those technologies were. Suddenly, people were worried that their VCRs, coffee machines, bankcards, and telephones wouldn't work anymore, that their everyday lives would at least be disrupted and perhaps collapse.

The arguments about our technological dependence stem from just this sort of realization: that we have become dependent on technologies we thought were created to serve us, and that this dependence could prove dangerous or even fatal to us. One bumper sticker during that era put it, "I'd never survive in the wild." People were asking themselves, if the power goes out, can I survive? Pushed just a bit further, what seem like questions for philosophers or science-fiction artists become of paramount importance: as machines become more sophisticated and replace human workers in more and more capacities, could machines eventually replace the entire human race?

The flip side of dependence is trust. The worries over y2K make us question the trust that we have placed in our machines and in the megamachine in which we live. We realize just how much we trust bureaucracies, large organizations, and complex technologies. Sociologist anthony Giddens argues that trust in abstract systems is characteristic of the experience of being modern.[24] In modern industrial societies, we are obliged to trust in these systems. He labels these systems "abstract" because most of the workings of these systems are outside our immediate knowledge. For example, if I withdraw money from an automated Teller machine (ATM), I have to trust that the machine is functioning properly, that it is connected to the proper networks in a secure manner so that no one steals my money or identity, that the other networks to which it is connected will maintain my account properly, and that the transaction will be kept private. With modern electronic banking, I am no longer sure where my money actually is or even where the bank is. Is there a bank somewhere, or just a network of people and machines performing tasks? Who or what, exactly, has access to the facts of the transaction? money itself, according to Giddens, has become an abstract system. We trust that these colored pieces of paper and stamped metal have value. But they only have value if the megamachine continues to process them as we trust it will. We trust that we understand the process that goes on when we undertake the transaction. But we clearly do not have access to what actually happens. Giddens says that we trust, not because we lack power, but because we lack sufficient knowledge of the system.[25] Trust is not the same thing as faith that the system will work, but a degree of confidence in that faith. We must always remember, however, that trust is related to risk, whether we are conscious or unconscious of that risk. In short, we still engage in risk when we trust.

[24] Giddens (1990).
[25] Giddens (1990), p. 33.

Master and Slave

To understand technological dependence more fully, we need to understand the idea of absolute mastery, the idea that one can have complete control over others, including nature, technology, and people. The Slave is the figure with absolutely no control; it is completely at the will of the other. In *The Phenomenology of Mind*, philosopher G.W.F. Hegel tells a story about the master and the Slave.[26] It goes like this: The human condition is marked by the struggle of person against person to achieve dominance and control. The winner of this struggle becomes the master; the loser is either killed or enslaved. The point of this struggle is not dominance for dominance's sake, but to achieve the recognition that one is dominant. For the master to achieve absolute mastery, it is not enough to have a Slave dependent on him; the master also demands recognition of his superior position. But the quest for absolute mastery is self-defeating for several reasons. First, because the Slave is utterly defeated, his or her recognition is not considered worthy. Indeed, the Slave is not usually considered human by his or her master. Second, because the Slave does all the work, the master becomes dependent on the Slave. Third, because it is the Slave who understands how to work and what it means to work with material reality—the earth and tools—it is the Slave who comes to a true understanding of who he or she is in the world, something that the master can never do. The quest for absolute mastery is self-defeating, since the master is now dependent on the Slave and lacks the Slave's knowledge of the world and sense of identity. Unlike the master, who is not self-reflexive, the Slave realizes that we shall all die some day.

Karl Marx read into Hegel's story of the master and the Slave support for his notion that the proletariat, the slave-like working class, would one day not only achieve enlightenment (something that their bourgeois masters cannot achieve), but also would revolt against their masters. If the bourgeoisie are so dependent on the proletariat, where does the true power in society lie?[27]

This same metaphor of master and Slave has been applied to technology. From the very first stories about living machines—either conjured creatures such as golems or artificial humans such as robots—the issue of whether or not these creatures would turn against us has been raised. We see this in Shelley's *Frankenstein*, in Karel C^apek's play *RUR* (which coined the term "robot"), and throughout the 1900s in short stories and films.[28] For example, the *Terminator* films are based on the premise that a sentient defense computer figures that the greatest danger to it is humanity in general, begins a war against humans, and creates killer robots to exterminate the remains of human resistance.[29] The film *The Matrix* is based on a similar premise: Our networked computers achieve a form of intelligence, struggle with humans for control of

[26] Hegel (1949).
[27] Winner (1977), p. 188.
[28] Shelley (1985); C^ apek (1923).
[29] Cameron (1984; 1991).

the planet, and enslave the humans. In fact, humans literally serve the machines by becoming the batteries that power the computers. Humans thus play a completely passive and dependent role. They are slaves to the technology.[30] and we could go on: The remake of the television series *Battlestar Galactica* that ran from 2004 to 2009 has humans fighting for survival against the Cylons, intelligent machines they themselves created.[31] More recently, our science fiction imaginary seems to focus its worry less on machines going out of control, but on the science and technologies of cloning (see, e.g., the television series *Orphan Black* [2013–]) or genetic manipulation.[32] a rising number of zombie films over the last few years point to out-of-control viruses (either man made or of mysterious origin) creating the zombies that then seek to destroy all human life (see, e.g., *28 Days Later* [2002] and *World War Z* [2013], and all those in between).[33]

AI, Expert Systems, and Intelligent Agents

Artificially intelligent computers (known as aI) may seem to be far off in the future, but those building their precursors still worry about issues of dependence and control, master and Slave. For example, reflecting on advances in genetics, nanotechnology, and robotics, Bill Joy, co-founder and chief scientist of Sun microsystems, asks the following question in his provocative essay, "Why the Future doesn't need us:" "as Thoreau said, 'We do not ride on the railroad; it rides upon us'; and this is what we must fight, in our time. The question is, indeed, Which is to be master? Will we survive our technologies?"[34] For Joy, one of the central issues about these new technologies (robotics, genetic engineering, and nanotechnology) is that they are potentially self-replicating, and rapidly so. It is not only that we may make a machine more powerful than ourselves, or that has the potential to undermine us, but that such a machine can easily and rapidly create more machines like itself or perhaps better than itself. A smart robot can build and program other robots; new pathogens can self-replicate and cross species barriers; and machines on the nanoscale could rapidly make millions more molecular machines in a process that we might be unable to stop. There are plenty of examples in popular culture that run with this fear of technology as self-replicating pathogen. Kurt Vonnegut's 1963 novel, *Cat's Cradle*, provided an early manifestation of this anxiety.[35] In the novel, Ice-nine is an altered molecular structure of water that acts as a seed crystal to freeze any water on contact. It cannot be contained and eventually threatens to freeze all the water on earth, which includes, of course, all living beings. Renewed interest in and the 2012 republication of Stephen King's 1978 novel, *The Stand*, in which a military-developed, mutated strand of super-flu decimates the

[30] Wachowski and Wachowski (1999).
[31] eick and moore (2004–2009).
[32] Fawcett and manson (2013-).
[33] Boyle (2002); Forster (2013).
[34] Joy (2000), p. 256.
[35] Vonnegut (1963).

population, also speaks to this anxiety.[36] another example of where such anxiety can be found is in the work on intelligent agents. Intelligent agents are pieces of software that work on your behalf. They have the capability to learn your wants and needs in order to function on your behalf on the Internet. For example, an intelligent agent could be authorized by you to seek out particular types of information, to purchase particular products, or to negotiate a business deal for you. The agent acts like a virtual butler or lackey. Though this software is not yet very sophisticated, its relative autonomy raises questions. MIT professor William J. Mitchell writes:

> Even if our agents turn out to be very smart, and always perform impeccably, will we ever fully trust them? and how will we deal with the old paradox of the slave? We will want our agents to be as smart as possible in order to do our bidding most effectively, but the more intelligent they are, the more we will have to worry about losing control and the agents taking over.[37]

Marvin Minsky, co-founder of the artificial Intelligence laboratory at MIT, writes:

> There's the old paradox of having a very smart slave. If you keep the slave from learning too much, you are limiting its usefulness. But, if you help it to become smarter than you are, then you may not be able to trust it not to make better plans for itself that it does for you.[38]

The above positions seem to assume that intelligence is the same thing as self-interest, and therefore, that an intelligent machine will care more for its own interests than for others'. If that assumption is incorrect, the fears expressed may be overblown. Regardless, the cultural concern over the question of trust remains paramount: Can we trust our machines? and when we consider matters of trust, we do not have to venture into science fiction, with its killer robots, to touch highly significant cultural concerns. Matters of trust and anxiety over being enslaved by technology enter at a very mundane level: Will this machine work? Will it do what it is supposed to do? Can I trust that the bank computer will remember the deposit I made and not lose it? Will the computerized stoplights at that intersection really keep the train from crossing into automobile traffic?

Matters of trust and anxiety over being enslaved by technology also enter at the level of extreme political significance and even at the level of life and death. Reactions to information leaked by edward Snowden in 2013 about metadata collected by the US national Security agency (NSA) reveal both a lack of trust and considerable anxiety about what technology can do to us.[39] One government program Snowden warned us

[36] King (2012/1978).
[37] William mitchell (1995), p. 146.
[38] Marvin minsky is cited here by Riecken (1994), p. 25.
[39] Greenwald (2014).

of is PRISm, a program instituted after passage of the Protect America act of 2007. PRISm collects, without warrants, mass data through broad sweeps of telephone logs. Electronic surveillance of phone, email, and other communications of US citizens is apparently extensive and is not limited to those under some kind of formal investigation. While the government defense of the program has been largely a version of "we don't use the data, we don't even look at it, unless we need it," much of the reaction has been negative. Apart from the mistrust people might feel about the potential political uses by real individuals, the data are being collected by networked machines, which, for some, is tantamount to enslavement. Julian assange, the beleaguered founder of Wikileaks, was interviewed about surveillance while he was under house arrest in the United Kingdom in 2012. Those interviews were published as *Cypherpunks: Freedom and the Future of the Internet*. There he explains that "the control is built in:"

> When you communicate over the internet, when you communicate using mobile phones, which are now meshed to the internet, your communications are being intercepted by military intelligence organizations. It's like having a tank in your bedroom....We are all living under martial law as far as our communications are concerned, we just can't see the tanks—but they are there.[40]

In a very real sense, according to assange, it doesn't matter if and how the information is used, the tanks are already there in the form of a technology exercising control.

A chilling example of how life and death get tangled up in matters of trust and the perception of enslavement to technology is the military unmanned aerial vehicles (uaVS), better known as drones. Although it is difficult to get unbiased statistics, US CIA drone strikes in Pakistan alone from 2004 to 2013 may be as high as 370, killing as many as 3,500 people, including up to 900 civilians of which 200 were children, and injuring thousands more.[41] Like the mechanical Hound in Ray Bradbury's classic novel *Fahrenheit 451*, drones are programmed to strike: "Hell! It's a fine bit of craftsmanship, a good rifle that can fetch its own target and guarantees a bull's-eye every time." meant to function as our slave: "It doesn't like or dislike. It just 'functions.' It's like a lesson in ballistics. It has a trajectory we decide on for it." But with programming (a mind?) of their own: "It follows through. It targets itself, homes itself, and cuts off....[W]hat does the Hound think about down there nights? Is it coming alive on us, really? It makes me cold....I wouldn't want to be its next victim."[42]

[40] assange et al. (2012), pp. 29 & 33.
[41] The Bureau of Investigative Journalism (2013).
[42] Bradbury (1991).

Conclusion

The question of control highlights the fundamental circularity of many of the arguments about technology and its relation to humans. We create technologies to establish control but then get upset that we are controlled by technologies. Technologies become a convenient scapegoat for problems that we have created. For example, media violence is blamed for increased violence in society, especially among youth. But why, we might ask, is the violence there to begin with? Who decided to write about, record, and air violent acts? and why? What do those decisions have to do with the culture of violence in which we live? In asking these questions, we are not denying that media have effects on their audience. Rather, we point to the variety of other sources of violence in society alongside of and with media: a troubled economy, lack of funds for schools, a shifting role of religion, shifting parental styles, the availability of weapons, a gun culture, and so on.

If technology is conceived as a matter of control and dependence, of master and Slave, it is set apart from human culture, treated as autonomous, then either blamed or praised. Either we have control over technology or it has control over us; the effects in either case can be conceived as either worthy of praise or blame. Those are the only options. Either way we look at it, technology is considered as something apart from human culture. The question of control or determinism simply shifts weight and focus from one side to the other and back again. In the end, neither formulation of this relationship gets us very far in reflecting on culture and technology in ways that suggest new directions and new answers. Neither formulation provides an adequate map for understanding the complex web of corresponding, noncorresponding, and contradictory forces within which technologies emerge, develop, and have effects. It is time to shift our focus away from issues of control, dependence, and trust (as well as causality, progress, and convenience), to think about technology in new ways, to pose new questions, and to find, perhaps, new answers.

We begin this shift by first reviewing major critical positions that have developed in response to the positions, values, contradictions, and challenges that surround the discourses and practices of technology as we have described them in this first part of our argument. These critical responses are Luddism, appropriate Technology, and the Unabomber. Then, in Part III of this book, we lay out a cultural studies approach that moves beyond these critical responses.

Part II: Representative Responses to the Received View

Figure 10: Old Water Wheel on Creek to North of Convent

Source: *Spring Hill Avenue, Mobile, Mobile County, AL,* Photograph by e.W. Russell, 1937, Library of Congress, Historic American Buildings Survey: http:// www.loc.gov/pictures/ item/al0433.photos.005513p/

Source: *Tennessee Valley Authority Watts Bar Dam hydroelectric plant This plant will supplement the big hydroelectric installations at Watts Bar Dam, which has an authorized output of 90,000 kilowatts, and a possible ultimate of 150,000 kilowatts Each of the four big turbo-generators in the steam plant is rated at 60,000 kilowatts* Photograph by alfred T. Palmer, 1942, Library of Congress, Collection of the Farm Security administration/Office of War Information

Black-and-White negatives, loc.gov/pictures/item/oem2002006580/PP/

Figure 11: A Sledge Hammer in the Hands of a Husky Iron Worker at TVA's Watts Bar Dam Steam Plant

Chapter Six: Luddism

IN PART I, WE INTRODUCED WHAT WE CALL the received view of technological culture: the beliefs, practices, and experiences that constitute the dominant cultural sense of culture and technology. It is the commonsense version that most of us have been exposed to, within which we negotiate a relationship with technology. That commonsense version, we have argued, posits technology as the source of inevitable progress, as the vehicle for making life better by making it more convenient, as the driving causative force of "civilized" Western culture, and as the mechanism for exercising control in and over the world. Even those who critique technology often launch their theories from within the commonsense version of the story. In such cases, the "problem" concerning technology is the fear that technology controls us, rather than the other way around, or that progress has undesirable "side effects" that we have to deal with. However, in the received view, these problems are seen as playing the role of minor nuisance in an overall endorsement of the storyline.

We have offered criticisms of the received view as we introduced it and have begun to introduce our theoretical alternative to it; but we have not yet laid out for you the components of our proposed alternative, which we do in Part III. Here, in Part II, we take you through what we think of as an *intermezzo*: in musical terms, a short movement between the major sections of a composition. This movement is meant to acknowledge that historically there have been important critical responses to the received view that have *not* been argued from within its logic. While there certainly have been more than the three responses we consider here—Luddism, appropriate Technology, and the Unabomber—we have chosen these three because they represent a range of responses from which there is something significant to learn. Each is problematic in its own way; but each also offers important insight: first, into the ways people have been blinded and/or blind-sided by the received view; and second, into some of the crucial components with which we construct our approach. Therefore, even if we do not identify with Luddites, appropriate Technologists, or the Unabomber (indeed, least of all the Unabomber), there is something that each of these responses can offer in piecing together a cultural studies approach to technological culture.

To be labeled a Luddite, in common parlance, is to be accused of being rabidly and ignorantly anti-technology and anti-progress. Luddites, popular usage suggests, are machine haters, sometimes machine breakers, sometimes anarchists, but always dangerously misguided souls who would reverse the flow of progress and have us "go back to the cave." Today they are often labeled as "terrorists." For example, environmental activists opposing development projects are often called Luddites, implying that they

are just simply and indiscriminately anti-technology, anti-development, anti-progress, and therefore, anti-the-good-life. If permitted their way, the story goes, they would destroy all the good that industrial progress has brought and render life, once again, mean, lean, and inhumane. Luddites would bring back the days of high rates of infant mortality, a short life expectancy, hard physical labor, debilitating pain, and suffering. While the efforts of Luddites may sometimes seem good natured or even quaint, they are, most people conclude, fundamentally misguided. Given the meanings the term is assigned, it is not surprising that the phrase, "I'm not a Luddite, but..." gets used often before critiquing technology, as if to be seen as a Luddite must be avoided at all costs.[1] This characterization of Luddism as a technophobic response to new technology—and, therefore, to progress—is unfortunate, but it is hardly surprising. Given the power of the received view to frame any criticism of technology as irrational, futile, and fatuous, it makes a type of perverse sense that what is really a fascinating and instructive moment in the history of technological culture would be reduced and misunderstood in this way. An understanding of the Luddite movement, achieved by listening seriously to the issues it raised, rocks the received view to its core.

To learn from the Luddites, we turn to the careful work of historians who have been willing to look past the summary dismissals of the Luddites—dismissals which were shaped by a blind commitment to the received view. To look with fresh eyes at the history of the Luddites, we draw, most notably, on the work of e.P. Thompson, in his monumental study *The Making of the English Working Class*, and eric Hobsbawm, in his meticulously researched article "The machine Breakers."[2]

Historical Luddism

It is difficult to characterize the Luddites and the Luddite movement for several reasons. Foremost among them is the fact that it was dangerous—even illegal—to be a Luddite. During the height of the movement, Luddites were hanged. By necessity they were secretive about their activities. Second, there are no surviving, comprehensive, and written accounts by those who considered themselves Luddites, if indeed any were ever written. A few reminiscences written in the late 1800s claim to penned by or based on the stories of Luddites; but even if true, these accounts were constructed nearly sixty years after the fact.[3] The histories of the Luddites on which we draw are the result of painstaking archival research sifting though letters, press coverage, public documents, and even literature written during the period. Third, evidence suggests

[1] Jones (2006), pp. 40ff discusses these claims further.

[2] In addition to Thompson (1963) and Hobsbawm (1952), we draw on Thomis (1970), who has a very useful "diary of events, 1811–17," pp. 177–186; and the generative research that has grown out of their work: research by Webster and Robins (1986); noble (1993); Sale (1995b), who also has a helpful "timeline," pp. 282–283; Robins and Webster (1999); Fox (2002); and Jones (2006).

[3] See Thompson (1963), pp. 496–497.

that the Luddite movement might have consisted of different, perhaps even relatively autonomous movements, rather than a single movement with a single coherent story. Finally, the story of the Luddites was from its inception caught up in a difficult political moment in which an allegiance to the received view of technology and culture was already at stake. Interpretations of their story have always depended on where one stood politically with respect to that view. Consequently, accounts of historical Luddism that presume to dismiss them out of hand, or oversimplify their significance, should be held in suspicion.

Luddism refers to a movement or movements of skilled workers and artisans in England in 1811–1817 in the textile industry, principally croppers, stockingers, and weavers.[4] The difficult political moment within which Luddism arose as a response involved a major shift in the nature of capitalism, the changing role of workers in the development of industrialism, and the development of new technology. Prior to this time, there was an understanding that the relationship between an industry and its workers was one of mutual support and obligation. Industry provided a livelihood for its workers; workers provided skill with dedication to the craft.[5] Textile manufacturing was craft work, carried out by skilled laborers brought up through an apprentice system and protected by what Thompson calls "paternalistic legislation."[6] To be a craft worker meant that the workers themselves largely shaped the knowledge, execution, and control of the labor process. Craft work may be difficult, but it is nonetheless creative.

A crisis in this situation was provoked by the gradual encroachment of the practice of laissez-faire capitalism, which shifts the idea of mutual support and obligation by arguing that, theoretically anyway, the overall economic situation of the country improves when the owners of industry are permitted free rein to maximize their profits, and when the quality of life and work of the individual worker is not given highest priority. It is not possible, however, to discount the motive of simple greed, which government policies and cultural practice had previously curbed. Nor is it possible to discount the motive of survival in what might have been, in effect, a coercive situation. As some manufacturers developed a competitive advantage using modern factory techniques, others might have felt "forced" to do so to survive.[7] Whatever the mix of motives, the paternal relationship with workers and their independence as craft workers were seen as hindrances to the maximization of profits. In response, manufacturers

[4] Thompson (1963), p. 543. Thomis (1970) describes the nature of this work and the machines that were targeted. A *cropper* raised the nap of finished cloth and cut it level with specialized shears (p. 15, for pictures of the shears and the process see p. 33). The workers were replaced by the gig mill and the shearing frame (p. 50). S*tockingers*, or framework knitters, worked at frames for making hosiery and lace (p. 29, for a picture see p. 51). *Handloom weavers* were replaced by steam looms (p. 53).

[5] Thompson (1963), p. 544.

[6] Thompson (1963), p. 543.

[7] Both Hobsbawm (1952) and Thompson (1963) offer considerable evidence to support these multiple motives. See Thompson's chapter 15, "an army of Redressers," pp. 472–602.

fought— eventually with success—government intervention and sought to rationalize the production process to minimize their expenses. To that end, it was desirable to exert control over the labor process by developing a factory system, replacing workers with machines wherever possible, deskilling the nature of the work, and keeping the cost of labor low.

The success of the manufacturers was hard won, and depended, in the end, on the voice and force of government adopting the voice and interests of the manufacturers.[8] It has been estimated that there were 12,000 troops deployed against the Luddites in the six counties where they were active,[9] and a number of Luddites were killed. Laws were eventually passed that resulted in deportation, jailing, and even hanging of many Luddites.[10] The Luddites did not set out to kill anyone or to destroy property indiscriminately; their actions had, for the most part, all the marks of a defensive rather than an offensive strategy. So it is astonishing when you think about the fact that machine-breaking became a capital offense. It indicates just how strongly the culture of the time was threatened by the challenge to the narrative of progress.

But what did the Luddites do? although it is debatable just how well organized they were, they resisted the changes being imposed on them by the manufacturers. Thompson calls them a "*quasi-insurrectionary movement*, which continually trembled on the edge of ulterior revolutionary objectives."[11] They objected to the deskilling of their jobs, the replacement of workers by machines, the extraction of exorbitant rents on the machines they used, the reduction of wages, and their overall subjection to the modern factory system in which they were treated more like servants than craft workers. Their resistance took many forms: negotiating, bargaining, striking, burning, rioting, and machine-breaking. These last (what protesters today would call "direct action") are what live in the popular memory as the legacy of the Luddites: riot and the destruction of machines. But in a very real sense, their insurrectionary resistance was part of a long tradition of "collective bargaining by riot" in which rioters would do whatever they deemed effective in their effort to gain concessions, including wrecking private property, finished goods, and machines.[12] However, even though the motives of rioters would surely have been mixed, Luddite activities were characterized by legitimate motives that were widely shared. As Thompson writes:

> What was at issue was the "freedom" of the capitalist to destroy the customs of the trade, whether by new machinery, by the factory-system, or by unrestricted competition, beating-down wages, undercutting his rivals, and undermining standards of craftsmanship. We are so accustomed to the

[8] Hobsbawm (1952), p. 66.

[9] Hobsbawm (1952), p. 58; Thompson (1963), p. 564. Some estimates are higher. Sale (1995b) suggests figures of 14,400 troops and 20,000 voluntary militia; see pp. 148–149.

[10] At least 22 were hanged as Luddites (Thompson 1963, pp. 584–586). Others were killed, deported, and jailed.

[11] Thompson (1963), p. 553.

[12] Hobsbawm (1952), p. 59.

> notion that it was both inevitable and "progressive" that trade would have been freed in the early-nineteenth century from "restrictive practices," that it requires an effort of imagination to understand that the "free" factory-owner or large hosier or cotton-manufacturer, who built his fortune by these means, was regarded not only with jealousy but as a man engaging in *immoral* and *illegal* practices.[13]

Luddism was thus a highly significant "transitional" conflict, one that "looked backward to old customs and paternalist legislation which could never be revived." at the same time, "it tried to revive ancient rights in order to establish new precedents."[14] Luddites were fighting for a way of life in a changing world, and they recognized that machines, and their incorporation into a system of work, were a crucial component of that way of life.

It is perhaps a prejudice of twenty-first century Americans to think that industrial workers in the early 1800s were probably pretty slow witted. But the history of the Luddites suggests otherwise. As Thompson concluded:

> The character of Luddism was not that of a blind protest, or of a food riot... Nor will it do to describe Luddism as a form of "primitive" trade unionism... [T]he men who organized, sheltered, or condoned Luddism were far from primitive. They were shrewd and humorous; next to the London artisans, some of them were amongst the most articulate of the "industrious classes." a few had read adam Smith, more had made some study of trade union law. Croppers, stockingers, and weavers were capable of managing a complex organization; undertaking its finances and correspondence; sending delegates as far as Ireland or maintaining regular communication with the West Country. All of them had had dealings, through their representatives, with Parliament; while duly-apprenticed stockingers in nottingham were burgesses and electors.[15]

Luddites did destroy machines, but for the most part only those machines that embodied the offenses of the way of life they saw being forced on them. In case after case, the Luddites thoughtfully discriminated regarding which machines were to be destroyed. As one account at the time in the *Leeds Mercury* reported:

> They broke only the frames of such as have reduced the price of the men's wages; those who have not lowered the price, have their frames untouched; in one house, last night, they broke four frames out of six; the other two which belonged to masters who had not lowered their wages, they did not meddle with.[16]

[13] Thompson (1963), p. 549.
[14] Thompson (1963), pp. 551–552.
[15] Thompson (1963), p. 543.
[16] Quoted in Thompson (1963), p. 554.

The Luddites were not anti-technology; they were concerned, as Thompson concludes, that "industrial growth should be regulated according to ethical priorities and the pursuit of profit be subordinated to human needs."[17] That surely strikes us as an admirable goal.

But what of the commonly held view, with its echoes in the present, that protest against progress is pointless, and that the efforts of the Luddites were futile? Was "the triumph of mechanization" inevitable, despite the fact that "all but a minority of favoured workers fought against the new system"?[18] To these questions we have two responses, both of which contribute to the cultural studies approach to technological culture that we develop in Part III. First, it is incorrect to think that the Luddite movement was completely ineffective. While it certainly did not hold up the general advance of industrial capitalism, there were many small victories in which the voice of the workers mattered. For the most part, Luddism segued into legal parliamentary forms, thus making it difficult to determine how influential the Luddite spirit was in the troubled political landscape after 1818. The Corn Laws, passed in 1815, which kept corn prices artificially high, thus literally starving the working classes, were eventually repealed after a protracted struggle. Other reform bills during the 1820s and 1830s helped to alleviate deplorable working conditions and to assuage working-class resentment to the extent that England did not have a revolution, as did other European countries at that time.[19] The efforts of the Luddites may have counted for something. Indeed, this is not a matter of the triumph of manufacturers versus the triumph of the workers. The role of workers in the evolving technological culture is never a "done deal," but an ongoing and changing relationship, within which the sites of and reasons for struggle shift dramatically. There have always been those who have argued for prioritizing ethics and human needs over profit; and their efforts, no doubt, have kept industrial capitalism from denigrating the life of workers more than it has. The Luddites exemplify the need to keep up the pressure.

Second, the Luddites provided a potent alternative to the concept of technology and culture in the received view, at a time when the received view was gaining acceptance. They knew from their daily experience that technology is never neutral, never merely a tool. They knew that technology is woven into the fabric of daily life and that it is to be judged in relation to the quality of everyday life. It is never automatically progress. They knew that what constitutes convenience for some might have undesirable consequences for others. Further, as their activities make clear—activities in which they risked their lives—they knew that the development and implementation of technologies were not inevitable, and that human choices and actions are shaped by conscious political interventions. It is unfortunate that so much of what else they might have

[17] Thompson (1963), p. 552.

[18] Hobsbawm (1952), p. 57.

[19] See Hobsbawm (1952), pp. 66–67; Thompson (1963), pp. 601–602; and Trevelyan (1965), especially pp. 250–251, 287. Sale (1995b, p. 201) is not as generous in his assessment that "Luddism did, however, lose."

to say to us has been lost in the vicissitudes of political power, that their voices were silenced, and that they have not been taken more seriously. It is certainly within our power, however, to take seriously any lessons we have gleaned.

Contemporary Luddism

Along with growing concerns about the effects of unbridled technological "progress," and the revised understanding of the history of Luddism, Luddism has become something of a contemporary rallying cry for a number of individuals and groups engaged in analyzing and/or resisting technology in some form or another. There is at certain times even a certain cachet attached to the claim of being a Luddite. Kirkpatrick Sale draws the parameters of what he calls neo-Luddism with a broad brush, "ranging from narrow single-issue concerns to broad philosophical analyses, from aversion to resistance to sabotage, with much diversity in between."[20]

When nicols Fox went in search of modern-day Luddites, and wrote about them in *Against the Machine: The Hidden Luddite Tradition in Literature, Art, and Individual Lives*, she found:

> That what accommodations they make to civilization vary from individual to individual and from year to year. Sometimes the goal is to avoid certain technologies, sometimes it is independence, sometimes it is to live more lightly on the earth for environmental reasons. Other times it has nothing to do with the environment.[21]

It is important to remember that the Luddite movement was conjuncturally specific: It made sense within a particular historical moment, and that moment has passed. Today, those who claim allegiance to the Luddites occupy a spectrum so broad as to guarantee little about their position beyond a willingness to challenge technological development in some form. Consequently, it does not provide a platform on which to build a response to technological culture that can take us very far.

For example, Frank Webster and Kevin Robins conceptualize an analysis of information technology as "a Luddite analysis," which, for them, means that it "refuses to extract technology from social relations," and insists instead that technology "must be regarded as inherently social and therefore a result of values and choices."[22] In contrast to this more philosophic variant of neo-Luddism, "ecotage" of the kind sometimes practiced by groups like earth First! and romanticized by edward abbey in *The Monkey*

[20] Sale (1995b), p. 241. His chapter on "The neo-Luddites," pp. 237–259, does a good job of characterizing the spectrum of contemporary neo-Luddites.

[21] Fox (2002), p. 336. For her full account of meeting those she considered modern-day Luddites, see Chapter 11, "Looking for Luddites," pp. 330–365.

[22] Webster and Robins (1986).

Wrench Gang and other works, also receives the imprimatur of the Luddite.[23] Mark engler, Senior analyst at Foreign Policy in Focus, writes that "Those of us who have been involved in global justice protests have gotten used to being labeled as Luddites by advocates of corporate globalization."[24]

In June 2013, economist Paul Krugman expressed "Sympathy for the Luddites" in a *New York Times* Op-ed Column in which he embraces an understanding of Luddism consistent with our own.[25] He notes that since around 2000 the distribution of income in America has shifted significantly, with labor's share falling sharply. Referring to the may 2013 mcKinsey Global Institute Report on "disruptive Technologies: advances That Will Transform Life, Business, and the Global economy," Krugman notes that there are "a dozen major new technologies...likely to be 'disruptive,' upsetting existing market and social arrangements" and that "some of the victims of disruption will be workers who are currently considered highly skilled, and who invested a lot of time and money in acquiring those skills." He continues, still drawing on the report, "we're going to be seeing a lot of 'automation of knowledge work,' with software doing things that used to require college graduates. Advanced robotics could further diminish employment in manufacturing, but it could also replace some medical professionals." at stake is "a society in which ordinary citizens have a reasonable assurance of maintaining a decent life as long as they work hard and play by the rules." He also notes that this is not a uniquely American phenomenon but a global technological trend. While he does not propose an activist response of the kind the historical Luddites engaged in, he does, in his calls for "a strong social safety net," with guaranteed health care and minimum income, sound very much like a Luddite himself.

In fact it has become commonplace to consider "The Luddites Revisited" or to ask "Where are the modern day Luddites?" or even "Is It OK to Be a Luddite?" because increasingly we recognize that they have something to teach us and some spirit that merits building upon.[26]

The particular Luddite propositions with which we have most sympathy in developing an alternative to the received view are those proposed by Chellis Glendenning in 1990. Summarized here by Sale, Glendenning resists the blind allegiance to progress, rejects the sense that technologies are neutral tools, and calls for critique that places technology fully within its cultural context. She calls for:

1. Opposition to technologies "that emanate from a worldview that sees rationality as the key to human potential, material acquisition as the key to human fulfillment, and technological development as the key to social progress."

[23] Abbey (1978).
[24] engler (2011).
[25] Krugman (2013)
[26] Recently, engler (2013) and Clarke (2012), and less recently Pynchon (1984).

2. Recognition that, since "all technologies are political, the technologies created by mass technological society, far from being "neutral tools that can be used for good or evil," inevitably are "those that serve the perpetuation" of that society and its goals of efficiency, production, marketing, and profits.
3. Establishment of a critique of technology by "fully examining its sociological context, economic ramifications, and political meanings...from the perspective not only of human use" but of its impact "on other living beings, natural systems, and the environment."[27]

We conclude, then, that we have much to learn from the Luddites about the possibilities of resisting progress blindly, about recognizing the political nature of technology, and about understanding and critiquing the integration of technology into everyday life. In Part III, we talk about this integration in terms of articulation and assemblage. However, it is important to recognize that Luddism, as a historical movement, must be understood within the historical conjuncture that made it a meaningful response. We can learn from the Luddites to keep asking important questions about contemporary technological culture; but the specific conjuncture within which we live requires responses crafted to address the present.

Source: Photograph by Harald Hoyer, 2007, Wikimedia Commons: commons.wikimedia.org

[27] Sale (1995b), pp. 237–238. Sale cites Glendenning (1990).

Figure 12: Nature Meets Technology

Chapter Seven: Appropriate Technology

APPROPRIATE TECHNOLOGY IS A DIRECT RESPONSE to the perceived failures of the widespread allegiance to and application of the received view of culture and technology on a global scale. Appropriate Technology rejects the idea and practice of large-scale, industrial megatechnology as indicative of progress; it rejects technological dependence in favor of autonomy; and it recognizes the integral nature of technology in the quality of everyday life. Unlike Luddism, discussed in the previous chapter, and the Unabomber, discussed in the next, the activities of appropriate technologists have the decided advantage of being legal, and the views and strategies of appropriate technologists are readily available for scrutiny.

Appropriate Technology (typically shortened to AT) refers to a particular kind of technology: that considered appropriate to achieving certain goals. It is also refers to a movement, akin in some ways to Luddism, that is concerned with making certain kinds of (appropriate) technological choices. It is, however, an even more diffuse movement than historical Luddism. Like any movement, AT is integrally related to the historical context within which it emerges: in this case at the nexus of the 1960s and 1970s counterculture, and the reactions against international development projects. It is a practice and a sensibility born of a particular era. While there are important lessons and strategies to be learned from it, its significant limitations necessitate the development of theory and practice beyond its confines.

Sources and Varieties of AT

AT comes in many forms with many different names: appropriate technology, alternative technology, intermediate technology, radical technology, smallscale technology, convivial technology, environmentally friendly technology, sustainable technology, energy-efficient technology, low-impact technology, soft technology, people's technology, liberatory technology, and so on.[1] The theme is apparent in the list of names: AT is about making technological choices that resist the development of technology for technology's sake, or in service of profit at the expense of quality of life. Instead, its guiding principle is to discern an acceptable or appropriate match between technologies and the structures of everyday life.

[1] Many of these are taken from dickson (1975), p. 38.

AT emerged in response to the proliferation of the ideas about development that we introduced in Chapter 3 on progress. In 1961, the United nations passed a resolution declaring the "United nations development decade: a Programme for International economic Co-operation." Its objectives included:

> The achievement and acceleration of sound self-sustaining economic development in the less developed countries through industrialization, diversification and the development of a highly productive agricultural sector.[2]

As a consequence, the un supported the introduction of a range of First World technologies into the Third World: technologies of power, such as dams; technologies of transportation, such as railways; technologies of communication, such as radio and television; and technologies of agriculture, such as tractors, fertilizer, and new hybrid seeds, in what was called "the Green Revolution."[3] as many people have pointed out, the development decade was, for the great majority, a failure, and the Green Revolution had only partial success.[4]

The problem was that technologies were introduced with insufficient attention to the role these technologies would play in the reorganization of everyday life. The disasters are mythic and include unfortunate events such as the 1980 explosion of the fertilizer plant located in a heavily populated area in Bhopal, India, and the marketing of canned milk to replace infant breastfeeding in poor areas in South America. But nowhere is the failure of development technology more dramatic than in the failures of the Green Revolution. Vandana Shiva, who has written a great deal about the consequences of the Green Revolution on women and peasants, summarized it this way:

> The Green Revolution has been a failure. It has led to reduced genetic diversity, increased vulnerability to pests, soil erosion, water shortages, reduced soil fertility, micronutrient deficiencies, soil contamination, reduced availability of nutritious food crops for the local population, the displacement of vast numbers of small farmers from their land, rural impoverishment and increased tensions and conflict. The beneficiaries have been the agrochemical industry, large petrochemical companies, manufacturers of agricultural machinery, dam builders and large landowners... The "miracle" seeds of the Green Revolution have become mechanisms for breeding new pests and creating new diseases.[5]

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[2] United nations (1961), p. 18.

[3] daniel Lerner's book, *The Passing of Traditional Society* (1958), laid out the logic of the development mindset that devalued traditional culture in favor of the technological modern. Everett Rogers's work on *Diffusion of Innovations* extends from that tradition. See Rogers's last (2003) edition of this influential work.

[4] For example, see Rybczynski (1980), pp. 10–11.

[5] Shiva (1991). Also see Shiva (1989), who addresses women and development in particular.

While awareness of the failures of the development decade was widely shared from its onset, there seemed to be little alternative to it. Witold Rybczynski notes, "even as advanced technology was criticized, it was apparent that it remained the only way to progress, and for most less developed countries, the only desired way."[6] There seemed, then, no real choice, even if that choice was a failure; the power of the received view seemed insurmountable. An alternative of some sort was needed.

In response to these failures of development technology, a group called the Intermediate Technology development Group held a conference in 1968 in England. They called it the Conference on Further development in the United Kingdom of appropriate Technologies for, and Their Communication to, developing Countries.[7] Spreading out from the work of members of this group and participants of the conference, and connecting with the larger sense that technology was out of control, the AT movement emerged. The founder and director of the Intermediate Technology development Group, ernst Friedrich Schumacher, widely known as simply e.F. Schumacher, is often considered the father of the AT movement. His book *Small Is Beautiful*, first published in 1973, is likewise considered its manifesto.[8]

While working as an economist and civil servant in Britain, Schumacher traveled to Burma and India, where his experiences made him question the focus on high technologies that he saw there. He acknowledged that there was a need for technology in the Third World but noted that the imported high technologies benefited a small elite and were of no use to the majority of the population. What they needed was to reorganize the workplaces in rural areas and small towns in response to their condition of being labor rich and capital poor. The overall task, as Schumacher saw it, was:

> *First*, that workplaces have to be created in the areas where the people are living now, and not primarily in metropolitan areas into which they tend to migrate.
>
> *Second*, that these workplaces must be, on average, cheap enough so that they can be created in large numbers without this calling for an unattainable level of capital formation and imports.
>
> *Third*, that the production methods employed must be relatively simple, so that the demands for high skills are minimised, not only in the production process itself but also in matters of organisation, raw material supply, financial, marketing, and so forth.
>
> *Fourth*, that production should be mainly from local materials and mainly for local use.[9]

[6] Rybczynski (1980), p. 11.
[7] Rybczynski (1980), p. 3.
[8] Schumacher (1989), p. 186.
[9] Schumacher (1989), p. 190.

According to Schumacher, appropriate technology would be intermediate, that is, "more productive than the indigenous technology...but it would also be immensely cheaper than the sophisticated, highly capital-intensive technology of modern industry."[10] AT would be more democratic than capital-intensive technology; it would benefit most of the people and not just the elites; and it would be culturally sensitive to the organization of everyday life. Therefore, it would avoid the disruptions that can be brought on by the introduction of new technologies. AT, according to Schumacher, was not a return to a "primitive" past; AT does not have to be simple or traditional. It can be, and often must be, created anew, and scaled to meet local needs and conditions in a sensitive manner.

It is noteworthy that another of the germinal works adopted by the AT movement was written by a thinker with vast international experience. Ivan Illich, the author of *Tools for Conviviality,*[11] was born in Vienna in 1926, left there in 1941, and traveled widely until his death in 2002. He has been described as a "polymath and polemicist" whose work as a philosopher, Roman Catholic priest, and activist took him to Puerto Rico, Central and South America, and the United States. He founded the radical Intercultural Center for documentation in Cuernavaca, mexico, in 1961, which trained volunteers to work in Latin America. His work in the 1970s and 1980s focused on alternative versions of development, including schooling, economics, energy, transport, and technology.[12]

Illich, like Schumacher, objected to the imposition of high technology by experts and was in favor of promoting technologies that he considered "convivial." He defined convivial thus:

> Tools foster conviviality to the extent to which they can be easily used, by anybody, as often or as seldom as desired, for the accomplishment of a purpose chosen by the user. The use of such tools by one person does not restrain another from using them equally. They do not require previous certification of the user. Their existence does not impose any obligation to use them. They allow the user to express his [sic] meaning in action.[13]

Convivial tools "give each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision," a goal that, according to Illich, is denied by industrial tools.[14] Conviviality, for Illich, designates "the opposite of industrial productivity."[15]

Illich did not offer up designs for convivial tools, although he named some (motorized and non-motorized bicycles, power drills, mechanized pushcarts, and telephones); nor

[10] Schumacher (1989), p. 190.
[11] Illich (1973).
[12] This biographical information draws on Todd and La Cecla (2002) and martin (2002).
[13] Illich (1973), p. 25.
[14] Illich (1973), p. 22.
[15] Illich (1973), p. 11.

did he detail what a convivial society would look like. Rather, he recognized that, in part, some of the obstacles standing in the way of the coming of a convivial society are those of imagination. Simply put, it is difficult to imagine a transformation of this magnitude. What he did offer are tools for the imagination, criteria for discerning whether a tool is using a person or vice versa, and criteria for determining whether a system of technology fosters independence or dependence.

It is interesting to note that Illich's *Tools for Conviviality* and Schumacher's *Small Is Beautiful* were published in the same year. The awareness of the need for AT was clearly "in the air:" not just because of developments in the underdeveloped, developing, or Third World nations, but also because of what was happening in north American culture. The 1960s and 1970s rise of AT coincides with the rising interest in social-responsibility movements and with the emergence of what has been called the counterculture. Barrett Hazeltine and Christopher Bull point out that many socially responsible projects and groups formed in which the goals of AT were embraced. Such groups included the national appropriate Technology Center; the projects of President Jimmy Carter and also those of California Governor Jerry Brown; the Office of Technology assessment; and even the projects of the USAID, the foreign-aid division of the State department.[16] But perhaps even more to the point is AT's connection with the developing counterculture. During the 1960s and 1970s, a mélange of people (primarily youth), disenchanted with what they considered the "establishment," sought alternatives to the dominant culture. These people, known widely as the counterculture, focused on creating alternative political structures based on anti-capitalist, anti-industrialist values such as personal growth, self-realization, self-expression, pleasure, and creativity. It's easy to see how this movement articulates to the AT movement, because AT, as it was understood, tended to be anti–big industry and pro-community. Indeed, members of the counterculture carried around copies of Schumacher and Illich as if they were the maps they needed to make the world a better place. The AT movement thus can be seen more broadly as not being about particular machines, but about a frustration with the political system. Langdon Winner points out that AT takes off in the US precisely when the political movements of the 1960s (like Students for a democratic Society) lose steam. Local, appropriate technologies become a way of doing politics by other means. Winner writes that AT's "true purpose was not to produce energy from renewable resources, but to generate the hope of social renewal from the winds of despair."[17]

For the remainder of the twentieth century there persisted an active counterculture for whom the works of Schumacher and Illich served as canonical texts. This group tended to identify more with environmental causes than it did during the 1960s, but it also increasingly identified itself as Luddite or neo-Luddite. For example, in 1978 Theodore Roszak's book *Person/Planet: The Creative Disintegration of Industrial So-*

[16] Hazeltine and Bull (1999), p. 4.
[17] Winner (1986), pp. 64–65, 70.

ciety, was identified with the counterculture.[18] His 1994 book *The Cult of Information* identified itself in the subtitle as *A Neo-Luddite Treatise*.[19] Similarly, when nicols Fox went in search of Luddites in the early twenty-first century, as we discussed in the previous chapter, the people she designates as Luddite are indistinguishable from people most of us would understand to be members of the counterculture: They live lightly on the land, use alternative energy sources, don't work nine-to-five, don't watch television, resist succumbing to consumer culture, are anti-capitalist, and so on. In part, as we discuss below, the countercultural orientation of much of AT may have contributed to some of its limitations.

If you are to believe Paul Polak, author of books such as *Out of Poverty* and, with mal Warwick, *The Business Solution to Poverty*, the appropriate Technology movement is dead. In 2010 he wrote that it "died peacefully in its sleep ten years ago." Why? Twice he insists, just so you get it, "the appropriate technology movement died because it was led by well-intentioned tinkerers instead of hard-nosed entrepreneurs designing for the market."[20]

It is true that, as Polak states, many AT organizations have closed their doors and that in their wake throughout the world there are "thousands of technically effective, often outrageously expensive tools...gathering dust on the shelf."[21] But what seems really to have happened is that the mantle of AT has been picked up by individuals and groups who name their projects differently: design for the Other 90%, design as activism, engineers Without Borders, expanding architecture, Sustainability, and so on.[22] These efforts are sometimes entrepreneurial (as Polak insists is necessary) and sometimes are not (as are the engineers Without Borders projects in Honduras, Guatemala, and Bolivia at Jennifer's university, and in ecuador and Kenya at Greg's).[23] all these efforts, in one form or another, are committed to designing technologies (whether in community-driven development programs or through marketing developed products) that are affordable, of appropriate scale, aid sustainability, and improve quality of life. The focus remains, as it was with AT in the previous century, on tools and the individual-tool interaction. Illich once wrote, "I will focus on the structure of tools, not on the character structure of their users,"[24] and that focus is maintained in its newest design-engineering-architecture manifestations.

There is an important insight for us to take from this: The tools do matter, as does the individual-tool interaction. It matters if a tool is large, unconvivial, complex,

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[18] Roszak (1978).

[19] Roszak (1994).

[20] Polak (2010a; 2010b).

[21] Polak (2010a; 2010b).

[22] See, for example, Smith (2007); Bell (2008); Polak and Warwick (2013); Pilloton (2009); and engineers Without Borders (www.ewb-usa.org).

[23] www.ewb.students.mtu.edu/, accessed July 27, 2013; and studentorgs.engineering.asu.edu/ewb, accessed September 10, 2013.

[24] Illich (1973), p. 16.

expensive, unmanageable, or dependent on absent and expert knowhow. However, it is never enough for a tool to be just small, convivial, simple, inexpensive, easily managed, or fostering of independence: not, that is, if such criteria are limited to characterizing the tool as an independent entity or as the individual-tool interaction. Why not? Because, we have also learned, almost ironically and accidently, that something much larger than tools and the individual-tool interaction also matters. Context matters. We know this because AT taught us that different tools were appropriate for different situations. We know this from failed development projects: you can't simply put a technology developed in one context into another context and expect it to perform in the same way. Context matters. So how successfully does AT deal with context? not all that well, as it turns out.

AT and the Limited Understanding of Context

When technologies are characterized and evaluated by a property—small, simple, inexpensive, easily managed, or supportive of decentralization, etc.— significant contextual features can be overlooked, with considerable consequences. In short, small is not always beautiful. Nowhere is this better illustrated than in the now-legendary case of snowmobiles as used by the Skolt Lapps in a story told by Witold Rybczynski drawing from the account of Finnish anthropologist Pertii J. Pelto.[25] By most AT criteria, a snowmobile is an appropriate technology: "it is small, easy to operate and maintain, encourages decentralization, and is not very expensive." The Skolt Lapps of northeast Finland adopted snowmobiles to make the difficult task of herding their reindeer easier. This "was not imposed but freely chosen."[26]

The consequences of this have turned out to be considerable. The community changed markedly as a number of realities changed: mechanized herding gave younger, less-skilled men an advantage they never had before. Herding could be done in much less time, freeing up time for other activities. Easier travel facilitated more socializing. The cost of maintaining snowmobiles increased financial pressures. A new social stratification emerged based on who owned or who did not own snowmobiles. And most interesting, all this has changed the relationship between the Lapp and the reindeer. Because snowmobile herding is stressful to the reindeer, the health and size of the herds may be compromised. But even more significant, where the relationship used to be proximate—based on the ability of skilled Lapps to tame their reindeer—the spatial and psychic distance has increased dramatically. The relationship of man to reindeer has been transformed. So much has changed, and perhaps not all for the better.

What we can see in this example is the fact that the abstract nature of the criteria for appropriateness is not enough to really understand the complexities of technological culture. The search for, and satisfaction with, such criteria make the hard work of

[25] Rybczynski (1980), p. 159. For the original account, see Pelto (1973).
[26] Rybczynski (1980), p. 160.

understanding seem easier than it really is. AT does not insist on thinking through the complex nature of context. That kind of attention to complexity is essential to the approach we propose in Part III.

When technologies are characterized and evaluated by the individual-tool interaction, the focus is on the individual (as is the tendency in countercultural politics), and not much beyond. Again, significant contextual features can be overlooked, with considerable consequences. We illustrate this inadequacy with an example from Illich, who claims that the telephone at that time was a convivial tool. Why? "anybody can dial the person of his choice if he can afford a coin ... The telephone lets anybody say what he wants to the person of his choice; he can conduct business, express love, or pick a quarrel. It is impossible for bureaucrats to define what people say to each other on the phone."[27] The analysis stops here, having satisfied the criteria for what makes a tool convivial and giving support to the notion that what matters is cheap, unfettered communication among individuals of one's own choosing. If one has the perspicacity to look beyond the satisfaction of the individual, this characterization of telephone technology is woefully incomplete. What of the structure of ownership of the telephone industry? Who benefits financially? Who does and who does not have access to a telephone? Who does and who does not have those few coins to make the call? What role does the telephone play in the spatial organization of family and friends? What about telephone lines and cables, competition, investment, surveillance being conducted on all these calls, and on and on? There is simply so much more to consider beyond the individual act of picking up the phone and being free to talk to anyone. Again, in Part III we point the way to making sure that all those larger questions are part of how we understand technological culture.

The logic of AT, with its focus on the tool and the individual-tool interaction, even its contemporary design-engineering-architecture manifestations, privileges the idea that how one lives one's quotidian life is what matters. According to this logic one need not engage in politics on a larger scale. Human scale is all that matters. The tools one uses are the measure of one's worth. This is where AT and the counterculture too easily dovetail with ("articulate to" is the term we will introduce later) new trends in consumerism. What matters is that you buy this or that product and that somebody profits. This is as true for the counterculture's *Whole Earth Catalogue* as it is for Polak's marketing schemes. This is where AT becomes the stuff you buy so you feel better about your relation to your immediate environment. This is where you "save the earth" by buying something. And this is where somebody (and who that body is matters), somewhere (and where that somebody is matters) profits (and how much matters).

We argue, instead, that what is needed, and what AT cannot quite give us, is a map for fully engaging the multiple layers of connections among the tools and the user; among the device, its user, and the larger social structure within which it occurs.

[27] Illich (1973), p. 23.

Without that map, an understanding of technological culture is not possible, and a technological politics will be severely limited.

With that limitation in mind, we conclude by acknowledging the enormous debt we owe to the AT movement. AT does challenge the blind allegiance to progress. It does insist on cultural sensitivity. It does strive for something quite admirable, which we wish to take along with us. That is, as Hazeltine and Bull put it, the concept "that the technology must match both the user and the need in complexity and scale."[28] We just want to think more broadly about the kind of complexity we consider, assess the concept of needs beyond the human–tool interaction, and expand the scale of our understanding.

Source: anonymous graffiti artist, Photography by melissa adams, 2012, Chapel Hill, north Carolina

[28] Hazeltine and Bull (1999), p. 3.

Figure 13: Ted Was Right

Chapter EIght: The Unabomber

ON A WALL IN NORTH CAROLINA RECENTLY, someone spraypainted the image of a man with a mustache and dark glasses wearing a hooded sweatshirt, with the words, "Ted was right." "Ted" refers to Ted Kaczynski, aka the Unabomber, and the image is based on the infamous FBI sketch of the Unabomber when he was still at large. "Ted was right" indicates that whoever drew this graffiti (possibly a local anarchist collective; for many anarchists, Kaczinski has become not only a folk hero but a political prisoner) agrees, we assume, with Kaczinski's critique of modern technology—that it is robbing us of our humanity. But Kaczynski also argued, in his manifesto published by the mainstream press (under the name FC and under pressure from the FBI), that to correct the situation, to stop technology and our dehumanization, many people would have to die, and he carried out a wave of deadly bombings to begin this "revolution." To the extent that his thinking led him to murder people, Ted was most definitely nOT right, in our minds. But why is his image appearing on walls? and what did he actually say? What might he have been right about?

Between 1978 and 1995 a man the FBI referred to as "the Unabomber" mailed a series of bombs to universities and corporations across the United States, resulting in the deaths of three men, and the injuries, some serious, of twenty-three others. He was referred to as the Unabomber because his victims seemed to be related either to academia (the university) or the airlines industry—thus, un-a-Bomber. The victims were for the most part not major public figures. As Tim Luke has described them, they were part of a new class of "comparatively obscure administrators, agents, or academicians who were actively working in the applied sciences, computer sciences, or mathematical sciences for small firms or universities."[1]

In 1995 the bomber, referring to himself as "FC," which stood for Freedom Club, an organization to which he said he belonged, began writing public letters to individuals and newspapers. He expressed frustration with the crushing alienation of industrial society. Later that year he offered to cease his bombing campaign if major newspapers would publish his 35,000-word essay expressing his views, and two 2,000-word essays, one each in subsequent years. On advice of the FBI, the *Washington Post* and the *New York Times* reluctantly published the essay titled "Industrial Society and Its Future," which was quickly dubbed the Unabomber's "manifesto." David Kaczynski read the essay and recognized in it key ideas and phrases similar to those that his brother

[1] Luke (1999), p. 171.

had used in letters home. He related this information to the FBI, which subsequently arrested Theodore ("Ted") Kaczynski for the Unabomber's crimes.

We discuss the case of the Unabomber here because he represents one of the most extreme contemporary critiques of technological culture.[2] also, the Unabomber's manifesto "is the most widely circulated writing in the field of science, technology, and society" because of the notoriety and circumstances of its publication.[3] Kaczynski has also become something of a myth: the insane hermit; the nut in the woods; a mythic archetype who resonates strongly with militia and survivalist groups, anarchists, and some neo-Luddites who likewise reject society and take up armed resistance. He seems to fit within a frightening trend in society that has increased in the past two decades, a trend towards isolation and violence.[4] What is especially disturbing about the Unabomber case is that many of the critiques of industrial society espoused in "Industrial Society and Its Future" are ones that we have written about ourselves, assigned as class reading, and consider to be classic statements in the field of technology studies. If we condemn the essay and its ideas in their entirety—as the work of a madman, as many are wont to do—then we will also have to condemn Jacques Ellul, Lewis Mumford, Herbert marcuse, Ivan Illich, and many others. As Scott Corey argued, there had been a profound silence on the part of academics in responding to the Unabomber case—despite the fact that the essay is assigned as reading in classes across the country—perhaps because Kaczynski hits too close to home.[5] If he is dismissed as an irrational nutcase (as many have dismissed the Luddites), we do not need to recognize or engage with what rings true, or at least what merits consideration in his ideas. Fortunately, the Unabomber has begun to be addressed by technology scholars such as Steven e. Jones in his book on neoLuddism and popular writers like Kevin Kelly, who titles a chapter in his book, *What Technology Wants*, "The Unabomber Was Right."[6] This is in addition to a slew of popular biographies. Considerations of the Unabomber and his writings always include a distancing statement, parallel with the "I'm not a Luddite, but..." we discussed earlier. We did this ourselves in the first paragraph of this chapter.

In this chapter, we first discuss the insistence that Kaczynski is insane, an insistence that permits many to dismiss his insights. Second, we view the despairing picture of a totalizing industrial society that drove him to commit the acts that he did. Throughout we consider what we can learn from Kaczynski about technological culture.

[2] This is a claim made as well by Luke (1999), p. 171.
[3] Shrum (2001), p. 99.
[4] See Castells (1997).
[5] Corey (2000).
[6] Kelly (2010).

Kaczynski Must Be Insane

The arrest of Theodore Kaczynski was an event for the media. The Unabomber's seventeen-year reign of terror ended when the FBI raided the one-room cabin in montana where he lived a hermit's life. In all the press photos, Kaczynski looks wild-eyed, with long, unkempt beard and hair. He had been living for decades in self-imposed low-tech conditions, growing or hunting most of his food, with no running water or indoor sanitation facilities. As his background was uncovered, he was shown to have been a brilliant mathematician who entered Harvard at age sixteen and taught at the university of California at Berkeley before heading for his cabin in the woods. It was easy for the press to brand him as an extreme loner, a boy genius who had gone insane, existing far outside of society. Portraying him in these terms made it easy to dismiss Kaczynski as an aberration. This portrayal as an extreme loner served to disconnect him from anarchist movements, environmental movements, or even a long tradition of the critique of technological culture. In a way, the public needed him to be a loner so they would not have to consider his arguments as worthy of attention.

Although he was portrayed as insane, his insanity was never proven. As alston Chase explains, most diagnoses of Kaczynski's insanity came from two forms of analysis.[7] First, diagnoses were based on superficial analyses of his lifestyle. Thus, to live alone, to live without much twentieth century technology, to be celibate, to be misanthropic, and to be a loner is to be insane. Second, diagnoses were based on examinations of his writings, which are inadequate bases for a genuine diagnosis of insanity. Some claimed that he was insane because he did not admit that he was insane or would not cooperate with experts who wished to declare him insane: a Catch-22 if ever there were one! To admit to being insane is to be insane; but to deny being insane is also to be insane! even Kaczynski's own lawyers, without his knowledge, based their case on an insanity defense. When Kaczynski found out, he tried to fire his lawyers, and failing that, asked to represent himself in court. The only court psychologist to examine Kaczynski in response to his own request, Sally Johnson, concluded that Kaczynski was competent to stand trial and to represent himself in court. She gave a provisional diagnosis of "paranoid schizophrenia," but apparently did not think that this hindered his competency. The judge still refused to let Kaczynski represent himself, which, many suspected, would have led to a very public and political trial. Therefore, Kaczynski accepted a bargain to plead guilty and spend life in prison rather than face a trial in which he would have been presented as insane.[8] alston Chase concludes: "although clearly neurotic, the best clinical evidence suggests he is quite sane. He willingly chose to kill, and his prideful intellect provided a rationale for doing do."[9] The manifesto itself has been presented alternatively as the ramblings of a madman or a work of genius. Kirkpatrick Sale placed him within a long line of neo-Luddites about whom

[7] Chase (2000), p. 46.

[8] See Corey (2000), pp. 180–181; Luke (1999), pp. 172–174.

[9] Chase (2003), p. 362.

Sale was just finishing a book, which we referred to in Chapter 7.[10] But, initially at least, there was a reluctance to look at the manifesto too closely, or to critique it on its own terms. Perhaps this is because if one were to take his work seriously, even if aiming to discredit each of his arguments, one would have to acknowledge places where FC has a point about the technological nature of society and its restrictions on free will.[11] To agree with any part of the manifesto might be seen as agreeing with FC's conclusions and methods (justifying his acts of terrorism and murder). But this need not be the case. Actually, Kaczynski was not quite the hermit and loner that most have portrayed. He traveled, read widely, and engaged in intense correspondence with many people throughout his time in montana. This correspondence continued from prison.[12] Indeed, when Steven Jones was interviewing a young antiglobalization protester for his book on Luddism, he was told he should just "write to Ted." One can engage and even agree with points that FC makes without advocating murder or violence (as critiques by Jones, Kelly, Luke, and Corey have shown).[13]

The Unabomber Manifesto

"Industrial Society and Its Future" is a fairly well-organized essay. Aside from its notable digressions against "The Left," it warrants a closer look. Its argument is set out in the opening paragraphs:

> The Industrial Revolution and its consequences have been a disaster for the human race. They have greatly increased the life-expectancy of those of us who live in "advanced" countries, but they have destabilized society, have made life unfulfilling, have subjected human beings to indignities, have led to widespread psychological suffering (in the Third World to physical suffering as well) and have inflicted severe damage on the natural world. The continued development of technology will worsen the situation. It will certainly subject human beings to greater indignities and inflict greater damage on the natural world, it will probably lead to greater social disruption and psychological suffering, and it may lead to increased physical suffering even in "advanced" countries.
>
> The industrial-technological system may survive or it may break down. If it survives, it may eventually achieve a low level of physical and psychological

[10] Sale (1995b) discusses the neo-Luddites. Sale (1995a) considers the case of Kaczynski.

[11] Strangely, despite the fact that handwritten drafts of the essay and early typescripts were found in Kaczynski's cabin, and the fact that the copy sent to the newspapers was positively typed on one of his typewriters, Kaczynski has never publicly admitted to writing the essay, and neither defense nor prosecution has pressed this point (see Corey, 2000).

[12] See Corey (2000) and Chase (2000).

[13] Jones (2006); Kelly (2010); Luke (1999); Corey (2000).

> suffering, but only after passing through a long and very painful period of adjustment and only at the cost of permanently reducing human beings and many other living organisms to engineered products and mere cogs in the social machine. Furthermore, if the system survives, the consequences will be inevitable: There is no way of reforming or modifying the system so as to prevent it from depriving people of dignity and autonomy.[14]

Roughly, the argument of FC is that technological society works for its own ends and not for the real needs of the individual. The individual is shaped to meet society's needs, and not vice versa. All aspects of modern society work to dehumanize and disempower the individual. The industrial system is due for a collapse, and the more humans are dependent on that system (and most are radically dependent on it), the harder that crash will be. It is FC's goal to bring about the earlier rather than the later collapse of industrial society. He aims to bring humankind back into balance with nature and with personal autonomy, where individuals or small groups can exist without being subordinated to corporations, bureaucracies, or any other system. Modern technologies are so thoroughly permeated with power and domination that they cannot be rearticulated for other democratic or libertarian uses. They must all be destroyed, and all the technical manuals burned.[15] according to FC, industrial society and its future are marked by absolutes: "technicism" has penetrated all aspects of society and nature absolutely; technology and "wild nature" are in absolute opposition to one another; small-scale society and small-scale technology are absolutely good; large-scale society and large-scale technology are absolutely evil. There is no compromise and no possibility of compromise. Those who compromise are part of the problem, and since there is no compromise, FC sees no other solution than the path he has taken. As Luke explains:

> No vocabulary is fully adequate for reiterating what the Unabomber attacks in his manifesto or for explaining how someone could commit this sort of violent action. On one level, it is about power and knowledge turning an individual against technoscientific structures because of the frictions felt by all individuals living within industrial, bureaucratic society. On another level, it is a plea to recollectivize people and things on a smaller scale, at a slower pace, and in simpler ways. And on a third level, it is a shallow justification for mayhem and murder.[16]

As Corey describes, Kaczynski was profoundly influenced by the work of Jacques Ellul, especially Ellul's groundbreaking book, *The Technological Society*, in which Ellul argues that modern society is characterized by all-encompassing *technique*, which permeates all aspects of modern life.[17] So deep is the reach of technique that the only

[14] "Industrial Society and Its Future" (1995), p. 1.
[15] "Industrial Society and Its Future" (1995), p. 1.
[16] Luke (1999), pp. 174–175.
[17] Corey (2000), p. 159; Ellul (1964).

escape from such a society is radical catastrophe or the intervention of a loving God (Ellul was a priest). However, Ellul never advocated violent rebellion and even thought that political action was useless. Kaczynski wrote letters to Ellul in the early 1970s, though it is unknown if Ellul ever responded or even read them. What we do know is that by 1976, in his book *The Ethics of Freedom*, Ellul had "denounced virtually every FC position."[18] Kaczynski refused to acknowledge these dimensions of Ellul's work.

FC's rhetoric is shaped by the intellectual and social climate of the 1950s and 1960s, especially the idea that humankind is becoming dominated by an all-encompassing system. Such ideas were prevalent in William H. Whyte's *The Organization Man* and Herbert marcuse's *One-Dimensional Man*, both of which argued, in different ways, that humanity was being reduced by the focus on the practice of obedience to authority, the value of efficiency through technology, and the overarching goal of corporate profit.[19] Taken out of the immediate context of their publication, many aspects of FC's argument would have found their place in courses on technology and culture for the past 50 years. For example, consider a paragraph from Lewis Mumford's *The Myth of the Machine: The Pentagon of Power*:

> The business of creating a limited, docile, scientifically conditioned human animal, completely adjusted to a purely technological environment, has kept pace with the rapid transformation of that environment itself: partly this has been effected, as already noted, by re-enforcing conformity with tangible rewards, partly by denying any real opportunities for choices outside the range of the megatechnic system. American children, who, on statistical evidence, spend from three to six hours a day absorbing the contents of television, whose nursery songs are advertisements, and whose sense of reality is blunted by a world dominated by daily intercourse with Superman, Batman, and their monstrous relatives, will be able only by heroic effort to disengage themselves from this system sufficiently to recover some measure of autonomy. The megamachine has them under its remote control, conditioned to its stereotypes, far more effectively than the most authoritative parent. No wonder the first generation brought up under this tutelage faces an "identity crisis."[20]

The themes of the transformation of humans to the needs of the machine, the transformation of the environment, and the destruction of human dignity and autonomy are all themes in FC's manifesto. The difference is that neither Mumford, nor Ellul, nor Whyte, nor marcuse killed anyone or advocated killing anyone as a viable solution to society's technological troubles. FC would undoubtedly argue that these figures simply lacked the courage of their convictions and that they were all a part of the too comfortable, academically ensconced "Left."

[18] Corey (2000), p. 160.
[19] Whyte (1956); marcuse (1964).
[20] Mumford (1964/1970), p. 284.

FC presents two major arguments that might explain, but not excuse, his violence. One is that FC felt that violence was the only way to gain attention:

> If we had never done anything violent and had submitted the present writings to a publisher, they probably would not have been accepted. If they had been accepted and published, they probably would not have attracted many readers, because it's more fun to watch the entertainment put out by the media than to read a sober essay. Even if these writings had had many readers, most of these readers would soon have forgotten what they had read as their minds were flooded by the mass of material to which the media expose them. In order to get our message before the public with some chance of making a lasting impression, we've had to kill people.[21]

FC's conclusion is obviously untenable, based on a number of unsupported assumptions. The most fundamental of these assumptions is that people would actually read the copy of the manifesto published in the newspapers, whereas it was more likely to be, as Luke surmised, "tossed away with the rest of the September 19, 1995, newspaper."[22] However, this wasn't quite the case. Copies of the newspapers sold out, and extra issues were printed. A number of publishers have independently printed copies.[23] But if gaining attention was FC's sole objective, then he most likely would have targeted higher-profile people to kill.

The Unabomber's turn to violence is more likely the result of his despair at what he sees as the totalizing nature of *technicism*, the imperialism of the received view of culture and technology as applied to the whole of human experience, or the methodological application of a technical logic to what is not technical.[24] The totalization of technicism, its intervention into every aspect of life, society, and nature, is a vision he draws from Ellul (even though his conclusions are rejected by Ellul, as we said above). Both FC and Ellul would agree with Mumford's identification of a fatalism characteristic of modern society: the unquestioning acceptance of technology as the only true path to improve humanity's lot, a "technological compulsiveness: a condition under which society meekly submits to every new technological demand."[25] What is key for Mumford is that this sycophantic attitude towards technology (and technocrats) is the product of a particular historic period and not innate to human beings. He points out several examples where scientists argue that it is simply human nature to pursue any technological or scientific possibility, no matter how destructive. This argument allows scientists, engineers, and technologists to completely ignore ethical and moral action.

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[21] "Industrial Society and Its Future" (1995), p. 3.

[22] Luke (1999), p. 176.

[23] The Jolly Roger Press claimed to have sold over 12,000 copies less than a year after the manifesto appeared. See Rubin (1996).

[24] On this definition of *technicism*, see Stanley (1978), pp. xii–xiii.

[25] Mumford (1964/1970), p. 291.

The problem with the fatalists, for Mumford, is that they simply cannot see any way of changing or reversing the seemingly inevitable conclusion of the technicist logic that they have accepted as gospel truth. As an historic phenomenon, this mindset can be opposed (and must be opposed), and he points to a contemporary "affirmation of the primal energies of the organism" that he sees in the counterculture of the 1960s.[26] But rather than valorizing the counterculture, he warns that such forces can be just as destructive to humanity if left unchecked.

Chase argues that the roots of the Unabomber's actions lie in the atmosphere of despair and desperation of the 1950s and 1960s.[27] Though these forces did have, and continue to have, an influence on a whole generation, they are simply not an excuse for murder. The totalizing vision of technicism has found a ready audience again in the new millennium as information technologies record and control our lives in ways that Mumford foresaw but in areas and scope that he could not have foreseen.[28] It is tempting to see overwhelming forces (for example, individual consumers being no match for giant multinationals with their corps of lawyers) as absolute because then it seems to give one's struggle a moral force.

There are other violent responses to industrial society that approach the totalizing rhetoric of FC. Some base their actions on an appeal to religious grounds (such as the terrorism of 9/11 or the arming of fundamentalist groups such as the Branch davidians), some appeal to ecological grounds (such as some of the factions of earth First!), and others to political grounds (anarchist groups and libertarian survivalists). The cry from many such groups, articulated especially well by the Unabomber, is that there is no alternative and that industrial society is all encompassing: that modern technology is so thoroughly permeated by relations of domination and dehumanization that the only solution is society's destruction.

Lessons to Learn

To us, the death of billions of people in the collapse of global industrial society is completely untenable and immoral as a goal or a solution. Likewise, we decry risking the death or injury of anyone to make some political point. Like Lewis Mumford, we do not hold with the universalizing view of the dominance of industrial society, and we need to work hard against the despair that such visions cause. But we also do not pretend to ignore the ways in which technicism has permeated everyday life.

Kevin Kelly, who seems to agree with Kaczynski's assessment of technology as autonomous, self-aggrandizing, and totalizing, disagrees with Kaczynski's fundamental premise: that "technology robs people of freedom." Kaczynski, Kelly argues, "confused latitude with freedom. He enjoyed great liberty within limited choices, but he erro-

[26] Mumford (1964/1970), p. 193.
[27] Chase (2000).
[28] Mumford (1964/1970), especially pp. 274–276.

neously believed this parochial freedom was superior to an expanding number of alternative choices that may offer less latitude within each choice."[29] That is, one might find more freedom and choice within industrial society than living in a one-room shack in the woods (which limits what one can accomplish in so many ways). We are reminded of Raymond Williams's argument against the romantics who would overturn the industrial revolution, discussed in Chapter 2. Kaczynski, in this view, can be seen as a hopelessly lost and deadly romantic.

We are not naive in our faith in resistance to totalizing regimes, nor do we tout resistance as yet another inevitable feature of technological society. One of the purposes of this book is to provide readers some of the tools for recognizing the important cultural dimension of technology, the important technological dimension of culture, and to examine the effects and possibilities for both human and technological action in our everyday lives. To this end, we must be able to recognize what is legitimate in the Unabomber's complaint, but incorporate it into a world view that better understands the possibilities for human action that reside in the complexities of technological culture. That is why, in Part III we propose a cultural studies approach to technology, which draws on concepts of meaning, causality, agency, articulation, assemblage, politics, economics, space, time, identity, and conjuncture. It is through these concepts that we can envision a more constructive path than the deadly alternative of the Unabomber.

One possible outcome of the Unabomber story is this: Perhaps in those moments of recognition, when, in FC's writings, we glimpse ourselves as academics, Luddites, political advocates, or environmentalists—in the moment before we look away, shut him up, and drive him and his arguments from our consideration—perhaps those moments might be profoundly disturbing enough for us to fundamentally reassess what it is we really want, and how we want to get there.

[29] Kelly (2010), pp. 207, 206.

Part III: Cultural Studies on Technological Culture

Figure 14: Electric Oven Setting Electric Oven II

Source: Photograph by Theodor Horydczak, ca. 1920–1950, Library of Congress, Horydczak Collection: `http://www.loc.gov/pictures/item/thc1995009281/PP/`
Source: Photograph by Cyron, 2005, Wikimedia Commons: commons.wikimedia.org

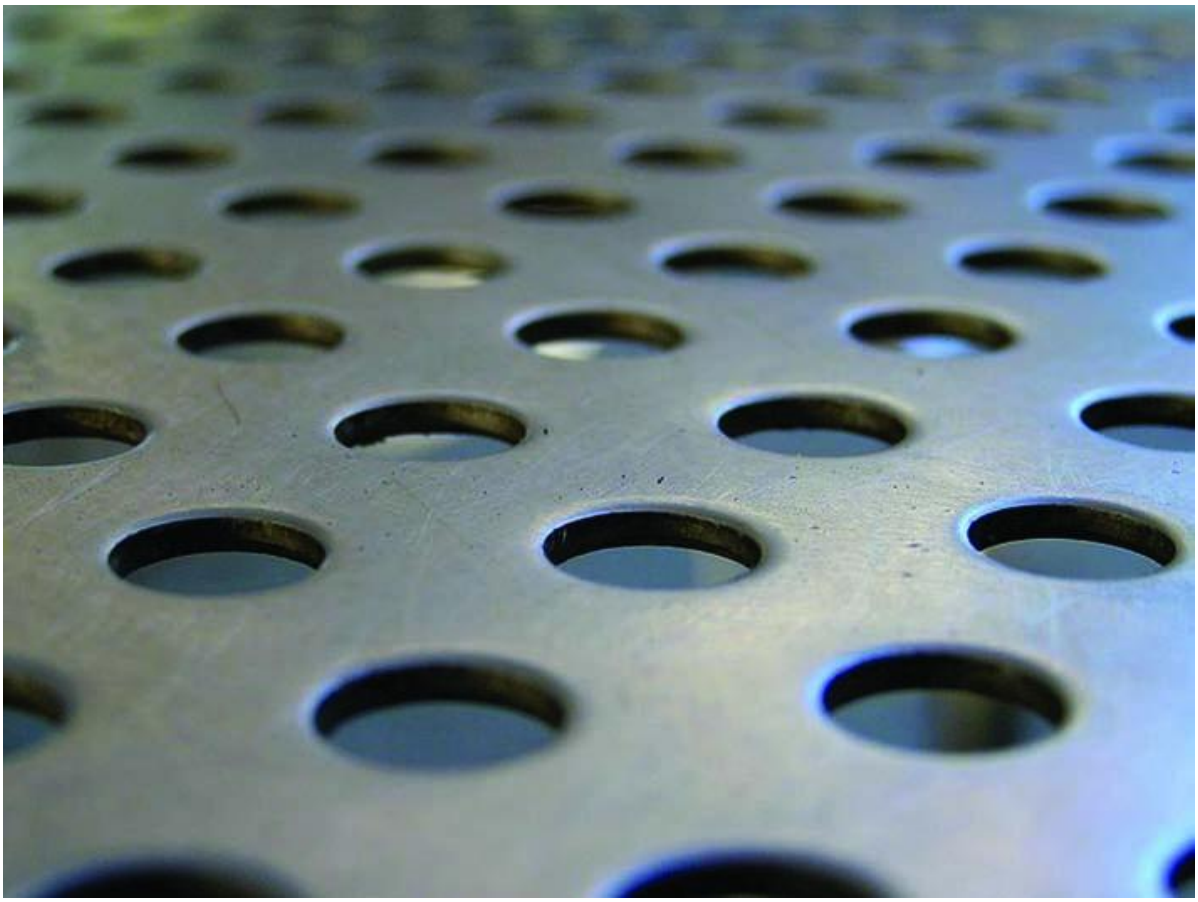

Figure 15: All in All Just Another Hole in the Table

Chapter Nine: Meaning

WHEN YOU PAY ATTENTION to what people talk about—in casual conversations, in class, on radio and television, in books, online, and in films—you note that they are often talking about, writing about, thinking about, reacting to, or responding to technology. Many of these conversations involve life-giving, life-changing, and life-threatening matters; controversial topics include fracking (hydraulic fracturing in natural gas extraction), genetic engineering, media surveillance, the use of unmanned drones in war (or even domestically), the impact of videogames on violent behavior, global climate change, nuclear energy, and weapons of mass destruction. Technology clearly matters, and it matters enormously. In less dramatic ways, the topic of technology also pervades talk about what matters in everyday life: in discussions of social media habits, the development of self-driving cars, or even in discussions about purchasing a tablet computer or the latest smartphone. Sometimes the matters seem relatively trivial: such as expressions of frustration over spotty mobile phone coverage, ATMs that are out of service, and gas-guzzling SuVs. Sometimes we know that these matters are deadly serious: such as debates over which countries can legitimately develop nuclear technologies or "weapons of mass destruction."

What is amazing about these conversations involving technology is how little agreement there is about what is at stake, that is, about what really matters. Especially when the topic is controversial, there is often little agreement as to what a technology is or what it does. When is nuclear technology energy-producing, and when is it a weapons manufacturing process? Let us consider a quite stark example of such a controversy. Beginning in the 1980s, US physician Jack Kevorkian began developing machines that hastened death. In doing so, he ignited a national debate over assisted suicide, or euthanasia. These simple machines were of two types. One was a set of intravenous bottles mounted on a metal frame with a mechanism that allowed the patient to turn on and trigger the flow of a series of drugs that would bring on death painlessly. The other was a tank of deadly gas and a mask with a mechanism that allowed the patient to turn on and trigger the flow of gas that would similarly bring on death painlessly. Kevorkian and his machines were the cause of considerable public and legal controversy. Was Kevorkian a passionate physician or a cold-hearted murderer?

Some people argued that the machines honored a person's right to take control of his or her life and death. They believed that when people have experienced prolonged suffering, they ought to have the right to cease that suffering. From this perspective, Kevorkian was a virtual saint, bucking an uncompassionate legal establishment, and

his machines were "assisted-suicide machines," a compassionate way to help people gain control that would otherwise be denied them.

Other people argued that no human has the right to determine the moment of a human death, even one's own. Some feared the possibility that, once allowed to kill legally, the machines would surely be used to justify killing those who were deemed undesirable—in the manner that fascist Germany used liberal euthanasia laws to justify killing Jews, Gypsies, homosexuals, and the handicapped. To legalize Kevorkian's machines would be to invite fallible humans—and eventually the state—to kill at will. From this perspective, Kevorkian was an agent of encroaching totalitarianism, and his machines were "killing machines," an evil that would usher in legalized, political murder.

From this case, we can see that this technology clearly mattered, and it mattered enormously (either in a positive or negative way). But there was little agreement about what was at stake, or what mattered: does the individual have a right to choose the time of his or her death? do states have a right to murder those deemed undesirable? These discussions often end frustratingly, at an impasse, without a way to reconcile what are seen as mutually exclusive stakes. There is seldom a shared framework for deciding, among the many decisions that might need to be made, if the machines should be legal or illegal.

This problem is enacted daily, at every level of conversation concerning technology, even at the most mundane level. For example, in discussing the desirability or undesirability of SuVs, what exactly matters? That there are too many polluting automobiles on the road? That people have the right to drive whatever they want? That restrictions on domestic drilling limit the availability of gas? That there are simply too many people in the world to use resources this way? That SuV drivers fare better than the drivers of smaller vehicles in crashes between them? That SuVs exemplify an unjustified disparity in income distribution?

In conversations about these topics, the reason we fail to reach more constructive outcomes can be understood partly in terms of a very significant lack: the lack of a sophisticated and shared understanding of how to approach questions of technology. Even if all participants agree (explicitly or implicitly) to consider that the matter in question is technological, it is striking how little agreement there is about precisely what that means. What exactly are people talking about when they support or criticize the existence of Kevorkian's machines or SuVs? What, after all, *is* technology, and how is it connected to our assessments of all the other aspects of daily life that matter? Without that key, that sense of common theoretical ground, we remain destined to discuss, argue, and live at cross-purposes in a communicative space where we cannot begin to sort out the basic terms of disagreement. Without that key, our mechanisms for achieving resolutions to technological matters of enormous importance remain hopelessly flawed.

It is important to remember that reaching understanding of the meanings involved does not guarantee agreement on controversial matters. It is both unrealistic and foolish

to expect agreement on all things, and this is not an approach designed to engineer such an agreement. It is an effort, however, to encourage thinking through the bases for our positions, and be willing to scrutinize and critique them, so that at least we can reach agreement about where we really disagree. If there is any hope for agreement on controversial matters, it might be achieved through this process.

So, Then, What Is Technology?

Part of the difficulty with reaching common ground in discussions concerning technology is that the term is used in so many different ways. One could turn to the dictionary, but dictionary definitions do not adequately capture the meanings of technology that people operate with in everyday life. If you take a group of people and ask each person to write down a definition of technology, you will get as many definitions as there are people in the group! This is often the case even when they are allowed time to consult sources (such as dictionaries) or experts. There do tend to be, however, some thematic similarities in the definitions people turn up. Here are some typical definitions. Drawing on *Webster's*, technology is:

1. A : the practical application of knowledge especially in a particular area: enGIneeRInG 2 <medical technology> b : a capability given by the practical application of knowledge <a car's fuel-saving technology>
2. : a manner of accomplishing a task especially using technical processes, methods, or knowledge <new technologies for information storage>
3. : the specialized aspects of a particular field of endeavor <educational technology>[1]

Rhetoricians typically define technology by pointing to the Greek root, *tekhne*, which means art or craft. The suffix *ology* means "the study of." When you put these two together, technology means the study of an art or craft. Cultural theorist Raymond Williams, in *Keywords*: *A Vocabulary of Culture and Society*, writes that technology is used to "describe a systematic study of the arts...or the terminology of a particular art" and has had this meaning since the seventeenth century.[2]

Interestingly, few people still make everyday use of the term technology in any of the above ways (if they ever did!). What is curious about these definitions is that they treat technology as application, capability, manner of doing, and specialized aspect, but not as a thing. When technology is referred to in popular discourse, however, it is almost always in reference to *things* (tractors, pacemakers, computers, and so on).

[1] *Webster's New Encyclopedic Dictionary* (2002), p. 1896
[2] Williams (1983), p. 315.

Even more interesting then is the fact that the examples in the dictionary definitions suggest things: medical technologies (e.g., respirator), fuel-saving technologies (e.g., catalytic converter), information storage technologies (e.g., computer), and educational technologies (e.g., computer set up for distance instruction). In our estimation, the most common meaning of technology in popular usage conceives technologies as "things that are useful;" that is, as things that have, as the dictionary puts it, some "practical application." So technology is, at least in terms of its most popular usage, a constructed and useful thing.

What does it mean to treat technology as a "thing?" Or, as we prefer to think of it, in terms of its "thingness?" It means to understand and treat technology in terms of objects that have discrete boundaries precisely delimiting the objects and differentiating them from others. So, for example, a digital camera is a different technology than a film camera. Although they are related in some ways, it is possible to specify what makes each unique. Likewise, it is possible to differentiate technology from other kinds of things. In this way of thinking, technology (the camera, for example) is different from nature (a tree, for example) and different from culture (religion, for example). Each occupies its own separate space. Although they may have a relationship, they are each separately bounded and definable. A technology may exist in culture, but like an egg in a nest, it is an isolatable, discrete object. A technology may touch but not interpenetrate the other object: culture. Where one begins and the other ends is always decidable, a mere matter of calculation, measurement, and discernment.

Most often, technological objects are understood to be constructed, solid, and nonliving, although biotechnology is increasingly adding living things to the category of technology. Technological objects are understood to be stable masses, that is, particular arrangements of matter that can be described in terms of their mass (large, small, heavy, light, soft, hard, dense, and so on). Technologies are artifacts, instruments, tools, machines, structures, and constructions; they are detached and different from other things. In this sense, they are discrete, isolatable objects, correlates of natural objects, but not natural. Examples of such things include cameras, paperclips, scissors, generators, automobiles, bridges, buildings, computers, televisions, overhead projectors, microscopes, mP3 players, Cds, assisted-suicide/killing machines, artificial limbs, and, increasingly, genetically modified structures.

"Thingness," however, also points to the fact that people often treat arrangements without solid mass *as though they were things.* An excellent example of this idea of technology is the Internet. While commonly thought of as a technology, the Internet does not occupy space in the same way that a computer monitor does. It is still commonly treated, however, as though it had a discrete, isolatable nature. Although the work of discernment is more difficult, it is possible to map its boundaries, to delimit what the Internet is and what it is not. It is a network that consists of certain components of hardware, software, and certain more ethereal components such as electrical connections, microwaves, satellite links, and clouds. It is not the computer monitor, the user, the software or hardware designers, or the companies that post Web

pages. It is, rather, the network of connections among these (and other) sites. Note: not the sites themselves, but the network of connections among them. Thus, even though the Internet has no "weight" (or other such definitive measure of mass), it is a constructed, nonliving, arrangement that is contained by boundaries that define what it is and what it is not. It has an inside and an outside. While it is a complex network, it does not interpenetrate the other "things" that we understand to constitute culture.

The cultural tendency to conceive of technology in terms of "thingness" has interesting and serious consequences. Significantly, as we have argued, it directs vision toward the "stuff" of technology: the solid, measurable things that are produced. In so doing, it deflects vision away from the interdependent relations among the living and nonliving within which these things are given form. To focus on bounded artifacts—on "thingness"—is to deflect understanding from the ongoing energies, activities, relations, interpenetrations, and investments within which these things appear, take flight, and have effects. Further, the formulation of technology as things that are "useful" deflects vision toward the tool-like use of these things, and away from the work or role of these things beyond matters of their usefulness.

At the same time, the formulation of technology as things that are useful emphasizes the role of technology as a human-focused object. What matters in this formulation is what technology means for humans, in the human world. On the one hand, this is obvious because it would not be a technology without human[3] action. A rock untouched by human hands is not a technology, but a rock bent to human purposes (a wall, a missile) is a technology. Technology involves human purpose and action. Ironically, by focusing on the human purposes it is possible to ignore the importance of an aspect of the thingness of technologies: their materiality, as objects of and for themselves quite apart from their function and meanings for humans.[4] Please do not misunderstand. We are not saying that we should consider this version of material thingness alone (objects of and for themselves), that it is *only* their thingness that matters (this is the mistake made by recent trends in the philosophy of technology).[5] We are saying that we cannot ignore their material thingness and focus *only* on the meanings and functions of technology for human life.

In the remaining chapters of this book, we develop a way of understanding technology that foregrounds the interconnectedness within which things appear, are developed, and have effects. While the approach we develop relies on the theoretical concepts of articulation and assemblage, it owes a great debt to many scholars who have proposed alternative approaches to conceiving the interconnectedness of technological culture. For example, in his book *Technology as Symptom and Dream*, Robert d. Romanyshyn

[3] Or chimpanzee or other tool-using animal.

[4] See Bennett (2010).

[5] We refer here to OOO, Object-Oriented Ontology, a philosophical approach to technology, *not* a cultural studies approach to technology, that has taken materiality off into interesting, but largely abstract, apolitical directions. See, for example, Bogost (2012).

defines technology as "an enactment of the human imagination in the world."[6] andrew Feenberg, in *Critical Theory of Technology*, defines it as a "process of development suspended between different possibilities."[7] Langdon Winner, in *The Whale and the Reactor*, defines technologies as "forms of life."[8] elizabeth Grosz put it particularly elegantly. She writes in her essay titled "The Thing:" "Technology is that which ensures and continually refines the ongoing negotiations between bodies and things, the deepening investment of the one, the body, in the other, the thing."[9]

While these formulations may not yet make sense, they do point to flows, connections, relationships, and interpenetrations among the living, the nonliving, producers, users, processes, possibilities, and energies—and not just to things. If we can learn to think with meanings such as these, we may be able to find productive common ground from which to speak about technological culture.[10]

Why Struggle with Meaning?

There are several forms of resistance that you might be feeling to this call to learn a new—and decidedly more complicated—sense of technology. First, you might ask, with all the definitions of technology available, why propose another? Wouldn't it make sense to simply advance the one that is "correct" or "best" and move on? Second, you may have a rather well-worked-out definition of technology with which you are satisfied. Perhaps you feel it has served you well up to now and see no need to abandon the comfort it offers. Third, you may challenge the idea that anyone has the "right" to simply develop (or "make up") a new definition as they see fit. You may believe that language and meaning are fixed and absolute and don't warrant such tinkering. As we argue below, grappling with the problems of what technology means, and the power

[6] Romanyshyn (1989), p. 10.

[7] Feenberg (1991), p. 14.

[8] Winner (1986). See his discussion of "forms of life," pp. 3–18.

[9] Grosz (2001), p. 182. The essay in its entirety helps the reader to develop a feel for "thingness." See pp. 166–183, 203–206.

[10] Some scholars of technology try to accommodate these additional considerations and complications about the definition of technology by providing elaborate schemes or typologies of technology. For example, allenby and Sarewitz (2011) delineate three levels of technology. Level I is "the reality of the immediate effectiveness of the technology itself as it is used by those trying to accomplish something." Their example is a jet airplane. Level II technology is a "systemic complexity" such as the whole system of air travel, in all its complexity. Level III is more the level of social and cultural context (what they call an "earth system"). Allenby and Sarewitz are not alone here. Economist W. Brian arthur (2009, p. 28) proposes: (a) technologysingular ("technology as a means to fulfill a human purpose"), (b) technology-plural ("an assemblage of practices and components") and (c) technology-general ("the entire collection of devices and engineering practices available to the culture"). Such schemes have their uses in parsing debates and particular technologies or technological systems (allenby and Sarewitz are examining transhumanism). Our approach takes a different tack, and we present the idea of technology as assemblage, a term scalable from the individual interactions of Level I to the global ways of life at Level III.

that different definitions have, actually provides crucial insight into the character of technological culture.

First, in response to the hope that we could simply choose the most comprehensive and useful definition of technology and move on, we maintain, as we have argued above, that there is no definition of technology that (as yet) seems to work consistently in everyday life. Dictionary definitions don't match up very well to actual use, and popular usage is inconsistent. Working to develop a widely shared, sophisticated understanding of technological culture might help us solve significant problems involving technology. But, in the interest of achieving that understanding, we can't simply jettison all the definitions and meanings of technology that have come before and that are a part of our culture. However inadequate or problematic they may be, they influence current understandings and actions—usually in inconsistent and contradictory ways. In a very real sense, all those definitions contribute to the shape of technological culture.

Second, in response to those who are comfortable with a particular definition of technology, we encourage you to put your definition to the test, in light of what you've read thus far in this book. Has it always served you well, or have you had to change your concept of what technology is from time to time in order to grapple with the issues that have been raised here? We suspect that the latter is the case. Why? Technology is—and will likely continue to be—polysemic. *Polysemy* is a term that points to the fact that words can have many different meanings. The more potential meanings that can be attributed to a word, the more polysemic that word is. Some words, at particular historical moments, are highly polysemic. Terms such as *love*, *life, liberal, conservative, democracy*, *freedom*, and *technology* are currently highly polysemic terms in north American culture. An understanding of the work performed by the term "technology" should be broad enough to accommodate the fact that technology is likely to remain polysemic, for it is a site of significant cultural struggle and change.

Third, in response to skepticism you might have about our "right" to develop a definition of technology, we next explore a little bit about the nature of language and meaning, to clarify that change, not stasis, is more the rule than the exception.

Struggles over Meaning

Most people are familiar with the distinction between denotation and connotation. *Denotative* meaning implies that a word has a precise, unambiguous, or correct meaning. A word, in this case, signifies, or denotes, an explicit and culturally shared meaning. If, for example, you want the denotative meaning of the word technology, the best source is the dictionary, which delivers the "real" meaning. It is interesting how often students writing papers on controversial topics will go—naively—to the dictionary for the "real meaning" and hence the "final word" on some topic, as though the dictionary was the final authority on what something "really is."

The dictionary, as we discussed above, is not the best place to look for the meanings of technology (or many other terms) used in everyday life. For that you need to understand connotative meanings: meanings that are implied by a word, meanings that are, in a sense, lived. *Connotative* meaning refers to the fact that words imply or evoke associations, memories, commitments, values, beliefs, and affects. These meanings are harder to track down than are denotative meanings, because they tend to be less consensual, less culturally explicit, and less likely to be "codified" in dictionaries. For many people, technology connotes progress; they encounter the word with enthusiasm, participating in a belief that new technologies make our lives better. For others, technology connotes economic hardship; they encounter the word with dread, believing that technology refers to the expensive things in life they would like to have but cannot afford, or to the objects responsible for the loss of a job. Connotative meanings such as these can vary dramatically, because they point to different—and often highly complex—ways of living in and experiencing the world.

Although connotative meanings are more difficult to assess than denotative meanings, they often play the more powerful role in everyday life. This is clearly the case with technology, where, as we stated above, almost nobody actually uses or lives with the denotative dictionary definitions. As a result, it is a rather difficult to track what the powerful denotative definitions are and what cultural effects those definitions have.

This task is made more difficult by the fact that meanings change—even denotative definitions—and that there is traffic between denotative and connotative definitions. In actuality, the distinctions between denotation and connotation are not absolute. Language, after all, does change, and dictionaries—to some degree—reflect those changes. New meanings develop in a culture and sometimes make it into the dictionary. For example, you'll find "Internet" only in a fairly new dictionary. Further, old meanings sometimes disappear. *The Oxford English Dictionary* is a resource that specializes in tracing the changing meanings of words. The changing meanings are significant because they demonstrate that no denotative meaning is absolutely "True." Rather, meanings are true—perhaps temporarily—simply because there is wide cultural agreement on a meaning and lexicographers have chosen to put those particular meanings in their dictionaries.

In a sense, then, all meaning is connotative. All meanings are implied, subject to change, and liable to be legitimated (or not) in a complex process of cultural change. At different historical moments, different meanings will seem more or less contested, because, we remind you, there is often very much at stake in how you define something. It truly does matter, for example, whether you define Kevorkian's machines as "killing machines" or as "assisted-suicide machines." If you wanted to use one of these machines to terminate your life, it would matter. A killing machine might be illegal and difficult to locate, and those who helped you locate it would be criminals working outside the law. You too would be a criminal for using it. An "assisted-suicide machine" is more likely to be legal and easier to locate, and those administering it would be respected

health care professionals earning salaries and paying taxes. You would be a patient rather than a criminal.

There are two interrelated definitional lessons to take from this example. First, changes in definition emerge within real cultural struggles. Kevorkian's public flaunting of the use of his machines was clearly an attempt to force a legal and cultural change in what the machines meant and what mattered. His efforts, and the lawsuits and debates that involved his efforts, may significantly affect the ways that people understand life and death. All meaning changes in struggles like this, although the struggles are not always as dramatic. All meaning changes in struggles to *make something mean* in particular ways.

Second, the definitional move we propose—away from the equation of technology with "thingness" and toward a notion of technology as articulation and assemblage—clearly matters. The two Kevorkian "machines"—the "killing machine" and the "assisted-suicide machine"—are only the same machine if you think solely in terms of their "thingness," as discrete objects that exist apart from other objects and bodies. They are clearly different machines if you admit that what they "are" interpenetrates the lives, bodies, and objects of which they are a part, and that the forms of this interpenetration can differ. By understanding them as different machines, we are compelled to explore the culture, the cultural arrangement, and the flows and relationships within which these machines come to have a variety of meanings. We learn, as a result, more about everyday life, and more about technology as part of everyday life. Therefore, it is important to struggle with the problem of definitions, definitional change, and meaning. That is, in part, the way the world changes.

Source: Photograph credited to the firm Lévy & fils, or to photographer Kuhn, 1895 Wikimedia Commons: http://commons.wikimedia.org/wiki/File:Train_wreck_at_montparnasse_1895.jpg

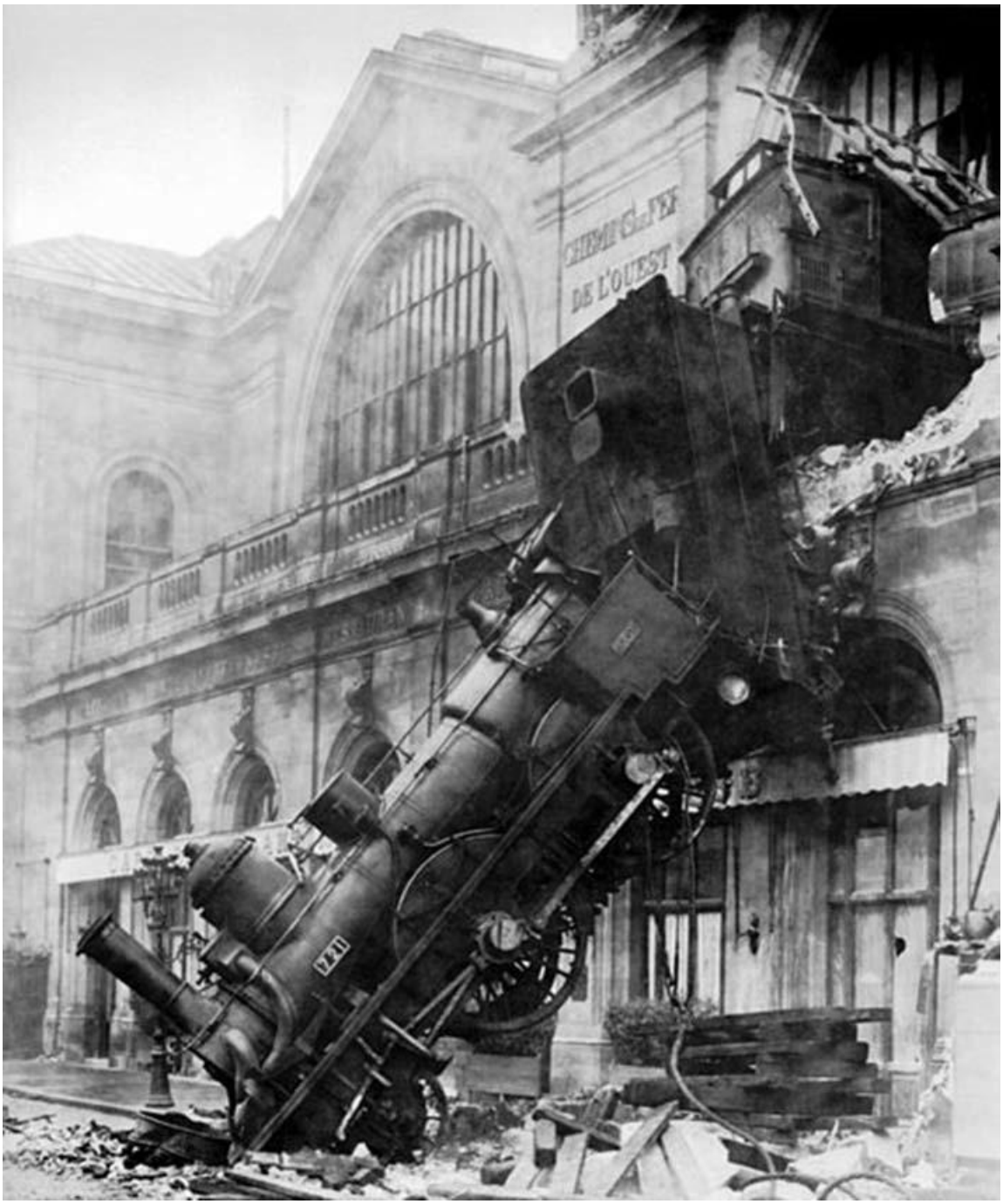

Figure 16: Train Wreck at Montparnasse Station, Paris, France, 1895

Chapter Ten: Causality

Beyond Determinism

AS DISCUSSED IN CHAPTER 4, technological determinism and cultural determinism represent two extreme positions with very few options for understanding how change happens. Most people, it turns out, think in more varied and often more complex ways about cultural and technological change. In her book *Communication Technologies and Society*, Jennifer described the most salient ways that people understand technology and change. She developed a way to explore the structures of thinking about causality used by people when they think about, make statements about, or take positions on technology.[1] These positions are not necessarily held consciously, although they might be. Usually, however, it takes careful reflection (sometime self-reflection) to see the assumptions at work. It is also the case, as you will see, that it is not logically possible to operate with or believe more than one of these positions simultaneously. In the real world, however, people often take positions on technology that mix up these positions, which contributes to sloppy, unhelpful arguments. By carefully exploring the four positions, it is possible to unmask such sloppy thinking (including our own) and work toward conversations based on sound, critical thought. As we stated in the previous chapter, this, at the very least, enables identifying real bases for disagreement.

In her book, Jennifer proposed that the ways people really think about technology fall into two major categories (or perspectives): *mechanistic* perspectives on causality, and *nonmechanistic* perspectives on causality. Within each of these categories there are sub-categories (or perspectives): The two mechanistic perspectives are *simple causality* and *symptomatic causality*. The two nonmechanistic perspectives are *expressive causality* and *articulation and assemblage*.

Mechanistic Perspectives	**Nonmechanistic Perspectives**
Simple Causality	
Symptomatic Causality	Expressive Causality
Articulation and assemblage	

[1] Slack (1984a; 1984b; 1989). The four positions on causality developed in this chapter build on Slack's work.

As you will see, this grid incorporates technological determinism and cultural determinism, but it transforms them in a way that makes it possible to characterize the more complex ways people think about culture and technology in everyday life.

Mechanistic Perspectives on Causality

When people understand change from a mechanistic perspective on causality, they think and act with four basic assumptions. It is important to remember that these assumptions are not necessarily held consciously, although they might be, and that it takes careful reflection (sometimes self-reflection) to see the assumptions at work. The four assumptions are as follows:

Assumption #1: Technologies Are Isolatable Objects, That Is, Discrete Things

The idea or definition of technology that comes into play when someone Takes a mechanistic perspective on causality is that technologies are objects, artifacts, and things. Recalling the discussion of definitions in the previous chapter, technology here means "stuff," with the consequence that it draws our attention away from the context within which the artifacts are produced and used. Technology is thus isolatable, meaning that we assume we can examine the technology itself, without having to consider, as part of what it is, the people who develop and use it, or the culture within which it is developed and used.

Assumption #2: Technologies Are Seen as the Cause of Change in Society

This assumption should now be familiar as a technological determinist position. When someone takes a mechanistic perspective on causality, discrete technological objects have effects on the culture and not the other way around.

Assumption #3: Technologies Are Autonomous in Origin and Action

"Autonomous" means that something is separate, discrete, and independent. To say that technologies are autonomous is to say that they are discrete things that function independently. What they are and what they do does not depend on a relationship with anything else. To be autonomous in *origin* means that technologies come into being independently, that is, all by themselves. To be autonomous in *action* means that technologies act and have effects independently, that is, all by themselves.

What does it look like to come into being autonomously? There are three ways that people talk about technology that suggest they assume it has autonomous origins: that it simply appears; that it arises in the mind of an inventor; and/ or that it is a self-generating force. First, people sometimes talk about technologies as though they simply *appear*: they materialize out of thin air, as though they dropped from the sky. They are the ultimate *deus ex machina*, literally in Latin, "the god in the machine." This phrase refers to the practice in medieval theater of dropping a mechanical device with a "god" aboard it onto the stage. The god's function was to resolve the conflict of the drama with no other apparent connection to the story (or context). Thus, no matter what seemingly irresolvable turn the story might take, the *deus ex machina* arrives "out of thin air" to set all things almost magically straight. In a similar way, people often assume that technologies appear as though motivated by some inertial force that exists apart from the goals, motivations, and desires of human beings and apart from the organization of culture. They are dropped from above to resolve (or create) conflict.

An additional image captures the way this belief in the autonomous *deus ex machina* works. Imagine for a moment that culture is a pool table covered with balls at rest. A new technology (the cue ball) drops on to the table, appearing from outside the culture. Once dropped, the technology/cue ball collides into the other balls, creating change. The new technology, like the cue ball, is understood as though it comes from somewhere outside culture, with no pre-existing relationship to the culture it affects.

Does the new technology simply appear, apart from the influence of culture? most people would answer that it doesn't; they will add that someone had to invent it, build it, use it, and so on. But if you listen to what people *say* about new technologies, and if you watch how they *interact* with them, you will see that they do in fact often assume that technologies appear in this autonomous way. A typical newspaper article on computers might begin with a statement like, "Computers have changed education since they were introduced into the schools in the 1980s." The article then details various effects caused by the computer. But, we might ask, where did the computer come from? How was it developed and why? Who introduced it into the schools and why? How was it taken up and used in the schools? and, most important, in what ways do the answers to these questions offer insight into the effects that we observe? The impression that technologies arise autonomously is reinforced by the absence of such questions (and the absence of answers to these questions) in the discourse about technology.

The second way that the origins of technology are treated as autonomous occurs when people consider the beginning of the technology as though it were simply created whole-cloth in the imaginings of an inventor. Just as in a comic strip, where the convention used to indicate an idea is the dialogue balloon with a light bulb lighting up, new technologies are like lightbulbs in the mind of an inventor. They simply light up, go off, appear in a flash. They are autonomously born out of the air. In this case, the

inventor, like the cue ball, is outside culture; the inventor is considered to be a unique being or a genius who simply comes up with ideas that appear like a flash.

But do such inventors and their inventions appear apart from the influence of culture? most people would answer, "of course not." But, again, if you listen to what people say about technologies, and if you watch how they interact with technologies, you will see how pervasive is the belief in their autonomy. We learn this way of thinking about and interacting with technology in grade school, when we are taught, for example, that eli Whitney invented the cotton gin in 1792, Robert Fulton invented the steamboat in 1802, alexander Graham Bell invented the telephone in 1876, and so on. We learn to associate particular technologies with individual inventors rather than with a particular cultural context within which technological solutions are searched for, invented, and developed.

The practice of granting patents reinforces this way of understanding the process of invention. Patent practice only recognizes individuals as inventors. Patent seekers must prove to the satisfaction of the patent office that the invention is truly theirs and theirs alone. Even though patent rights may be assigned or sold to a company, corporation, or other individuals, inventions are *not* understood to "belong" inherently to the culture within which the inventor lives and works. Rather, inventors have the right to prohibit others from using or producing the invention. When technologies are regarded and treated as unique acts of invention in the minds of isolated inventors, the culture reinforces the understanding that technologies arise autonomously, which reinforces, in turn, the privileging of the individual in culture generally.

The third way that technologies are understood as autonomous in origin is that technologies are sometimes seen as self-generating. In this way of thinking, technologies give birth to other technologies. Nobody, when pressed, would say that technologies actually give birth, yet it is common to hear people say that one invention gives rise to another: People make statements like, "the internal combustion engine gave rise to the automobile," and "the radio begat television." Without questioning what it means to "give rise to," we often talk about technologies *as if* they give birth, without the aid of any cultural influences, or even inventors. Thus, technologies are treated as though they simply arise autonomously.

If technologies are understood to arise autonomously in the above three ways, it follows logically that people would understand them to act autonomously as well. If the very appearance, or birth, of a technology, is free from cultural influence, it stands to reason that it does not need culture to do what it does. It acts independently, and its effects are the effects of the objects and artifacts, the stuff, the isolatable things, not the effects of cultural choices or arrangements. Further, because a technology acts autonomously, it acts with impunity, as an amoral force that cannot be held responsible for its effects, whether for good or evil. It simply exists, and, because it exists, it simply acts. Members of the culture upon which it acts are virtually helpless in the face of this enormous, autonomous force.

Assumption #4: Culture Is Made Up of Autonomous Elements

Once you understand how technologies are seen to arise and operate autonomously, it is easier to understand how, when people think with and utilize a mechanistic perspective, every aspect of the culture is seen as autonomous. The image of the pool table can serve again to illustrate. Think of culture as all those individual pool balls lying at various positions on the pool table. Each component of culture—economics, politics, law, religion, the family, education, music, and so on— is understood, like a pool ball, to be a separate phenomenon, each without any intrinsic relation to the others. Music, for example, would be understood to develop in a particular way totally unrelated to politics or law or the family, and so on. One might have a momentary effect on another—like when a pool ball strikes another—but the essence of each remains intact. Family and religious values may have an effect on the law, which may have an effect on a music rating system, which may have an effect on music. But the music is still music; it isn't in any intrinsic way about family values, religion, or the law. After the effect, music goes on in its own independent way.

This is important because, from a mechanistic perspective, the meaning, significance, and role of something such as music or technology are understood by focusing on the thing itself. To understand music, you would study music, not law. To study any component of culture, such as technology, you look at the thing itself, not law, not music, not the family, and so on. Even when you might have to acknowledge the momentary effects that other components of culture occasionally have on technology and the effects technology has on the other components of culture, it is as though culture is made up of all these independent entities sitting on the pool table waiting for technology (the cue ball) to come careening on the scene to put them all in motion in their own separate way.

These four assumptions form the backbone of a mechanistic perspective on technology. But if you closely examine the way that people think with and make arguments from a mechanistic perspective, you will find that it takes two different forms: a simple causal form and a symptomatic causal form.

Both simple and symptomatic causality are mechanistic positions, and thus operate with the four assumptions discussed above. Where simple and symptomatic causality differ is in their understanding of the *inevitability* of effects. Simple causality assumes that *effects are inherent* in the technology and that *precise effects are inevitable*. Symptomatic causality assumes that *broad parameters of effects are inherent* in the technology, that *a limited range of effects is inevitable*, and that various social forces are responsible for steering, or choosing from among those effects in that limited range.

Simple Causality

As stated above, when someone thinks about or understands how technological change happens from a simple causal perspective, they assume that *effects are inherent in the technology and that precise effects are inevitable*. To say that the effects of technology are *inherent* in the technology implies that the effects are a natural and inseparable quality of the technology. To say that the *precise* effects are inevitable implies that once the technology appears it is absolutely certain that precise effects will follow. When you put these two assumptions together, it is the nature of the technology that determines these precise effects. If someone believes in this way, the effects are seen as "built in" to the technology; they are inevitable; and no force, no human, and no organization could shape or change them. The effects would therefore be unavoidable.

Recalling that the mechanistic perspective assumes that technologies arise and act autonomously, the simple causal perspective really understands technologies as coming out of nowhere to exert uncontrollable and precise effects on culture, without any form of cultural assistance. We could only be passive recipients of these effects. We might choose to accept them, or, as some people put it, we could simply be left behind. We can be "on the bus" or "off the bus," but we can't do anything other than accept the fact that the bus will roll on down the road, with or without us.

When we look at the theoretical logic in this way, it's difficult to imagine that anyone could really believe in a simple causal perspective. We've never known anyone to actually admit to believing this "hook, line, and sinker." However, when you look at the positions people take up in relation to technology—how they argue, what they say, what they do—evidence abounds that a simple causal perspective is quite widespread. For example, when we have asked computer and engineering students why they have chosen these professions, they often respond with a simple causal argument. They argue that the computer, by its very nature and over which they have no control, is creating a world that determines where they will have to work if they want to thrive. The computer, in this answer, is singularly responsible for the changing nature of the workforce, as though it were an entirely autonomous force. Statements such as "it is inevitable that the computer will change—indeed, is changing—the nature of employment" have become commonplace, and millions of people have made life choices based, at least partly, on that belief.

When looked at carefully, critically, and theoretically, as we advocate in this book, simple causality is quite simply indefensible. To go back to the example of the gun introduced in Chapter 4: everyone knows that guns don't simply materialize autonomously and kill people—someone has to manufacture one, pick one up, and use it. Remarkably, however, people do make these kinds of arguments. It is as though somewhere, deep down, many people believe that these technologies do have enormous power to appear autonomously and shape our lives all by themselves, and that there is absolutely nothing that anyone can do to alter their inevitable effects.

Symptomatic Causality

The symptomatic causal perspective probably represents the most commonly held position when people think about, talk about, and interact with technology. Though still a mechanistic perspective grounded in the four basic assumptions discussed above, it assumes a more sophisticated understanding of effects than the simple causal perspective. When people take a symptomatic perspective, they do not believe that *precise effects are inherent* in the technology and therefore exactly inevitable. Rather they believe that *an inevitable but limited range of effects is inherent* in the technology and that there are choices that can be made within that inevitable range of options. For example, a simple causal argument might maintain that it is inevitable that guns will kill. However, from a symptomatic perspective, there are options open to us among an inevitable range of possible effects. Yes, guns will kill (that much is inevitable), but there is also a limited range of possible effects, usually understood to be a range from good to evil effects. So, the range of possible effects might include: (1) killing game animals and not people, (2) killing game animals and people, (3) killing only criminals and not innocent people, and so on. In another example, a simple causal argument might maintain that computers will put people out of work. A symptomatic causal argument might agree that it is inherent in the computer to change the structure of jobs. However, the range of possible effects might include a good to evil range within which the resulting changed structure of jobs differs. So the range might include (1) increasing the number of unemployed people, (2) retraining those put out of work to take up new kinds of computer-related jobs, (3) retraining people to take up new kinds of non-computer related jobs. In this case, it is inevitable that the structure of jobs will change, but there is a limited range of ways that might happen.

The difference between precise effects (in a simple causal perspective) and a range of effects (in a symptomatic causal perspective) is significant. While killing is an inevitable result of the gun (according to either perspective), only the symptomatic perspective assumes that there are any options to choose among regarding cultural responses to such killing. While the structure of jobs will change (according to either perspective), only the symptomatic perspective assumes that there are any options to choose among regarding the configuration of those jobs.

What then determines which effect within the limited range actually occurs? Remember those pool balls on the table? Like pool balls in motion, a variety of social forces (such as law, religion, economics, politics, family, etc.) may deflect the technology (the cue ball) so that one effect or the other occurs. So, for example, we might pass laws making killing other humans a mere misdemeanor, in effect encouraging people to use the gun to kill humans. We might develop a religious belief that renders it unthinkable to kill another human with a gun. In the first case, guns will kill game animals and humans; in the second case, the gun will kill only game animals. However, in both cases, the gun will inevitably kill, because, remember, this way of thinking still operates within the mechanistic causal framework. In the example of the computer and

jobs, we might let those people who lose their jobs to computers fend for themselves. Alternatively, we might develop educational programs for retraining people to work with computers in new jobs or to take up new kinds of non-computer related jobs. In the first case the effect will be unemployment; in the second and third cases the effects will be different kinds of reemployment. However, in all three cases, the inevitable effect is that the computer will change the structure of jobs, because, again, remember, this way of thinking still operates within the mechanistic causal framework.

When people understand change from a symptomatic causal perspective, they see that our choices involve more than simply adapting (or not) to technology, being "on the bus" or "off the bus," but steering, directing, or choosing within the inevitable, but limited, range of effects. The challenge is to figure out what that inevitable range of effects is, to evaluate those effects, and to develop creative ways to ensure that the better effect is the one that happens.

It is worth recalling, however, that the symptomatic causal perspective, like the simple causal perspective (because they are both mechanistic), does not assume that we can initially encourage or interfere with the appearance of the technology. Neither does it assume that we could avoid the inevitable effects. Technology is still assumed to appear autonomously, and it is still the technology rather than the culture that is assumed to cause the effects. From this perspective, there is nothing, or nobody, to blame or praise for its appearance (except, perhaps, for that genius inventor) or for the fact that it has certain inevitable effects. From the symptomatic perspective, we do have some responsibility, for we are charged with shaping the outcome within the inevitable but limited range. We can only do so much, however, for we can only steer to one side or the other, to the "good" or "evil" options, as we careen down the road on which technologies inevitably take us.

Soft Determinism: A Variant of Mechanistic Causality

In response to the complexities of studying technology, scholars have come to resist thinking of technology as being either autonomous in origin or as the sole agent in causing effects. For example, a workshop at MIT on the question of determinism was held for a group of such scholars in 1989. Their discussions resulted in a provocative book that explores the problem, *Does Technology Drive History? The Dilemma of Technological Determinism*. The introduction to the book, by Leo Marx and merritt Roe Smith, proposes a two-stage causal process called "soft determinism."[2] The soft determinists recognize that "the history of technology is a history of human actions," implying that every technology has an origin in human actions.[3] The task of the soft determinist is to describe the particular action, or *critical factor* that gives rise to a technology to begin with. For the soft determinist, the critical factor is *the original*

[2] Marx and Smith (1994), pp. ix–xv. The book is edited by Smith and Marx (1994).
[3] Marx and Smith (1994), p. xiii.

causal agent in a chain of causality. For example, the irrepressible human desire to create may be seen as the critical factor, or initial cause, of inventing the gun. After the gun is invented, though, it takes on a life of its own and has effects on its own. Thus, even if it had its origins in human actions and is not autonomous in origin, the technology still acts autonomously.

Soft determinism thus acknowledges—in a restricted way—the importance of the cultural context within which a technology originates. It tends to remain, however, a form of determinism, like simple and symptomatic causality, because there is, first, a single cause (not unlike the flash of inventive genius in the simple causal approach) and, second, because the technology acts with "a life of its own," to generate effects. Although it is a significant attempt to resist the problems of mechanistic causality, soft determinism simply extends the cause-effect relationship back to particular critical factors (such as economic, demographic, intellectual, and cultural factors) that act as a prior cause.

In response to the soft deterministS, we might ask: How can a technology's actions be autonomous if its origins are not? don't we deploy technologies in particular ways, steering their effects to some degree? Wouldn't this imply partnership in the generation of effects? This is, after all, the implication of symptomatic causality: that effects can to a limited degree be steered. Marx and Smith realize that as soft determinists sort through the various social, economic, political, and cultural causes, they often end up describing a complex matrix within which technologies originate. It becomes difficult to identify a single critical factor in a simple causal chain in this situation. As Marx and Smith observe, causal agency becomes so deeply embedded in the larger social structure "as to divest technology of its presumed power as an independent agent initiating change."[4] If the origin of a technology is so caught up in a complex cultural context, how can it be said to have effects independent of this matrix? If, for example, the gun is developed because we are a hostile species inclined to kill those we perceive as enemies, *and* because we have a pressing need to kill a particular enemy, *and* because we have already developed gun powder, *and* because we revel in the intellectual challenge of invention, *and* because we have a religious sanction to kill, and so on, how then can we say that the gun causes killing, rather than the relationship between the gun and culture? This observation suggests that technology does not act autonomously. Consequently, if neither the origins nor the actions of technologies are autonomous, we unseat technology from its role as the central defining causal agent in cultural change.

Technological determinism and its various forms quite simply are insufficient to explain the role of technology in culture. Instead, we need to know more about the context within which technologies are invented, developed, and used. We need a better way to understand the complex process within which there are effects. This is exactly what the nonmechanistic perspectives attempt to accomplish.

[4] Marx and Smith (1994), p. xiv.

Nonmechanistic Perspectives of Causality

When people understand change from a nonmechanistic perspective of causality, they think and act with three basic assumptions, which differ dramatically from the mechanistic assumptions of causality. Again, these assumptions will not necessarily be held consciously, although they might be. Again, it often takes careful reflection (sometimes self-reflection) to see that the assumptions are at work. The three assumptions are as follows.

Assumption #1: Technology Is Not Autonomous, but Is Integrally Connected to the Context Within Which It Emerges, Is Developed, and Used

When people assume that technology is *not* autonomous, they assume that it is not a discrete isolatable thing. This is where definitions, as we discussed in the previous chapter, begin to matter enormously. If people define technology as integrally connected to the context within which it arises, it cannot (by definition) come from outside the culture. It cannot drop from the sky, appear like a bolt out of the blue, pop like a lightbulb in the head of an inventor, or emerge like a baby from another technology. It cannot be understood to be like a cue ball introduced onto the pool table from somewhere else. That is because there is no somewhere else. Technology, if it is not autonomous, is always already a complex set of connections, or relationships, within a particular culture—not an independent thing, but always already a structure of connections. Within these connections, things emerge and are used, but the "thingness" of a technology is only one aspect of what it is. The rest of what it is can only be understood by describing the nature of the connections within which it is developed and used. For example, rather than thinking of the gun as just a material object, it might be understood as a thing invented, developed, and used to kill enemies. That *is* what it is; it is the connection between the thing, the desire to kill, and the practice of killing enemies. It was invented, developed, and used within that set of relationships to do exactly that.

Assumption #2: Culture Is Made Up of Connections

When people assume a nonmechanistic perspective, not only is technology understood to be a structure of connections; culture too is understood to be a structure of connections. In this way of thinking, culture is not just a bunch of unrelated components that are scattered like pool balls on the table. Rather, culture is a complex set of connections or relationships: more like the formation of the balls on the table than the balls themselves. In fact, the usefulness of the image of the pool table drops out at this point, as it becomes misleading to imagine discrete objects or forces at all.

In non-mechanistic causality, no particular cultural component, such as education or the economy, stands alone. What they are is the set of connections or relationships among forces. For example, if you wanted to understand education from this perspective, you must understand its connection to the economy, for education is integrally bound up with economic developments. You must understand its connection to technology, for education is integrally bound up with the role of technology in relation to the economy. A rich understanding of education would require understanding many more connections among the cultural forces that animate the practice we call education. From this perspective, then, *culture is the constantly changing web constituted by these connections*. Every phenomenon in the culture (including technology) would have to be understood as distributed in that complex web. That is how cultural studies understands context.

Assumption #3: Technologies Arise Within These Connections as Part of Them and as Effective Within Them

People who think with and use a nonmechanistic perspective do not regard technology as being either a simple cause or a simple effect. In fact, in a nonmechanistic perspective, the language of cause and effect no longer suffices. Rather, adherents to a nonmechanistic perspective draw attention to the ways that technologies emerge in shifting connections of forces and the ways that they are part of those connections and forces. In this view, technologies emerge from within a context, as part of that context, and in relationships that have effects. The relationships—not simple things—give rise to effects. The challenge for nonmechanistic thinking is to explain this complex process of affecting change.

These three assumptions form the backbone of a nonmechanistic perspective on technology. But if you closely examine the way that people think with and make arguments from a nonmechanistic perspective, you will find that it takes at least two different forms with respect to understanding how the cultural context is put together: an expressive causal form and a form we call "articulation and assemblage." These two perspectives differ principally in the way they understand how the cultural context is put together. When someone takes an expressive perspective, they believe that *one* force or connection takes center stage and gives a uniform, homogeneous shape to the context. When someone takes an articulation perspective, they believe that no single force or relationship takes center stage, and that the context is more heterogeneous. As a result, adherents to each of these perspectives understand both the nature of context and how change occurs differently. While adherents of each perspective will explain the emergence, development, and use of technologies as things as well as connections, each group conceives the process differently.

Expressive Causality

When people think with and understand culture and technology from an expressive causal perspective, they assume the three basic assumptions of a nonmechanistic perspective: that technology is not autonomous, but is integrally connected to the context within which it emerges, is developed, and used; that culture is made up of connections; and that technologies arise within these connections as part of them and are effective within them. Beyond that, there are two distinctive features of the expressive perspective: First, that there is one factor, or cause, what we call an *essence*, that drives absolutely everything else in the culture; and second, that the culture, the everything else as it were, is an homogenous totality, that is, that every aspect of culture shares that essence by reflecting, manifesting, and enhancing it.

The Essence

What does it mean to say that culture has an essence? Think for a moment about how some people believe that individual human beings have an essence. Even though a baby and a full grown adult have little in common, there is, for many people, a belief that something about that person remains essentially the same for all their life: that they have a core, a center, that characterizes them, and all that individual's actions can be understood as emerging from that core. There are many ways that people think of individuals as having an essence, or a core, to their beings. For example, many religious people believe that everyone is at their core *good*. That good is always in there, no matter how superficial actions may seem to hide it. They are always salvageable, because they are in essence good. But the essence is not always thought of as positive. When, for example, we put a criminal in prison for life without the possibility for parole, aren't we enacting the belief that the person has a core (hardened criminal) that cannot possibly change? and don't we often look back to that criminal's childhood for evidence that they have always been that way? That sense of an individual's irrecoverable nature is akin to believing that the person has an essence—criminal—that they were born with and will die with.

When the belief in an essence is applied to culture, as opposed to simply an individual, it is assumed that there is one element, factor, or cultural arrangement that is the essence of that culture. So the culture, like an individual, has at its core a single essence. In some ways the essence for the expressive thinker is similar to the soft determinist's "critical factor." However, where for the soft determinist there might be different critical factors in relation to the development of different technologies, there is for the expressive thinker only one critical factor for all of culture in every instance. That means that every human action, every cultural force, every connection, every relationship, every technology, absolutely every thing is essentially, at its core, the same, in that they all share the same essence. Different theorists and different people will assume that the core is different (just as some people may think that everyone's core is good, whereas others would disagree). There have been and are many ways that people think of culture as having an essence. The essence has been understood to be as varied

as the following: creativity, capitalism, the contradiction between labor and capital, technique, standing reserve, greed, the drive to reproduce, aggression, even good. We consider below some examples of positions on technology that rely on this assumption of an essence, but before we do, the idea of culture as homogeneous warrants a little more explanation.

Culture as Homogenous Totality

It follows naturally that if everything in the culture shares the same essence, the culture is a kind of totality, a whole, almost like an organism in and of itself. Regardless of what the culture looks like, every aspect shares the same essence. That means that elements as seemingly diverse as these are essentially the same: law, the family, religion, politics, economics, art, education, and so on. The appearance of difference is superficial, even illusory. Think about good behavior exhibited by the "hardened criminal:" The criminal is still in essence a criminal and the good behavior might just be a cover for evil scheming. That is what we mean by the term *homogeneous*, that everything in its essence the same.

So for example, if capitalism was understood to be the essence, then everything in the culture could be explained in terms of capitalism. Law is designed to protect the interests of capital. The family is a way that culture creates new workers for a capitalist system. Religion teaches people to take up their place willingly in a capitalist structure. New technologies are created to make profit and will only succeed if they do so in a capitalist market. Etc. There is nothing that cannot be explained as being fundamentally about capitalism. And there is no possible resistance to or escape from, for anything or anyone, the logic of capitalism.

If everything is the same, how does the expressive thinker account for change? Really, doesn't it seem that if everything was always only the same, nothing could change? What would make it change? Change can't really come from outside the totality, because everything is by definition within the totality. To explain change, it is helpful to think in terms of elements (such as law, the family or technology) of the totality in three ways: as reflecting the essence, as manifesting the essence, and as enhancing the essence. Let's take the example of capitalism as the essence again, and the technology of the Internet as the element under investigation. To say that the Internet reflects the essence means that it emerges within a capitalist totality so it is clearly shaped by it. It is as though it shares the same genes; it is capitalistic, even though it has a unique appearance and role in the totality. The Internet also manifests the essence, which means that when it does its work, it is operating capitalistically. It functions as a capitalistic technology. Further, the Internet enhances the essence: It enhances capitalism, furthers the development of capitalism, and helps capitalism grow.

With these three roles—reflection, manifestation, and enhancement— elements such as technology contribute to the evolution of the totality, like a baby growing up, or a rosebud opening into a rose. The essence of the totality evolves, develops, becomes more of what it is, so that eventually, at least theoretically, the totality would be

completely saturated with the maximum expression of the essence (an adult, a rose). Again, using the example of capitalism and technology, eventually capitalism would, with the help of technology (and everything else), develop and occupy every nook and cranny of the totality in its most evolved form. Nothing—no human action, cultural force, connection, relationship, technology, thing—would or could escape the logic of capitalism.

But how large is a totality? are expressive causal thinkers positing their totalities as the whole world? The whole universe? For all time? actually, the boundary and duration of a totality vary from one thinker to another. For some it is understood spatially and for others temporally; for most it is a combination of the two. Imagine that you are drawing a circle around the totality: Is it US culture? European culture? Western culture? Haitian culture? Gay culture? urban culture? etc. Often when people use these terms, they are thinking in terms of a spatially defined totality. And what about 1960s culture? Postindustrial culture? early capitalist culture? Postcolonial culture? etc. Terms such as these add a temporal dimension to the understanding of the totality.

It is often, but not always, the case that expressive causal thinkers have criticisms of the totality they are investigating and look back to a "golden age," before things "went wrong." Those who argue this way, as you will see in the example of Jacques Ellul below, have a difficult time explaining how things could possibly move from one totality to another. If there is no escape from the logic of totality, how is it possible that one totality could give way to another?

Let's now turn to a couple of very famous examples of expressive causal thought with regard to technology.

Martin Heidegger and Jacques Ellul

Perhaps the most famous philosopher who argues using the logic of expressive causality is martin Heidegger. Heidegger's well-known essay on technology, "The Question Concerning Technology," seeks to discover what the essence of technology is. The essence of technology is not anything technological; technology is not technology in itself. The essence of technology is not an essence like you would get in a typology, like the essence of trees is a certain treeness that they all have in common. Likewise, the essence of technology is not mere means (technology as being the means to an end, an instrument). The essence of technology, for Heidegger, is a revealing, a revealing of Being. It thus has much in common with art. This perspective is that of expressive causality in that a core essence (which is not technological) is revealed in all technologies throughout the culture.

The problem, for Heidegger, is that modern technology conceals this fact that technology is a revealing of Being. Modern technology tends to reveal itself as a certain way of framing (or enframing) our relation with the world: modern technology is a challenging of the world which turns the world into mere resources for our use ("standing reserve"). Heidegger writes, "The revealing that rules in modern technology is a challenging, which puts to nature the unreasonable demand that it supply energy that

can be extracted and stored as such."[5] Modern technology, then, is about control of nature (as we discussed in chapter 5). There is profound danger here, warns Heidegger. Humans themselves easily become enframed too, as simply "standing reserve" for modern technology (consisting of labor and resources and no more), and we lose sight of what we really are ("In truth, however, precisely nowhere does man today any longer encounter himself, i.e., his essence"[6]). We also lose sight of other ways of revealing, *poiesis*, which are at odds with the path modern technology has taken. These other ways of revealing "lets what presences come forth into appearance" but don't seek to force, order, or control.[7] We head down the dangerous path of modern technology when we see the use of technology only as the domination of nature; indeed, we have the hubris to think ourselves as being in control of all creation (even Being). This course is not inevitable (though it may present itself as such). Indeed, Heidegger basically argues that when we consider the question of technology, and the revealing of modern technology's ways of transforming the world and ourselves into standing reserve, this may shock us into thought, into reflection. He writes that the essence of technology always includes a "saving power," the "keeping watch over unconcealment...of all coming to presence on this earth."[8] and that our reflection on these processes might lead us (back) to other means of revealing and creating that are in better balance with Being. Another very significant philosopher who considers technology using expressive causal assumptions is Jacques Ellul. For Ellul "technique" operates as the essence of the totality he critiques, even though he never uses the term "essence." By "technique" he means "the totality of methods rationally arrived at and having absolute efficiency (for a given state of development) in every field of human activity."[9] Technique is thus the application of rationality and efficiency. Ellul insists that technique is the essence of modern culture, which is temporally modern and spatially global: "Technique is not an isolated fact in society...but is related to every other factor in the life of modern man."[10] Thus, to understand technology, or the family, religion, politics, economics, or anything else, we must understand technique. He scorns this totality and longs for the "golden age" of the premodern totality.

Examining the implications for thinking about a technology like guns illustrates how the expressive logic works. Because technique permeates and defines everything, every thing—such as the gun—and every relationship—such as the relationship between the gun and politics—the implications must be explained in terms of technique. The gun can only emerge as reflecting technique, it can only manifest technique, and it can only enhance technique. Because its essence is technique, the gun is a rational and efficient method of doing things. That it kills, or is used to kill is almost not the point;

[5] Heidegger (1977), p. 14.
[6] Heidegger (1977), p. 27.
[7] Heidegger (1977), p. 27.
[8] Heidegger (1977), p. 32.
[9] Ellul (1964), p. xxv.
[10] Ellul (1964), p. xxvi.

that is a mere manifestation of efficiency and rationality. The pertinent question about killing could be to ask is, how is killing a reflection, manifestation, and enhancement of technique? The response would be, what more efficient way to rid yourself of enemies than to kill them? The significance of the gun is that it kills more rationally and efficiently than weapons that precede it. So, likewise, it enhances technique in the cultural totality. Because the totality is homogenous, there really is nothing that we can do about this situation; every facet of life is caught up in the inexorable march of our cultural totality toward increasing rationality and efficiency, that is, toward increasing technique. We can only stand by and observe. If we try to resist, we end up merely contributing to streamlining the process of enhancing technique.

The despair and/or hopelessness Ellul's position gives rise to was too much for his readers, so he posited a somewhat magical solution to escape the logic of totality. In the 1964 revised American edition of *The Technological Society*, he offered these three ways that the situation could be changed (and note, they all originate from outside the totality):[11] First, there could be a catastrophe so large that we would have to start all over again. But think about this: if there were one single remnant from the previous totality, and there would have to be to have something to start up with, why wouldn't that manifest to simply give rise again to the same totality? Second, we could all at one time decide to jettison the old totality and start anew. But think about this: How could that desire and that level of coordination possibly emerge from within the logic of totality? Third, a god so kind could decide that this was going to change. Ellul, after all and in the end, was a priest.

If all of this sounds a little crazy and you are thinking that nobody but some philosopher (which Ellul and Heidegger were) could come up with something like expressive causality, stop and observe a bit more carefully. Here are some quick examples: The Unabomber's fatalism, discussed in Chapter 8, can be attributed to his understanding the industrial-technological system in expressive causal terms. He was unable to imagine any way to change the cultural totality other than to dismantle or destroy it. Communication researchers James Katz and mark aakhus, in one of the first scholarly collections of research on mobile phones in 2002, argued that we need to consider these developments in mobile media as expressions of a totalizing socio-logic they refer to as *Apparatgeist*, "the spirit of the machine that influences both the designs of the technology as well as the initial and subsequent significance accorded them by users, non-users, and anti-users."[12] The apparatgeist underlying mobile phones and similar devices they call "perpetual contact." In 2010 technology writer Kevin Kelly coined the term *technium* to refer to the "idea of a self-reinforcing system of creation."[13] The technium, for Kelly, encompasses all of contemporary technology (in its material and cultural aspects) as a whole, as an autonomous entity. The technium even has its own wants.

[11] Ellul (1964), p. xxx.
[12] Katz and aakhus (2002), p. 305
[13] Kelly (2010), p. 12.

But there are also plenty of examples of a less dramatic nature. If someone protests that the telephone, television, or computer systems are developed only to make money, the response is often to point out that in a capitalist system "that's just the way it is." all new communication technologies, it is often argued, must be developed as capitalist enterprises—they wouldn't be viable otherwise. That is an expressive causal position. If the essence is capitalism, then every aspect of culture can only reflect, manifest, and enhance capitalism. The underlying assumptions are typically left unstated, unexplored, and unchallenged, but they function powerfully in arguments and practices involving the development and use of new technology. Recall, for example, in the chapter on AT, that Paul Polak insisted that the only way a technology could be a success was if it were designed and developed for profit. As with all the perspectives considered thus far in this chapter, assumptions such as this are invoked in day-to-day language and practice, but the assumptions on which they depend are rarely examined.

Articulation and Assemblage

The concepts of articulation and assemblage, as they have developed in cultural studies, provide an alternative to the perspectives on causality presented above. Because articulation and assemblage are so central to understanding the orientation of this book and the direction we propose, we discuss them more fully in a separate chapter: Chapter 12. But we take a little space here to point toward the direction we are moving.

To think about technology as articulation and assemblage is to adopt a nonmechanistic perspective and thus operate with the three nonmechanistic assumptions discussed above. Articulation and assemblage assume: that technology is not autonomous, but is integrally connected to the context within which it is developed and used; that culture is made up of such connections; and that technologies arise within these connections as part of them and as effective within them. As such, articulation and assemblage share crucial features with an expressive perspective. However, articulation differs from expressive causality in significant ways. First, while it does hold that culture is made up of connections, it does not insist that all these connections are reducible to an essence or to a critical factor. Instead, culture is understood as being made up of myriad *articulations* (intermingling elements, connections, relationships) that make some things possible, others not. These articulations are sometimes corresponding, as they would be in an expressive perspective, where they share some common aspects (though not as an essence); but they are also sometimes noncorresponding or even contradictory (not sharing any aspects). Indeed, a single articulation could contain all three. Articulations are dynamic interminglings that can move in many and various directions, propelled by various and changing circumstances (of other articulations). The "web" of these articulations is what we call an *assemblage*.

Within a particular assemblage, technologies are developed, used, and have effects. In so doing, new articulations are constituted in a revised (or rearticulated) assem-

blage. As Larry Grossberg has argued, "the path of causality is always mediated, which is to say, it is interrupted, intersected, magnified or diminished, transformed, bent, blocked, inflected, redirected, etc., by other practices and events."[14] as philosophers Gilles Deleuze and Félix Guattari put it, technologies exist "only in relation to the interminglings they make possible or that make them possible."[15] Because technologies only exist in relation to these articulations, they are themselves articulations. Technologies come into being, are developed, and are used in the dynamic movement of an assemblage. They are diffused in myriad ways within the assemblage. They *are* assemblage, in that they are made up of webs of corresponding, noncorresponding, and contradictory articulations. Therefore, no technology has one single essence, definition, purpose, role, or effect.

Thinking of technology as articulation and assemblage allows us at last to take seriously the implications of eddie Izzard's playful insights about guns raised in Chapter 4 and apply these insights to any and all technologies. We no longer need to decide if guns kill people or if people kill people, because we no longer see the problem as attributing causal power or responsibility to one or the other—to the technology or to the culture. Instead, the relevant task, when utilizing this perspective, is to map and critique the assemblage (what we have previously called context) within which different articulations are both possible and effective. A complex cultural assemblage produces technologies (such as guns) as particular, contingent kinds of tools to be used in particular, contingent ways. Similarly, a complex cultural assemblage takes up technologies (such as guns) and uses them in particular, contingent ways with particular, contingent effects. Because an assemblage is made up of multiple (corresponding, noncorresponding, and contradictory) articulations, change takes place in the dynamic tensions among the articulations that constitute an assemblage.

Clearly, this perspective is nonmechanistic. But what you have just read is, admittedly, a little difficult to "unpack." The new vocabulary you need, the new concepts to work with—*articulation*, *assemblage*, and *contingency*—are explored in much more detail in Chapter 12. Regardless, it will be helpful to explore the concept of *agency* first, which we undertake in Chapter 11.

Conclusion

It is important to remember that anyone who thinks or writes about technologies, anyone who makes a decision involving technologies, and anyone who interacts with technologies, lives out an understanding of one or some combination of the above perspectives on technology: simple, symptomatic, expressive, and articulation/assemblage. That is clearly true for all of us. Whether we think these matters through theoretically or not, we internalize a scheme of how technology works and what role it plays in our

[14] Grossberg (2010a), p. 191.
[15] Deleuze and Guattari (1987), p. 90.

lives. Throughout the many years of listening to what people say about technology and watching them live out a relationship to it, we can say without hesitation that most people tend to be inconsistent in their understanding of what technology is and how it works. For example, a person might be against gun control because people, not guns, kill people (a symptomatic causal perspective), but they might be opposed to computerized banking because the machine depersonalizes banking (a simple causal perspective). This inconsistent thinking points to the likelihood that other cultural forces and connections (beyond the purely theoretical) come into play, that is, articulate, in the decision-making process. By thinking through the problem from the perspective of articulation and assemblage, we can begin to see the power with which some of these other forces and connections shape technological culture, our understanding of it, and, finally, our responses to it.

Source: Photograph by nevit dilmen, 2001, Wikimedia Commons: commons.wikimedia.org

Figure 17: Footprint on Earth

Chapter Eleven: Agency; From Causality to Agency

THERE IS A COMPUTER SITTING ON GREG'S DESK. This is hardly a surprising disclosure in this day and age. Actually, if we want to be accurate, there's a computer monitor sitting on his desk; there's a mouse and a mouse pad to the right of the monitor; there's a keyboard mounted on a nifty sliding drawer just under the desktop; and the computer sits on the floor under his desk (unfortunately, just within range of his idly kicking foot).

We begin with such a banal example because instances from everyday life allow us to address more easily the weaknesses of the received view of technology. For example, the received view of technological determinism would look at the scene described above and consider the computer to be the center of attention. It would focus on how the computer affects life: changes work habits, communication patterns, posture, and so forth. But this view ignores much of what else is going on: It ignores the yellow sticky notes attached to the monitor frame and screen, the orientation of the monitor to the door and window, the piles of papers blocking the mouse, the nature of the work being done, and so on. If it does notice these things, it sees them only as evidence of the effects of the computer on the way Greg works.

In contrast, the received view of cultural determinism would look at the scene in Greg's office and focus on how the computer in general and this computer in particular have been developed in response to the needs of computer users such as Greg. The computer itself almost disappears from the picture, obscured by the functions for which it was developed and to which it is put. Here, the yellow sticky notes would be taken to represent some of those functions.

What is problematic with both these views is that in restricting their view of the office in their particular ways, they are unable to grasp or even recognize the articulation of broader cultural forces at work. Despite their differences, both positions view this situation through the same lens: that of causality. They are restricted to asking questions only about one dimension of the situation. They can only ask, on the one hand, what does the computer cause to happen in Greg's life? Or, on the other hand, how is the computer a response to the cultural wants and needs of people like Greg?

The causal approach has a certain universal undertone to it, meaning that its purported causal effects are assumed to be the same under any—and every— circumstance. The causal approach does not adequately grasp the particularities of situations. For example, it is ill-equipped to differentiate the significantly different office environments

of the co-authors of this book, both of whom work with computers but in very different ways. The causal approach talks about the effects of *the computer*, but is less helpful in discussing the effectiveness of *this* or *that* computer. A causal approach is reductive; that is, it reduces the multiple elements that matter into a simple line of determination that holds "true" for all cases.

To obtain a richer view of the role and work of technology, we propose a multi-dimensional view that is sensitive to the contingent interplay of a wider variety of factors, what we call the work of *articulation*. To insist that the interplay is *contingent* is to recognize that culture (or technology) is not a set of stable, unchanging, and fixed elements or components, but rather a set of dynamic, changing, and interrelated connections or relations, within which elements and components (such as a computer) are produced and perform work. While we discuss articulation in greater depth in the next chapter, it is helpful to look first at the concept of agency. To do so makes clear that something like a field of forces requires our attention rather than a single line of determination.

What we mean by *agency* differs somewhat from the definition that is found in the dictionary. According to *Webster's*, agency is

> **1** active force; action; power **2** that by which something is done; means; instrumentality **3** the business of any person, firm, etc. Empowered to act for another **4** the business office or district of such a person, firm, etc. **5** an administrative division of government with specific functions **6** an organization that offers a particular kind of assistance [a social *agency*].

The emphasis in this definition, consistent with popular usage, is that agency is the power and ability to do something, and it assumes an *agent* that possesses that power. An agent, according to the same dictionary, is "generally, a person or thing that acts or is capable of acting, or...one who or that which acts, or is empowered to act, for another [the company's agent]" to bring about a certain result.[1] What is important about the dictionary meanings and popular usage of agent and agency is that they are ultimately defined in terms of the human realm and assume *intent* behind every action. For example, if your intention is to communicate with your mother, you can either send a friend over to her house to tell her something, write her a letter and drop it in the post and have the mail carrier deliver it, telephone her, text her, or walk over there yourself. The friend, the mail carrier, the letter, the telephone, the texting function, and even your own body can be called agents in this situation because each represents a possible means of achieving the original human intention. They are all intermediaries through which you exercise your agency. Agency in this view is thus almost something you possess. Possessing it allows you to get something done. It is measurable in the sense that you can have more or less of it. If you have more agency, you can get more done. Having access to intermediaries (other agents) is one way to increase your agency.

[1] *Webster's New World College Dictionary* (2002), pp. 25–26.

Much of the world does not have access to many of these intermediary agents; thus their agency, their ability to secure a particular effect, is limited. The popular view of agency, as reflected by the dictionary, reduces agency to a thing, and further, as the possession of an agent, ultimately a human with intentions. It does not recognize, as well as explain, agency as a process or a relationship. The consequences of this oversimplification are significant.

We propose two changes to this view of agency. First, agency is not just about human intention; many elements are involved in relations of agency, including technology. Second, agency is not a possession of agents; rather, it is a process and a relationship in which some elements are designated as agents, as having the power to act. The remainder of this chapter will set out each of these changes in turn.

Technological Agency

First, in response to the assumption that agency ultimately resides in human intention, we propose that technologies are particularly important active participants in everyday life and can be seen as participating in relations of agency. Even though you are talking with someone on the telephone, isn't the phone itself part of that conversation? We tend to ignore the phone, as though it were transparent, because we engage in the conversation and think of it in terms of its content (what is said). But just as the tenor of a conversation changes depending on the individuals involved, the tenor of the conversation changes depending on the technology involved. For example, you might have to shout because of static or a weak signal. You may have to be thoughtful about talking in turn because you are using a mobile phone. You might talk quickly because you are paying per minute of use. You might be able to walk around because the phone is cordless, and so on. The shape of the conversation in these cases cannot be reduced to simple human intentions. The technology matters quite apart from your intentions.

When we ignore the technologies, we typically treat them as intermediaries, conduits through which intention, power, or action are achieved. However, as Bruno Latour has argued, the technologies are actually mediators, not intermediaries.[2] a mediator of a dispute is a person who steps between the parties involved and actively tries to get both sides to agree, to influence them in some way. A mediator is active and presumes a transformation: The demands of both sides in the dispute are altered to reach common ground. So in our example of a telephone conversation, the telephone (including both phones, their electronics, wires, switches, networks, satellites and transmissions in between) is a complex mediator; it is one of the factors transforming the conversation.

In another example, backaches are often related to the posture you take when you work at a computer. In this case, it doesn't make sense to talk about either the user or the technology as consciously "intending" to give you a backache. Yet, the

[2] Latour (1993).

computer clearly plays a role in your backache. The technology adds something more than, apart from, or different from human intention. This is why it is incorrect to talk about technology as a mere "tool," as though it were merely helping you realize your intention. It does something more, beyond, and apart from its intended "use." For this reason, some theorists have developed the argument that technologies are also actors. One version of this perspective is called actornetwork Theory, and involves the concepts of *actors* (another term for agent), *translation*, *delegation*, and *prescription*, each of which we will discuss below. Actornetwork Theory is a useful approach for beginning to think about how technology is involved in relations of agency. However, there are some problems with the way the approach has developed. So, we first explain the position and then attend to the problems in order to move beyond them.

Actors

French sociologists michel Callon and Bruno Latour define an actor as "[a]ny element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own."[3] Let's break this definition down and explore each part. First, "any element which bends space around itself." What does it mean to bend space? Imagine that you see a strange dog snarling on the sidewalk. You might respond by slowing down, changing your path of travel, your attitude, and your behavior. That dog has altered, or bent, the space around it. Likewise, a computer shapes the space around it. While working at the computer, you assume a particular posture, even an attitude. You arrange the elements of your desk or table, place the desk or table close to an outlet, a router, and so on. You might wear particular glasses or hold your hands in a particular way. That computer has altered the space around it, bent space, and bent you as part of that space.

Second, it "makes other elements dependent upon itself." a technology is never alone or isolated; it is always connected with other actors, that is, with other technologies and beings in a network of relations. Any network of actors consists of an indeterminate number of relations of dependence and control. Technologies make other actors/elements dependent upon them, just as technologies depend on other actors/elements. The relations of dependence take different forms, at different strengths, throughout the network. For example, people become dependent on computers in many ways, such as to communicate with others via e-mail or instant messages, to check spelling and grammar, to pay bills, and to calculate math functions. Likewise, the computer is dependent on other actors in many ways, such as for repair, programming, start up, electricity, and general implementation.

Third, it "translates their will into a language of its own." Translation implies an altering of form. In terms of actor-networks, to translate means *to alter the form of something to bring it into alignment with the technology, system, or culture.* For exam-

[3] Callon and Latour (1981), p. 286.

ple, we translate a sentence from one language to another to facilitate understanding. Technologies translate crude oil into a form so that other machines can use it. Computers translate human language into machine language so that the computer can process it. When you write a letter on a computer you translate your thoughts into a particular posture as you sit at the keyboard and enact the particular movements of typing. When you take a multiple-choice exam, you translate the answers in your head into an appropriately filled bubble on the page. Translation is the process of transformation. The function of a mediator is to translate and transform. An actor—whether human or technology—is a mediator.

Delegation

In order to emphasize a different aspect of the process of translation, Latour gives another name to the process of translation: *delegation*. (Since this is quite a different way of talking about technology, theorists like to try out a number of different metaphors or terms to try to grasp just what it is they are getting at.) To be a delegate means that you are representing someone else (or many people), and speaking and acting (for example, voting) on their behalf, like a representative in a democracy. Delegates speak on our behalf to political conventions, international bodies such as the United nations, or in peace negotiations. To delegate means to hand over a task or tasks to someone (or some*thing*) else. Tasks are delegated to humans or nonhumans, such as technologies. In the process of delegation, a *translation* occurs and the task is *inscribed* or incorporated in a new form.

Humans delegate tasks to other beings (humans and other-than-humans) as well as to technologies. In this chapter we focus primarily on delegation involving humans and technology. In our culture, the goal of delegation is often understood to be to delegate from human to technology, since we believe (rightly or wrongly) that technologies are more reliable than humans or animals. But we would caution you to remember that in any network of agency and delegation there are other beings involved.

When humans delegate tasks to technologies, the technology does something a human used to do (direct traffic, open doors, assemble cars, carry a message) or performs a task that humans could not do but wished they could (fly). Let's take the example of a bread machine. This is a machine to which a variety of tasks have been delegated. Tired of mixing ingredients, kneading dough, baking, and so on, humans invented a machine to do all this. All the human actor has to do is measure and pour in the ingredients, shut the lid, plug it in, turn it on, and the machine does the rest. So in this way a tiresome task has been delegated to a machine. We have translated much of the human work of making bread into a machine process by delegating the task to a machine.

Latour gives the example of a door. In his analysis, a door is a technology that makes walls more convenient. Walls are wonderful at keeping things in (warm air, small children, prisoners) or out (wind, bugs, barbarians), but they also keep us in or

out. If we need to enter or leave a room, we need a hole in the wall, which defeats the whole purpose of the wall: now whatever is outside can come in (and vice versa). Latour argues that we take all the work of tearing a hole in the wall, climbing through, and rebuilding it again and translate that work by delegating it to a door. Opening and close a door is much easier, much less time consuming, and much less messy than tearing down and rebuilding walls, but it also translates the nature of movement in and out. Once we designate agency to the door, a new form of passage is inscribed. It may be easier to move in and out, but we also need locks and keys to keep it from being too easy, which would once again forfeit the purpose of the wall in the first place.

The effect of delegation in reinscribing forms is evident in the bread machine example as well. The machine is delegated all the tasks of making bread "by hand" and translates them into a form of bread "by machine." a new form of bread is inscribed, because the tasks have been translated into a "language" the machine understands. The machine does not, indeed cannot, make just any or every kind of bread, but only a specific type of yeast-based loaf bread. This network of relations of delegation designates the bread machine as the producer of bread, the agent that has the ability to make a particular thing happen. It is a culturally specific machine performing a culturally specific task that produces a culturally specific loaf of bread.

Prescription

When technologies delegate tasks to humans, Latour uses a different term to describe this process: *prescription*. According to Latour, once the technology has been inscribed with tasks and is released into the culture, it prescribes tasks back to us, with the inevitable work of translation. It is perhaps less obvious and more difficult for people to acknowledge, but tasks do get delegated by technologies and translated (inscribed or incorporated) into humans. For example, if we know how to drive a car, it is because the car has delegated certain tasks to us: a posture; a form of attention; the need to perform particular movements at particular times; knowledge of rules, regulations, and customs of the road; accepted practices of negotiating traffic; the need to carry a key; and so on. Those tasks take the form of habits and skills inscribed in our bodies. We certainly don't need to be reminded of them at every turn and rarely even think about them, but we do perform them.

Latour refers to prescription as "whatever a scene presupposed from its transcribed actors and authors."[4] He means by this that the newly prescribed tasks, once they become inscribed as habit are presupposed; that is, they are assumed to be natural and normal. To continue with the bread machine scenario: Once the machine has been inscribed with tasks and is released into the culture, or at least placed on our kitchen counters, it prescribes back to us what bread is, and presupposes an enormous range of behaviors, attitudes, and values. Some of these presupposed behaviors, attitudes,

[4] Latour (1988), p. 306.

and values have to do with bread. The machine presupposes a desire for a quantity of a particular type of bread, the availability of particular ingredients, and a particular, narrowed, or shifted taste. In other words, the machine translates tastes into a form consistent with its function. It is quite a taskmaster as well, demanding exactitude in ingredients and proportions of ingredients, or else it will not produce "good" bread. It requires cleaning and it requires that its owner find a space for it somewhere. In other words, it presupposes that you will be exacting in following directions, in maintaining and cleaning the machine; and it presupposes that you have space, ingredients, and a power source. It also presupposes that it was put together competently in the factory, that it was programmed correctly, that the delivery person did not drop it on the way to the store, and so on. The machine also prescribes behaviors, attitudes, and values having to do with technology, such as reinforcing the valuation of convenience and efficiency. It prescribes expectations for the proper household; if you have the machine you now are expected to produce fresh bread daily and eat it. In a sense, the machine demands that you make bread regularly to justify the machine.

The mobile phone offers another example of the way that a technology prescribes or presupposes behaviors, attitudes, and values back onto humans. When a person wanted to use the phone before the invention of mobile phones, they had to get to a telephone. Now the mobile phone does the traveling for us. So, in a sense, people delegated the task of traveling to the phone to the mobile phone itself. But the mobile phone prescribes back a daunting range of behaviors, attitudes, and values. First it demands that a person carry it; if you don't carry it, you can't use it. Beyond simply carrying it, a person has to keep it charged, subscribe to a carrier, and pay regular monthly bills. The prescriptive work extends still further. Now a person is expected to use the mobile phone in places where there had been no telephone before: in restaurants, in automobiles, on vacations, while mountain climbing, and so on. People, when they wished, used to be able to be out of phone contact, but there is barely a place where that is possible anymore. The prescriptive pressure is to always be in contact and presupposes this as a cultural value. Thus, it becomes a good thing—if not a necessity—to have a mobile phone while mountain climbing or in an automobile, because a climber or motorist can call for help if need be. Thus, the mobile phone prescribes and presupposes the value of always being in contact, of always being "on call," and works at obliterating privacy and the idea that privacy might be desirable. A whole new standard of expectations about being available is emerging as the mobile phone (and e-mail or messaging) gradually blankets the planet.

Network

We have been unable to talk about actors, delegation, and prescription without sneaking in the language of the network. Now we will look explicitly at the idea of a network. What do we mean by *network* in actor-network? a network is a "summing up" of the relations among actors in relation to processes of translation, delegation,

and prescription. Networks are maps of these relations and connections, which involve both the processes and the effects. The term we introduce to describe the processes and effects of making these connections is *articulation*. The task of an actor-network scholar is to discover how such networks get built, how they are maintained and transformed, how the articulations are made and unmade, and what qualities comprise those articulations.

We are being pretty abstract here; so we will give you an example. Let's talk about making bread by hand, before those bread machines became so trendy. You cannot make bread on your own, because it does not spring, fully baked, from your forehead! you need to gather the ingredients (eggs, flour, water, yeast), which you will articulate (connect) in a certain way to make bread. You also need to enlist the aid of other actors: a bowl or two, a rolling pin, a countertop, an oven, and so on. You are building a network right there in your kitchen. However, it does not stop there: For the eggs you need to enlist a chicken, which might mean walking next door to the barn and disturbing the chickens. Even if there are chickens waiting, you had to previously enlist a barn, chicken feed, and so on. For the flour, you might need to enlist the help of your pickup truck to get to the store to purchase it. The store didn't make the flour, so you need to follow the network further to include the distributor, manufacturer, milling machines, engineers, granaries, farms, farm policy, government regulation, and so on. And you haven't even started kneading, rolling, patting, or baking yet!

Here is another banal example: One night Greg was heading out to teach his graduate seminar on technology; the topic was actor-network Theory, believe it or not. His hands were full, with a plastic-wrapped tuna sandwich on a plate, hot coffee, and books; and he found himself faced with a closed door. In order to get through the door, he enlisted the aid of a passing student, who kindly held it open for him. That is an obviously contingent articulation: He can't assume that this student will always be there. It worked once; it might not work again. If we wanted to stabilize this articulation, it might be more reliable to delegate this task to a nonhuman. In this case, we could delegate the task to an electric door opener activated by a button near the door. This is a more stable network, although it too can still break down.

Networks are more or less stable: The network of production and distribution of Pillsbury flour may be more stable and reliable than the network of production and distribution of eggs to a local farmer's market. An electric eye may be more stable and reliable than a passing student. We often think that we can make a network more stable by adding more nonhumans to the mix. But with that stability and reliability come a plethora of prescriptions with which we must operate. The distribution of responsibility has merely shifted, albeit in significant ways and with consequences and, sometimes, with significant consequences.

While we have chosen to explain actor-network Theory using rather mundane examples (to make the process obvious), it is possible, using actornetwork Theory, to talk about any phenomenon (Congress, electric cars, a war) using the same methods and terminology. In every case, each moment of enlisting is a process of delegation

that prescribes back and presupposes a range of expectations and requirements that are more or less stable with consequences.

Issues with Actor-Network Theory

You may have noticed that in our discussion of actor-network Theory we seem to have slipped into using a construction we initially objected to: referring to technologies as objects possessing agency. We did this in constructions such as "the mobile phone prescribes," which suggests that the mobile phone possesses the ability to make people respond in a certain way. We have done this in order to make it clear that what technologies do is not that different from what humans do. Technologies are not mere tools that we use, but active forces in the world. In saying this, however, we could be accused of anthropomorphism, treating machines as if they have a will of their own, which is considered a "bad thing" if you are studying technology. Actually we *are* adopting a form of anthropomorphism here, but we don't see that as a bad thing. In popular discourse, we think of anthropomorphism as referring to a dancing tea kettle in a disney film: The tea kettle acts like a human; it has a face; it sings; it dances. But as Latour uses the term, anthropomorphism means "either what has human shape or what gives shape to humans." So the mobile phone or bread machine is anthropomorphic because (a) "it has been made by men" [and women]; (b) "it substitutes for the actions of people;" and (c) "it shapes human activities by prescribing."[5]

The danger here is less that of falling into a disney-like version of anthropomorphism than it is the risk of restricting the attribution of agency to technologies alone and ignoring the activity of the network. The danger of thinking of technologies (and humans, for that matter) as agents in a network is that we then tend to think of actors as points in a stable web, like knots in a fishing net. This, Latour points out in his later writing on actor-network Theory, leads us into the misguided practice of separating the agent from the structure. Rather, the actor/ agent is the structure (the network) and the structure is the actor/agent. There is no actor without a structure; there is no structure without actors. And neither are stable things; although some versions of actor-network Theory have treated them as such. There are, instead, ongoing processes of translation, delegation, and prescription. In fact, Latour came to dislike the very term actor-network, because of the tendency for people to use it to separate actor/agent and structure.[6]

The process of delegation does not just occur once, when the object is invented or manufactured, but over and over. When describing an actor-network or a map of articulations, we do not see a stable schematic before us, such as a map of the city

[5] Latour (1988), p. 303.

[6] Latour, (1999), p. 16. However, Latour has more recently reconciled himself with the term. See his 2005 book, *Reassembling the Social: An Introduction to Actor-Network Theory* (esp. p. 9, footnote 9).

or a diagram of a process, with all the elements and lines neatly and permanently set out. Instead, what we see is a series of constant movements, transformations, and circulations. We map brain to arm, to hand, to keyboard, to processor, to display, to server, to Internet, to education, to regulations, to politics, to something called the economy, and so on. We map a small packet of bread yeast to a store, to a distributor, to a manufacturer, to a bank, to a paper mill, to law and regulations, to something called the economy, to something called politics, to beliefs about the good life, and so on. (However, Latour would be quick to point out that before we can talk about "the economy" or "politics" we need to map the delegations and articulations of each and not leap too quickly to abstract entities or "black boxes."[7]) each connection "to" is a delegation—Latour says it's like passing a ball in a sport.[8] each delegation, which is a process and not an event, is a transformation. When you enlist something, you transform it. When the stove enlists electricity to bake bread, it transforms electricity into heat. The grocer transformed a pack of yeast into a profit. Greg changed a student into a door opener. So while actor-network Theory sometimes encourages thinking in terms of actors and networks as both stable and separate, it is important to resist this tendency.

An additional and significant issue with actor-network Theory is that it tends to treat agency as if it were somehow universally available. In foregrounding a network as a web of translation, delegation, and prescription, the work of power in the ongoing process of maintaining or changing a network is somehow lost, or at least relegated to the background. Agency, in the sense of the ability to act, is actually bestowed or denied in real relations of power that bring elements of the network together or break them apart. We may think of *an agent* (say, for example, a person) as having power, but this is only an artifact of a network within which that agent is designated *as having the power* to act. To put it succinctly: agency and power are not distributed equally throughout networks, and to understand stability and change in networks, to understand how networks privilege some possibilities and preclude others, we have to foreground the work of power in forging and breaking the relations and connections that constitute networks. In cultural studies, the concept of articulation, with its sense of "lines of tendential force," is better at accounting for the unequal distribution of agency and power in networks. We turn to those concepts in the following chapter.

Conclusion: Why Agency?

In spite of the problematic tendencies that accrue to the concept of agency and of actor-network Theory, there are very important lessons to take away from their consideration. First, instead of human intention as the centerpiece in a relationship with technology, we now understand that technology is every bit as critical an actor as

[7] Latour (2005).
[8] Latour (1993), p. 129.

the human. Humans may delegate to technologies, but technologies invariably prescribe back.

Second, in the processes of delegation and prescription, translation occurs, and in the process of translation change occurs. Technologies are not mere tools that do our bidding, but mediators that perform tasks in ways that make presumptions about who we are and convey expectations on our behavior, attitudes, and values. When we think of ourselves as moving through everyday life, we tend to focus on encounters with other people and how those encounters alter the character of our day, our actions, and our behavior. If we acknowledge the agency of technology, we also have to ask: How do we choose to delegate to technologies (for example, choosing apps for our mobile phone or deciding to send production processes to factories in Cambodia)? What are the consequences of delegating or not delegating tasks to technologies? How do our interactions with technologies contribute to the shape of everyday life? How do the processes of translation, delegation, prescription, and inscription account for what we do, think, and feel? How do technologies reinforce or give shape to rules and values from the mundane (when to cross a street) to the extraordinary (how to make war)? How free are we to enlist technologies to perform other tasks? (you might be able to use your bread machine as a mixer or doorstop but you can't "scratch" it to make rap music; at least nobody has as yet.) a technology is never completely pliable to your will, as you are always engaged in a network of relations within which you are maintaining some connections or changing others.

Third, with respect to actors in relations of agency among technologies and humans, one is not the cause and the other effect. It is the network that requires understanding; it is the network that is effective. If we continue to ask the question of which affects the other more, we end up in a sort of philosophical tennis match (they influence us, but we influence them) that doesn't get us very far. We suggest a more useful approach: to set to the side traditional questions about the division between technology and human and concentrate on analyzing the cultural field within which we live – a field of forces, relations, processes, and affects. When we quibble about the origins of effects, we often ignore the real ways that life changes: how practices change, how values and beliefs shift, how power and responsibility are distributed, and how some possibilities are empowered and others disempowered. Those are issues that matter.

Fourth, attention to agency in the sense of the ability to make things happen and linking that to a concept of the network absolutely demands that we address the mechanisms and work of *power in networks.* Although this is not foregrounded in most discussions of agency and in actor-network analyses, these are the issues we suggest need to be addressed more centrally. To do that we turn to the way these concerns are developed in cultural studies, particularly using the concepts of articulation and assemblage, which we turn to in the next chapter.

Source: Photograph by Luc Viatour, 2007, Wikimedia Commons. commons.wikimedia.org

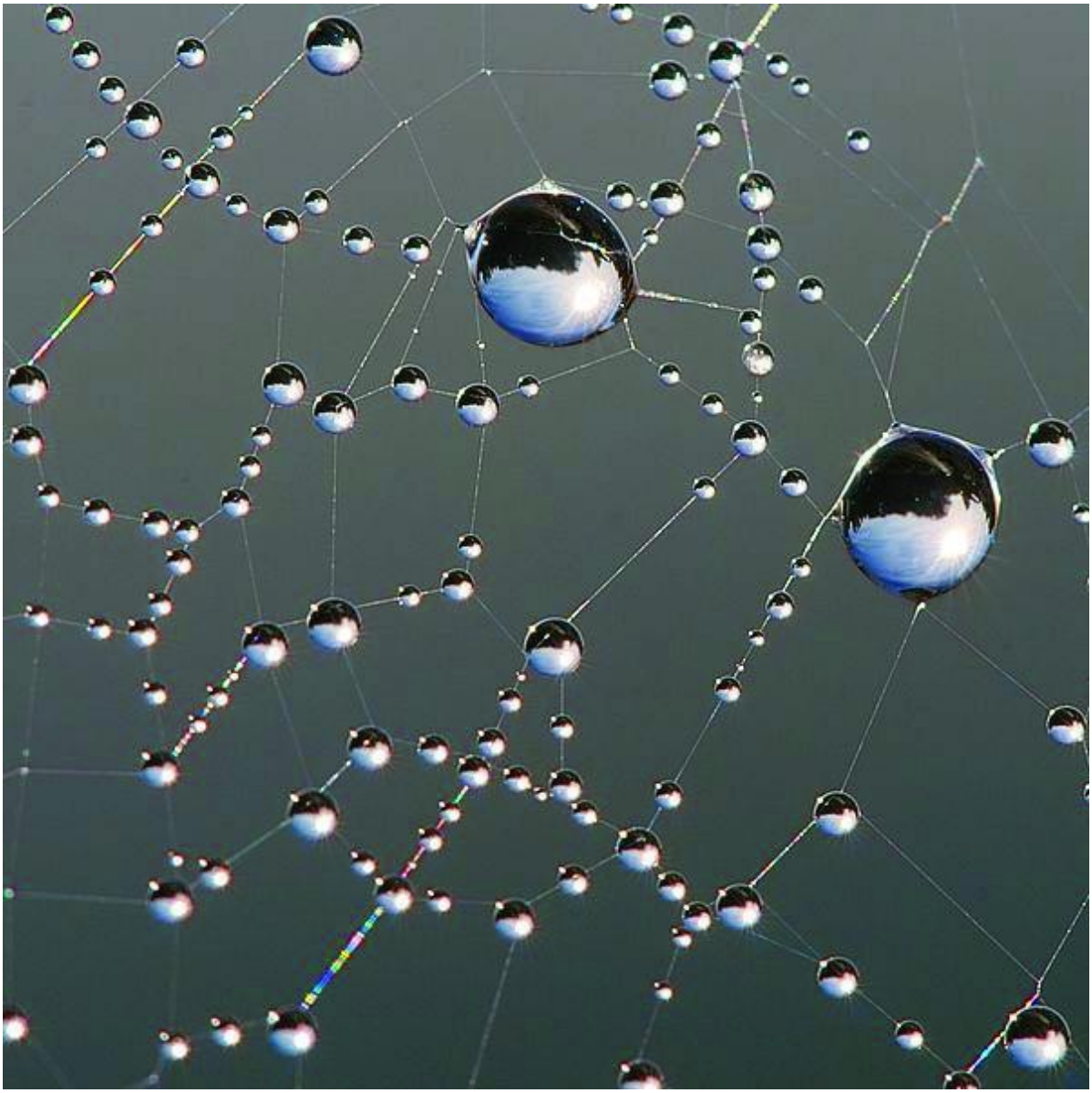

Figure 18: Dew on Spider Web

Chapter Twelve: Articulation and Assemblage

ON MAY 1, 2010, A CAR BOMB WAS DISCOVERED in Times Square, New York City. Police scrutinized surveillance footage of the area and circulated an image of an unidentified man near the vehicle. As the investigation continued, another man, Faisal Shahzad, was arrested and charged with the crime (the unidentified man in the surveillance photo was not related to the crime). Of the many questions raised by the incident, one prominent one was how many surveillance cameras *are* there in Times Square?[1] The answer: a lot. It was estimated that at that time there were 82 surveillance cameras owned by the city of New York in the Times Square area, not to mention all of the private cameras on banks, nightclubs, shops, and more. In 2005, the New York Civil Liberties union counted over 4,000 cameras below 14[th] street, which was before a major multi-million dollar expansion of surveillance cameras in the city. Chicago, apparently, has more cameras than New York; and London, uK, has more than Chicago. In fact, the uK has a surveillance camera for every 14 people. China has even more. The city of Shenzhen alone was expected to install over 2 million cameras by 2011 (and nationally over 10 million cameras were planned as part of China's "Golden Shield" project).[2]

The proliferation of surveillance cameras is hardly surprising. After the terrorist attacks of 2001 and the subsequent economic downturn in the United States, surveillance technology was one of the few growth industries. Not only were CCTV systems expanded, but there were increases in the surveillance of all sorts of data, like traveler information. The US Government proposed programs to sift through electronic communications and economic transactions (sales, video rentals, and so on) looking for patterns that would indicate terrorist activity. Some accepted this burgeoning surveillance system as the price we pay for security; but others pointed with concern to similarities between the new forms of surveillance and Orwell's novel, *Nineteen Eighty-Four* and the figure of Big Brother.

While the United States seemed to have backed off its post-9/11 campaign for Total Information awareness, at least publicly, documents made public in June 2013, by edward Snowden, an IT specialist for one of the national Security agency's (NSA) contractors, revealed massive government surveillance of US citizens. For example, the

[1] *The New York Times*, *Slate*, *The Week*, *Popular Mechanics*, and others asked this very question.
[2] Gilliom and monahan (2012), p. 118.

PRISm program allows the NSA access to information on the servers of Google, apple, and other companies; another program gave the agency access to the phone records of millions of Americans; and it was reported that the NSA had actively undermined encryption programs used privately and commercially to insure that the NSA could decrypt it. Most recently it was revealed that the NSA and the British surveillance agency GCHQ collected images from the webcam chats of millions of unsuspecting yahoo account holders.[3]

These surveillance systems are only one part of how surveillance occurs in our daily lives. Companies track our buying habits in order to sell to us better. They install "cookies" on our computers if we visit their websites, or track our purchases via frequent buyer cards. Mobile phones constantly transmit location data, and indeed there was some controversy when it was discovered that software on apple iPhones was keeping records of an owner's movements. More troubling were the revelations by Snowden that this record of our daily commercial and personal habits (from movements to web searches) held by the companies that provide these services (such as Facebook, Google, and others) were being handed over to the government through PRISm and other programs. In the months since these documents were made public, the IT companies have fallen all over themselves distancing themselves from such practices, but the fact remains that they gather and store such information in the first place.

These examples, of both government and corporate surveillance, paint one picture of the situation: Large organizations and institutions use surveillance as a means to monitor and control the population, be it for security concerns or economic gain. As massive as the surveillance system in New York City is, it pales in comparison to the number of people with mobile phone cameras that pass through Times Square daily. It is estimated that on average 350,000 pedestrians pass through the square each day (up to 460,000 when it's really busy), not to mention the estimated 236,000 who pass through its five subway stations and 115,000 who pass through in vehicles.[4] How many of them have mobile phone cameras that could capture events that happen there? Given that in the United States we have more mobile phones than people, it would be safe to say that the majority of them would have a mobile phone camera.

On april 15, 2013, two bombs went off near the finish line of the Boston marathon, killing three and injuring hundreds. In the investigation that followed, despite having access to the surveillance cameras of Boylston avenue and Copley Square, the FBI solicited the public to submit their own videos and still pictures of the event. Photos and videos quickly flooded in to the investigators and were also posted online on social media sites such as Reddit and 4Chan where users began their own analyses.

When not made adjunct to criminal or terrorist investigation, the sheer numbers of mobile cameras would be an example not of an institution surveilling citizens, but

[3] www.theguardian.com/world/the-nsa-files, accessed 4 June, 2014.

[4] www.timessquarenyc.org/do-business-here/advertising-sponsorships/index.aspx and www.timessquarenyc.org/do-business-here/market-facts/index.aspx, accessed 4 June, 2014.

of citizens surveilling each other (and institutions). When we surveil each other, it is called peer-to-peer (P2P) surveillance, which includes Googling each other for fun or tracking each other on social network sites like Facebook. When we surveil institutions (looking up at them, as it were), this has been termed *sousveillance*, surveillance from below.[5] all these practices are surveillance, too, even though they differ from the CCTV cameras in Times Square.

We raise the issue of surveillance technologies to begin this chapter because it illustrates the need for understanding technology in terms of the concepts of articulation and assemblage. If you were to approach surveillance from the received view of culture and technology, you would be left with a wholly inadequate picture of what is going on and extremely poor tools for influencing or changing the role of those technologies. Often, surveillance is treated as a purely technological question: The problem is the technology and its effects. Typical questions include: What is the impact of using surveillance technologies? Should there be cameras or not? does face-recognition software work? This mechanistic, often technological deterministic, view cannot account for the reasons for the development of surveillance technologies to begin with, for their interpenetration in everyday life, or for the way they participate in the changing character of everyday life. When the origins of surveillance technologies are considered, they are typically done so in a cultural determinist, often expressive way: identifying the single cultural reason for their development. Some cite national security, especially in the wake of September 11. Some cite increased crime. Some point to the increasing isolation of individuals in contemporary culture, a situation that leads to suspicion. Others point to a growing culture of fear, especially fear of those who are different, sometimes referred to as "the other." Some draw attention to the new forms of commerce that require more sophisticated marketing techniques. Some point to the development of the technologies as the effect of the corporate drive for profit. It is as though, at best, the causal tools that feel familiar lead us to find an explanation, including praise or blame, in either the autonomous technology or an autonomous cultural cause.

We assert that the technology alone cannot explain the myriad ways in which surveillance matters in everyday life. Nor is there is any single reason that explains the rise in the number of cameras or surveillance technologies or the relationships among them (especially once we add in P2P surveillance). Rather, there are multiple dimensions that need to be understood in order to get an adequate grasp of the place of surveillance technologies in contemporary culture. Articulation and assemblage provide tools to understand these dimensions and open up useful strategies for action in relation to surveillance technologies, indeed in relation to any technologies, with far more sophistication and hope of being able to make a difference. Articulation draws attention to the contingent relations among practices, representations, and experiences that make up the world. Assemblage draws attention to the structuring and affective nature and

[5] See the work of Steve mann, especially mann (2001).

work of these articulations. Together they foreground the work of power on forging maintaining and altering the connections that constitute culture.

This approach is nonmechanistic and thus operates with the three nonmechanistic assumptions discussed in Chapter 10. The assumptions are: (1) that technologies are not autonomous, that they are integrally connected to the context within which they are developed and used; (2) that culture is made up of such connections; and (3) that technologies arise within these connections as part of them and as effective within them. However, this approach differs from expressive causality in significant ways. Primarily, while it does hold that culture is made up of connections, it does not insist that all these connections are reducible to an essence or attributable to a critical factor. Rather, culture is understood to consist of corresponding, noncorresponding, and even contradictory practices, representations, experiences, and affects. Note this last term: affects. We do not refer to effects, as in the outcome of a causal process, but to affects as a state: as disposition, tendency, emotion, and intensity.

Technology as Articulation

Perhaps the crucial thing to understand about articulation is the assertion that culture is made up of articulations (or connections) that are *contingent.* Contingency implies that these articulations or connections are not necessary, and it is possible that they could connect otherwise. In explaining how articulation works, Stuart Hall once used the image of a truck.[6] Imagine a semi with a cab and a trailer. The cab is articulated (connected) to the trailer. Together they constitute a connection, a relation, an articulation, and a unity: a truck. But this connection is not necessary. It is possible to disarticulate the cab and the trailer and rearticulate it by attaching a different cab or a different trailer. The newly configured truck is a new identity and a new unity, even though it too might still go by the name "truck." all identities or unities are like this: they are made up of articulations, but these articulations are neither necessary nor permanent. Identities are thus contingent; in other words, they are dependent on the articulation of particular elements that could change, thereby changing the composition of the identity. *Articulation can be understood as the contingent connection of different elements that, when connected in a particular way, form a specific unity.*

But what are these "elements" that get connected? The answer to this requires rethinking the term "element," which is misleading in that it suggests only "things," like cabs and trailers, or computers and video cameras. However, elements, understood as articulations, can be made of words, concepts, institutions, practices, and affects, as well as material things. Indeed, one can articulate an idea to an object to an affect, like connecting "progress" to automobiles to the affect "cool." every so-called element is itself an articulated identity, and therefore always part of a connection of still other "elements." as Larry Grossberg has explained:

[6] Hall (1996b), p. 141. See also Slack (1996).

> Articulation is the production of identity on top of difference, of unities out of fragments, of structures across practices. Articulation links this practice to that effect, this text to that meaning, this meaning to that reality, this experience to those politics. And these links are themselves articulated into larger structures, etc. Articulation is the construction of one set of relations out of another.[7]

A car, for example, is a unit, but it articulates many elements: parts, processes, a manufacturing industry, roads, advertising, an ideology of individualism, the pleasure of speed, and so on. The idea of progress seems to be a simple concept, but it too is made up of many other ideas, practices, and affects: a belief in evolution, a manufacturing industry, a capitalist economic structure, the valuation of industrial technologies, the pleasure we take in gadgets, and so on. So rather than draw attention to the articulation of *things*, a cultural studies approach draws attention to the movement and the flows of relationships. Because language and popular philosophy have "taught" us to talk about and understand the world in terms of things, we tend to think and talk about things. But the challenge is to remember that even things are merely labels for momentarily frozen elements (misleadingly) isolated from the web of contingent relationships within which they are animated. Culture is better understood as the movement and flow of relationships within which things are created and animated, rather than as the accumulation of things.

We propose that you think about technologies in terms of articulations among the physical arrangements of matter, typically labeled technologies, and a range of contingently related practices, representations, experiences, and affects. Thus, surveillance technologies in the United States post-9/11 would be understood as being the particular contingent relationships among (at least) the following: the physical arrangements of matter (such as the thing we might call the video camera); the fear of terrorism; the propensity to think of space as something that needs to be controlled; a desire to care for and protect citizens; the belief that cultural profiling can predict and prevent terrorism and crime; the acceptance of a level of racism, classism, and sexism; a popular culture that idolizes new technology as "cool;" the titillation typically felt when snooping in a culture in which much is kept private; a strong commitment to the technological fix; a belief in the equation of new technologies with progress; the existence of a physical infrastructure and knowledge necessary to produce increasingly complex technology; a global intelligence community; a governmental leadership that emphasizes a particular political agenda; a legal practice that operates within a framework of rights and laws that define privacy within particular parameters, and so on.

It is possible to map these elements to one another to illustrate the nature of their connections. For example, the fear of terrorism leads the government to support the implementation of surveillance programs; those programs turn to the producers of

[7] Grossberg (1992), p. 54.

technology to purchase video surveillance cameras; the producers turn to banks for loans to fund production; the banks fund these efforts because they believe in progress, are concerned about terrorism, and benefit financially from making such loans; students also take out loans to attend school to become engineers and make a lot of money in the burgeoning surveillance industry, and so on.

These articulations are not fixed for all time; they do not remain permanently in place but can and do change over time. But how and why do they change, and why and how do some change more easily and quickly than others? It is at this point that it becomes clear what articulation adds to the discussion of agency in the previous chapter.

Articulation is not just a noun: a description of a connection already forged. It is also a verb: it is the work of articulating, of making connections, of constructing unities; and disarticulating is the work of breaking connections, of deconstructing unities. It is possible to map articulations as though they were little more than a captured moment: a web, a network of actors. But cultural studies insists on emphasizing the *work* of articulation, the real cultural work of articulating this to that, of "producing" connections or breaking them, of producing unities or dismantling them. That work, as Grossberg explains, entails "real historical individuals and groups, sometimes consciously, sometimes unconsciously or unintentionally, sometimes by their activity, sometimes by their inactivity, sometimes victoriously, sometimes with disastrous consequences, and sometimes with no visible result."[8] and while that work may connect to real historical events or actors, whether natural (a tsunami) or human-made (the 2001 destruction of the Twin Towers in New York), the work of naming them, categorizing them, and mapping them in a web of relations necessarily involves real historical individuals and groups.

The choice of the word "work" is purposeful; in fact the term "struggle" is often used to describe this work. Articulating connections (or disarticulating them) is not always easy, and there are almost always competing interests engaged in a struggle (whether consciously or not) to articulate alternatively. For example, consider the articulation in the United States between gun ownership and freedom. For many this is a firmly entrenched unity: freedom *is* gun ownership. The articulation is held in place by the work of many other articulations: for example, the work of gun manufacturers who want to keep gun ownership both desirable and easy in the service of profit; the work of patriot groups that identify with the militias that won freedom for the colonies from the tyranny of England; the work of individuals and groups who believe that governments shouldn't regulate anything. Yet the national Rifle association (nRa) has had to actively promote that articulation through lobbying efforts, promotional materials, and a variety of programs in ongoing efforts to articulate that "reality" as a natural "unity." There are no guarantees that the articulation will be fixed for all time, and the nRa has taken up the task of keeping it in place. Indeed, it is challenged by the

[8] Grossberg (1992), pp. 54–55.

efforts of other individuals and groups to disarticulate the unity and assert otherwise: freedom is to be free from the threat of gun violence, and hence, easy gun ownership makes us less free. So if we point out that recent research has demonstrated that more gun ownership and a significantly increased murder rate resulted after missouri repealed the requirement to undergo a background check to purchase a handgun, you would be correct to see that our offering that information might contribute to the effort to disarticulate gun ownership and freedom. You might, in fact, be correct to see that our offering that information in the way that we have as an effort to rearticulate unregulated gun ownership to an increase in violence. This is the strategy (again, whether conscious or not) of many individuals and groups who advocate for regulating gun ownership.[9]

Some articulations are powerfully forged, held firmly in place by the work of many articulations. Hall called these "lines of tendential force," which draws attention to their tendency to remain articulated in spite of (less convincing, less powerful) efforts to disarticulate these connections.[10] Others, however, might be less powerfully forged, more vulnerable to being broken, and thus subject to disarticulation and rearticulation. It all depends on the particulars of the nature and work of articulation at any particular historical moment. For example, legal efforts to protect the privacy of citizens, given their articulation to a political commitment to the rights of individuals expressed in the Bill of Rights and to edward Snowden's revelations about the extent to which these rights have been wantonly violated, might be successful in reshaping the legal framework of what constitutes unjust invasion of privacy and effectively curtail certain forms of surveillance. However, there are several powerful articulations working against the articulation of surveillance as an invasion of privacy: for example, the fear of terrorism linked to the power of surveillance to counter terrorism; the articulation of Snowden as a common criminal, which discredits and dismisses his "testimony;" and a deeply felt affective connection between technology and the good life.

Articulation matters. The work of articulation, the forging of unities, the struggle over identities—all this matters. The work of articulation has effects: it empowers possibilities and disempowers others; legitimizes some identities and delegitimizes others; makes some things happen and other things not. For example, the articulation of gun ownership to freedom makes it difficult to regulate gun ownership. The articulation of responsible gun ownership to good citizenship makes it possible to regulate gun ownership. The articulation of gun ownership to irresponsible violence compels us to regulate gun ownership. The articulation of edward Snowden to criminal makes it difficult for people to hear his warnings. The articulation of edward Snowden to whistle-blower makes him audible. The articulation of Snowden to hero empowers his warnings with enormous potential to curtail government surveillance.

[9] Amos (2014).
[10] Hall (1996b), p. 142.

To think of technology in relation to articulation (which is tantamount to articulating technology in a particular way) thus has several implications. First, it is no longer possible to think of technology as an isolatable thing in relation to a context out of which it emerges or into which it is put. Instead, technology as a general term and technologies in particular consist of complex articulations and processes of articulation. This is why, once again, we insist that that there is no culture *and* technology; rather there is technological culture. Second, the work of articulation is ongoing. While there are lines of tendential force that might fool us into believing that identities are fixed, there are always processes of disarticulation and rearticulation at work. What technology is, how a particular technology is constituted, and the role of a particular technology can always change. There are no guarantees; relations are contingent and subject to intervention. Such intervention is dependent on the real efforts of individuals and groups. Third, the articulations that constitute the identity of technology and the work of articulation within which particular technologies operate have effects, often significant effects.

While we have illustrated ways that multiple articulations constitute technologies and can account for variable effects, it is helpful to consider explicitly the structures that emerge in the work of multiple articulations. These structures, which we refer to as assemblages, allow us to focus on the effectiveness of structures that, while linked to what we traditionally think of as technology, resonate within the larger cultural context. Focusing on assemblages allows us to move out from the articulation of technology and technologies per se and address more profoundly technological culture.

Technology as Assemblage

Technology as articulation draws attention to the practices, representations, experiences, and affects that constitute technology. *Technology as assemblage* adds to this understanding by drawing attention to *the ways that these practices, representations, experiences, and affects articulate to take a particular dynamic form with broader cultural consequences.* The concept of assemblage is drawn from the work of philosophers Gilles Deleuze and Félix Guattari in their book *A Thousand Plateaus.*[11] although their understanding of assemblage is more richly philosophical than the version we present here, it is still a powerful concept in this somewhat scaled-down version.

The concept of assemblage might best be understood by thinking about the term "constellation" used by Deleuze and Guattari when they talk about assemblage. A constellation of heavenly bodies like the Big dipper, for example, takes a particular form: It selects, draws together, stakes out, and envelops a territory. It is made up of imaginative, contingent articulations among myriad heterogeneous elements. The constellation includes some heavenly bodies and not others; these bodies only appear to be in proximity with one another given a particular act of imaginative gathering and

[11] Deleuze and Guattari (1987), pp. 406–407, 503–505.

the angle of our view across space. And, since both they and we are constantly moving, the relationship and angle change. Further, the particular collection of (moving) bodies is articulated to a particular image: a dipper and not, say, a cap or a bear.

The constellation of our example could be said to *territorialize* the articulations of heavenly bodies, angles of relationships, space, atmospheric conditions, trajectories of movement, a way of seeing, and a way of experiencing the world and the universe. It is, in a sense, a contingent invention, both artificial and natural. However, once drawn into this form, the constellation exhibits some tenacity; it doesn't simply appear and disappear. The constellation that is called the Big dipper has been called that for a very long time. Further, the constellation matters, in that it has real effects on our lives: It is effective in terms of practices. For example, the practice of astrology relies on the designation of constellations. It is effective in terms of representations. For example, we teach our children to read the sky in terms of constellations. It is effective in terms of affective experience; we feel at home in the hemisphere where constellations are familiar. As Deleuze and Guattari put it, assemblages are "constellation[s] of singularities and traits deducted from the flow—selected, organized, stratified—in such a way as to converge ... artificially and naturally."[12] For Deleuze and Guattari, an assemblage involves an intermingling of bodies, actions, and passions. In this sense, then, *an assemblage is a particular constellation of articulations that selects, draws together, stakes out and envelops a territory that exhibits some tenacity and effectivity.*

To this point we have talked in terms of the elements drawn together as practices, representations, experiences, and affects. But it might be helpful to expand a little on this list using terms from Deleuze and Guattari, who suggest that what is drawn together are both *forms of content* and *forms of expression.* Content includes what they call the "machinic assemblage of bodies, of actions and passions, an intermingling of bodies reacting to one another." These bodies can be, of course, both human and nonhuman, heavenly and mundane. Expression includes what they call the "collective assemblage of enunciation, of acts and statements, of incorporeal statements attributed to bodies."[13] Thus, whether the cultural theorist looks for connections among practices, representations, experiences, and affects, or between forms of content and forms of expression, both acknowledge the work of the material and the imagined, the lived and the represented.

A technological assemblage will obviously select, draw together, stake out, and envelop a territory that includes the bodies of machines and structures. But it also includes a range of other kinds of bodies: human bodies, governmental bodies, economic bodies, geographical bodies, bodies of knowledge, and so on. It also includes the kinds of articulations listed in the previous section: actions, passions, practices, commitments, feelings, beliefs, affects, and so on, such as those that we argued give shape to the identity of surveillance technology.

[12] Deleuze and Guattari (1987), p. 406.
[13] Deleuze and Guattari (1987), p. 88.

In making the leap to technological assemblage, it is important to remember that a technological assemblage is not a simple accumulation of a bunch of articulations on top of one another, but a particular concrete constellation of articulations that assemble a territory that exhibits tenacity and effectivity. Thus, we may be able to characterize a surveillance assemblage post–9/11. To characterize that assemblage, we would have to do more than list its elements. We would be charged to "map" the territory with attention to the power of particular articulations to produce this constellation, to assemble specific bodies, actions, passions, and representations in particular ways, to give a world shape, so to speak, in a concrete and imaginative way, with concrete effects.

Let us demonstrate with a different example. Over the last few years, self-service checkout lanes have been introduced in supermarkets across the country. Rather than standing in line for a checker to scan and weigh items, bag them, and take payment, the customer can now stand in line to scan and weigh their own items, bag them, and pay the machine. This is said to be more convenient. Perhaps it's even said to be progress. Be that as it may, the received view would look at the situation as the machines merely appearing in the supermarkets and then having effects: unemployment for store workers, increased employment for equipment-repair folks, varied states of satisfaction and dissatisfaction of customers, increased or decreased profits for store owners and equipment manufacturers, and so on.

But to think about the self-service checkout assemblage, we have to begin mapping the articulations. At the most obvious these machines may be invented and developed with an eye toward making a profit for the manufacturers, purchased and implemented by organizations also hoping to make profits by eliminating labor and better controlling inventory and customers—all within a powerfully influential capitalist economic system. Beyond mapping the invention, design, and distribution of the machines, a still larger constellation of bodies is involved, only some of which are machines. For example, we need to consider the form and practices of the self-service machines and how they relate to, or resonate with, pay-at-the-pump gasoline, ATMs, vending machines, self-service machines in libraries, self-service machines at airports, and in other locations.

Beyond the physical machines, there are other bodies and articulations in this constellation. Beyond the more obvious role of drive for profits and the delegation of labor to machines in the name of progress, we should consider the idea of self-service itself and its articulations to ideas such as convenience and to do-it-yourself practices such as pumping your own gas, pouring your own drinks, and bussing your own table in a fast-food restaurant. Why do we do these things rather than have someone do them for us? We would also need to consider the articulation to the process of training customers and employees. People must be taught how to use the machines, but also *to* use the machines in the first place. Both these practices—to use and how to use—require training in new habits and practices. Customers have to be taught a whole new attitude toward purchasing and a whole new model of how to purchase. This attitude and the new practices articulate to an increasing "gamification" of culture, the use of

game-like practices and affects in the service of non-game contexts. The expectations of the consumer and their relationship with store personnel must be dramatically altered. The assumption that a customer is "waited on" must be disarticulated, and the customer must be convinced that this is a convenience, a good thing, a pleasurable activity, and so on.[14]

So when we consider the self-service checkout-machine assemblage, we have to consider the effectivity of a whole array of machines, practices, habits, attitudes, ideas, and so on, which reach far beyond the effects of physical machines on cultural practices.

Assemblages do not remain static, however, and a map of existing relationships will fail to capture the tensions and movements that undermine any assemblage's stability. Assemblages are characterized by a constant process of transformation: what Deleuze and Guattari call processes of *deterritorialization* and *reterritorialization*. *Deterritorialization* describes the process by which an assemblage changes when certain articulations are disarticulated, disconnected, unhinged so to speak. *Reterritorialization* describes the process by which new articulations are forged, thus constituting a new assemblage or territory. Sometimes rearticulations can contribute to reterritorializing an assemblage in significant ways; sometimes the differences are effectively inconsequential. For example, it is clear that the surveillance assemblage post–9/11 is not the same as the surveillance assemblage pre–9/11. While many of its elements, taken in isolation, *look* the same, the overall assemblage has changed. A video camera post–9/11 may look just like a video camera pre–9/11, but it is not the same from the perspective of the technological assemblage. In contrast, some of the technical features of video cameras post– and pre–9/11 may look dramatically different; but these differences may be relatively insignificant from the perspective of assemblage. When people get excited about the appearance of a new technology and begin to prophecy its effects, they may be missing the possibility that in terms of the effectivity of the assemblage overall, nothing really significant at all may be changing.

The argument we are making clearly connects with the insights about agency we raised in the previous chapter. As we argued there, it is not technologies or people that have and exercise agency. Rather agency—the ability to bend space, to make something happen—is possible or not possible depending on the particular assemblage. That assemblage may or may not assemble the world in such a way that agency is *attributed* to one thing or another. It just so happens that the assemblage within which we find ourselves—the technological culture of north Americans in the twenty-first century—assembles technological practices, technological representations, and experiences in such a way that we tend to think and feel that technology is a causal agent: the bearer of progress, the deliverer of convenience, the guarantor of the good life, and so on.

[14] "Gamification" as an explanation of this phenomenon became popular in 2010, encouraged by such scholars as Jane mcGonigal (2011).

There is still a danger here, however, a danger of misinterpretation, a danger to see assemblage as simply a collection of objects or as simply a newer way to talk about articulation. We see this danger in some of the ways assemblage has become a popular, critical, but vague, term in recent work. In a critique of this popularization, critical scholar n. Katherine Hayles wants to "recall that in Deleuze and Guattari, 'assemblage' is meant to subvert the notion of preexisting, intact human subjectivity."[15] That is, the agency active in any assemblage isn't necessarily *human* agency, and that human subjectivity itself is an assemblage. It is this nonhuman aspect of assemblage we need to speak briefly about, because it also provides a further distinction between articulation and assemblage.

Articulation—as it has been theorized and mobilized in cultural studies work—relies too much on human agency. The articulation of words to practices to meanings to artifacts and so on presumes that the work of articulation is human driven. With assemblage this is not necessarily the case. While Deleuze does talk about an alcoholic and their preferred drink as an assemblage, Deleuze and Guattari's work also references ticks and their environments, orchids and wasps, chemistry, biology, and geology. Let's take crowd behavior as an example. When a critical mass of people is reached, the crowd itself seems to act as a single entity, like a swarm. The point here is that though the crowd is composed of humans, the crowd as assemblage is the emergence of a nonhuman entity that follows a nonhuman logic.[16] To think of something as an assemblage is to see it as an *emergence*, but we must be cautious not to immediately attribute a human, political, ideological, cultural, or social logic to that emergence.

In terms of the ideas of assemblage and emergence, Philosopher andy Clark has a useful image. He considers the mangrove swamps of the tropics, with tall mangrove trees rising up from little islands in murky water. He uses this image to test our assumptions—in this case, that trees grow on land, when in fact the islands and the trees emerge together as an assemblage. The process begins as floating seeds send down roots in shallow water and send up shoots that look like stilts. Eventually, dirt and debris begin to accumulate (or accrete) around the roots and the island begins to form. We have here a mangrove-water-island assemblage that emerges in the combination of its elements. Clark extends this example to question how we understand thinking—that words emerge from thought, where perhaps "[o]ur words and inscriptions are the floating roots that actively capture the cognitive debris from which we build new thoughts or ideas...[W]e may find whole edifices of thought and reason accreting only courtesy of the stable structures provided by words and texts."[17] Thinking with the concept of assemblage, we can begin to think of our everyday technological assemblages as accretions and emergences.

[15] Hayles and Wiley (2012), p. 24.
[16] See Galloway and Thacker (2007).
[17] Clark (2003), p. 82.

There is a trend in contemporary theory and philosophy that takes the focus on the nonhuman a bit too far (in our minds). This is what gets called ObjectOriented Philosophy (OOP) or OOO (Object-Oriented Ontology), philosophy from the perspective of objects.[18] While admirable in reorienting, reconceptualizing, disorienting, and decentering our human assumptions, OOP, in its own focus on the thingness of things, omits the relationality of the full range of elements crucial in our approach (relations among nonhumans, among humans, and among humans and nonhumans). Though we wish to retain a healthy respect for the nonhuman, our investigations remain committed to addressing human affairs, if for no other reason than that our topic of study is technological culture, which always involves somewhere in the assemblage an element of the human.

Rearticulating Technological Culture

So what is there to do if you want to change the culture? What practical strategies follow from understanding technology as articulation and assemblage? The first lesson is to be certain that your analysis has been of the technological assemblage, and not of the technology as thing. If you don't like what you see, don't blame technology or the culture; understand the assemblage that maps technological culture. It is important for our argument to utilize both articulation and assemblage in our analysis and not simply proceed with one or the other. As David Featherstone has argued, thinking of both articulation and assemblage in tension brings to articulation the idea of "multiple trajectories" and brings to assemblage a way to more specifically "think through solidarities and alliances," contributing "a directly political edge that usages of assemblage generally lack."[19]

Then if you want to imagine or contribute to change, look more closely at the particular articulations that account for the particular constellation of the assemblage. Where are there powerful lines of tendential force, those articulations that you may not be able to disarticulate? There you may not be able to accomplish much. As Hall has written, "if you are going to try to break, contest or interrupt some of these tendential historical connections, you have to know when you are moving against the grain of historical formations."[20] But also consider where there might be lines, connections, relationships, and articulations that could be altered, where the lines of force are less powerful, more vulnerable. Where might the topic of a college class matter? Where might a legal case make a difference? Where might saying "no" to a particular technology be significant? To answer questions such as these requires careful analysis of an assemblage and how in that assemblage the particular bodies we call technology fit. Thus, to build on the example of surveillance we developed earlier, it would

[18] See, for example, Bogost (2012) and Harman (2011).
[19] Featherstone (2011), p. 141.
[20] Hall (1996b), pp. 142–143.

probably be far more successful to work toward curtailing the growing pervasiveness of the surveillance assemblage by appealing to a commitment to the right to privacy guaranteed in the Bill of Rights, rather than trying to convince people that their blind love affair with new technology is serving to erode their privacy. The commitment to the Bill of Rights hits home affectively in the mainstream heart of the United States, even if real understanding of those rights is limited. And that affective response can articulate to the work of law, building on legal precedent to craft ways to protect privacy. Such a strategy is likely to be far more effective than trying to convince people to give up their unquestioning acceptance of technology as an inherent good.

We see this very real situation in the effects of edward Snowden's leak of classified documents, when, in exposing the breadth and depth of NSA surveillance, he hopes to "open a dialog" on the appropriateness of the government's surveillance practices. We see different articulations struggling to prevail: Secret surveillance is necessary to protect our safety vs. secret surveillance is an illegal violation of our privacy. Each version of this story seeks to capture popular opinion by articulating its position in relation to a range of other elements: asserting links to what is legal or illegal, asserting links to historical practices, asserting links to a trust or mistrust of government, asserting links to trust or mistrust of a technology, and asserting links to beliefs in the inevitability of technology. We submit that given the powerfully situated actors, beliefs, and practices that currently constitute the surveillance assemblage, current surveillance practices will not likely be significantly curtailed in north America, not until one addresses the decline of community and the isolation of individuals that lead to lack of trust, suspicion, and fear of others. That is a monumental task, but one worth addressing in our opinion.

Given the complexity of any technological assemblage, one can never be certain about what processes of rearticulation might make a significant difference. Sometimes the world throws curves, and the work of complex articulations that we haven't noticed before comes screaming on the scene to remap the territory in significant ways. There were those few who predicted a terrorist attack on the magnitude of 9/11, but most people thought that possibility was out of the question. Once that attack happened, however, the surveillance assemblage took a turn few of us would have predicted. Similarly, processes of rearticulation can work for good ends: hence the commitment on the part of Jennifer and Greg to write this book. This book is testament to the belief that rearticulating people's understandings of the relationship between culture and technology away from the idea that they are autonomous entities and toward the idea of technological culture or the technological assemblage can make a difference, even if that difference is down the road a ways. Sometimes the rearticulation of small matters will connect with larger ones, and the world changes. As Deleuze once put it, "Our ability to resist control, or our submission to it, has to be assessed at the level of our every move."[21]

[21] Deleuze (1995), p. 176.

Conclusion: Why Articulation and Assemblage?

Technology as articulation and assemblage offers a whole new way of posing the "problem" of culture and technology. No longer is it possible to think in terms of either technological determinism or cultural determinism, or for that matter, some hybrid of the two positions. By understanding assemblage, flow, relations, connections, and articulations as what matter and what are effective, the "things" themselves, the physical arrangements of matter, drift into helpful perspective. They are not unimportant; they are just no longer all-important. They do not act alone or independently. Assemblages—those imaginary yet concrete constellations—matter. To understand their structure, their work, their power, their reach, and their effects, is the *task* of the cultural theorist. To contribute to changing them in constructive directions is the *goal* of the cultural theorist.

Therefore, we need to talk about *politics* and *economics*, and that's the next chapter.

Source: Photograph by martha Cooper, 1994, Library of Congress. Working in Paterson Project Collection (aFC 1995/028) Loc.gov/item/afcwip002941/

Figure 19: Workers at Work, Most Are Sitting Behind Sewing Machines

Chapter Thirteen: Politics and Economics

ON THE FACE OF IT, THE ASSERTION THAT "technology is political and economic" seems neither controversial nor difficult to grasp. Prisons can be used to confine political prisoners; telephones can be used to raise political contributions; bombs can be dropped to win political advantage. Hence technologies are political in that they can be used for political ends. Computers can be sold to make a profit; self-service checkouts can be used to lay off workers and save money; factories can operate 24/7 to maximize economies of scale. Hence technologies are economic in that they can be used for economic ends.

But this typical way of thinking about politics and economics is an oversimplification, and ultimately deceptive in three ways. First, it tends toward a symptomatic causal understanding, which posits the technology as a separate, neutral (innocent) entity that can be used in this way, or not: as if a prison is not made to incarcerate undesirables; as if a bomb is not made to explode. We offered a critique of this symptomatic tendency in Chapter 10 (on causality). Second, in relation to the first point, this typical way of thinking assumes that one can isolate technology as an identity separate from politics and economics. Third, it separates politics and economics: as if economics were not also political, as if politics did not entail economics. This book's fundamental critique of the tendency to consider technology and culture as isolatable, separate entities holds just as true for interconnections among technology, politics, and economics.

Politics and Economics as Assemblage

Taking seriously our assemblage approach to technological culture means that we approach the issue of politics, economics, and technology not as the articulation of three separable and isolatable entities: a political system or practice, an economic system or practice, and a technology. Technology is not an element taken up and used by a political and/or economic system, nor does technology create a political and economic system. Rather, technology is integral to an assemblage in which political and economic work is performed. In other words, technological culture is political and it is economic. The task, then, is to examine how particular technological assemblages of technology, politics, and economics are constructed, what work they perform, and how

they might be changed. As part of this approach, the typical conceptions of politics and economics are necessarily transformed. By politics we mean much more than the electoral politics of political parties or the distinctions among left, right, and center. By economics we mean much more than "the bottom line" of a ledger or the distinctions among stereotypes of capitalism, socialism, and communism. In introducing a cultural studies understanding of technological culture in terms of articulation and assemblage, we have made it a point to emphasize the dimension of power. Assemblages are maps of power relations, which in turn work to shape and transform political and economic possibilities and relations of power and agency. The work of assemblage privileges some populations over others, privileges some possibilities over others, and distributes agency unevenly. It takes contextualized forms of power and agency to disarticulate and remake the articulations that constitute an assemblage.

Politics, then, is the term for the work of generating, concretizing, and challenging positions of possibility, status, and relations of power and agency. Politics emerges within assemblages, operates within assemblages, and contributes to the persistence or transformation of assemblages.

Economics entails the production, distribution, and exchange of resources, which include human resources (for example, labor), natural resources (for example, copper), and informational resources (for example, knowledge). The character of production, distribution, and exchange is inexorably articulated to politics: to the contingent choices made with respect to what is produced, how and to whom it is distributed, and in what ways it serves relations of power, possibility, and agency. This is why, even though there is no agreed-upon definition of political economy,[1] scholars have used the term "political economy" since the eighteenth century to examine the articulation of the two.

While it is difficult and somewhat artificial to separate out politics and economics for discussion, we proceed by highlighting the significance of each for the sake of working toward the significance of their integration. This is always a problem for cultural studies. When the task is to demonstrate the integral character of interconnections, that is, of articulation, in the work of assemblages, it is both necessary and misleading to consider particular components of the process. In the end, we must put politics and economics back together. You will notice that when talking about the one, the other often asserts its presence.

Politics and Technology

Langdon Winner has been the most prominent and influential thinker to argue for the articulation of politics and technology. Although he does not use the theoretical language of articulation and assemblage, we read him through that lens. For Winner "politics" means "arrangements of power and authority in human associations as well

[1] For a discussion of different conceptions of political economy, see mosco (1996).

as the activities that take place within those arrangements."[2] Because these activities include both humans and nonhumans, we argue—and Winner implies—that both human and non-human associations constitute technological politics. Here is Winner on technological politics:

> The things we call "technologies" are ways of building order in our world. Many technical devices and systems important in everyday life contain possibilities for many different ways of ordering human activity. Consciously or unconsciously, deliberately or inadvertently, societies choose structures for technologies that influence how people are going to work, communicate, travel, consume, and so forth over a very long time... Because choices tend to become strongly fixed in material equipment, economic investment, and social habit, the original flexibility vanishes for all practical purposes once the initial commitments are made. In that sense technological innovations are similar to legislative acts or political foundings that establish a framework for public order that will endure over many generations.[3]

The things we call technologies are emergent and sometimes tenacious articulations. They are contingent structures that are constructed in particular contexts, the product of possibility and particular relations of power and agency. They are constructed for particular cultural, political, and economic reasons with particular cultural, political, economic goals. Some of these articulations are constructed of concrete and steel, some of processes, practices, and techniques, and others of discourses and conceptions of technology and culture.

When Winner asserts that technologies are "ways of building order in our world," he means something more than that technologies make it possible to build order. Rather, by their very existence, they do work: they embody, impose, and enforce (instantiate) possibilities, arrangements, and order. For Winner, this means that technologies are actually "forms of life."[4] In Latour's terms, technologies are "prescriptive." In a sense, then, technologies *are* forms of law, legislative acts, and political institutions. However, there is an interesting and significant difference. The founding documents of the United States—the Constitution and the Bill of Rights—were crafted in processes of extensive deliberation; and laws passed by Congress are, for the most part, deliberated (the legal process acknowledges the importance of debate). But the assemblages we call technological, though they often have equal or greater impact on culture than laws do, are rarely deliberated. Instead, we seem to proceed in a state of what Winner calls, "technological somnambulism," that is, sleepwalking through sweeping technological changes in everyday life.[5]

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[2] Winner (1986), p. 22.
[3] Winner (1986), pp. 28–29.
[4] Winner (1986), Chapter One.
[5] Winner (1986), p. 10. This echoes mcLuhan (1964).

Consequently, there is, according to Winner, a largely unexamined, political "de facto...sociotechnical constitution...of sorts" in place.[6] This constitution, a tenacious assemblage, which gives meaning and shape to cultural relations, has been developed by economic and ideological interests, is embedded in structures, institutions, and practices, is the ongoing production of political struggles, and is sustained by our acceptance of a particular political language and value structure. This constitution exhibits five interrelated characteristics:

1. The "ability of technologies of transportation and communication to facilitate control over events from a single center or small number of centers."[7]

2. The "tendency of new devices and techniques to increase the most efficient or effective size of organized human associations," which leads to gigantic centralized corporations and organizations.[8]

3. The tendency to "produce its own distinctive form of hierarchical authority," which in the workplace is "undisguisedly authoritarian."[9]

4. The tendency of "large, centralized, hierarchically arranged sociotechnical entities to crowd out and eliminate other varieties of human activity."[10]

5. The ability of "large sociotechnical organizations [to] exercise power to control the social and political influences that ostensibly control them. Human needs, markets, and political institutions that might regulate technology-based systems are often subject to manipulation by those very systems."[11]

Winner proposed the existence of this de facto constitution in 1986, but how well does it hold up today? Let's bring this analysis down from the larger, more abstract assertions about the generalized technological assemblage to a particular, concrete, and current technological assemblage: the network.

Network Culture

Networks are commonly thought (in a rather utopian fashion) to be technologies of a decentralized politics. The Internet, for example, is widely seen as birthing the 2.0 culture, where every user becomes (at least potentially) a producer, where the user/producer can get off the couch of passive reception and contribute to the creation of culture, thus exercising a new form of democratic politics. However, if we look more

[6] Winner (1986), p. 47.
[7] Winner (1986), p. 47.
[8] Winner (1986), p. 47.
[9] Winner (1986), p. 48.
[10] Winner (1986), p. 48.
[11] Winner (1986), p. 48.

closely, the politics is not that simple. Yes, alexander Galloway explains, there has been a technological transition from vertical, centralized control (of the kind that Winner depicts), but it is not toward a decentralized politics, which would make control of networks difficult. Rather, he argues, networks, such as the Internet, are "distributed not decentralized," with the effect that they are "in fact highly controlled despite having few if any central points of control."[12]

How does a distributed network embody control? To answer that, let's look briefly at different models of networks, as explored by Galloway. First, in a *centralized network* there is a hub at the center and all elements of the periphery must link through the hub in order to (if they are to) connect. The classic case (besides that of the panopticon) is the way airlines connect through major hubs. If, for example, Jennifer wants to fly to marquette, michigan, which is 100 miles away from her home, she must first fly to the hub (Chicago) and then on to marquette, which is a trip of over 800 miles. All connections or translations are controlled by the hub. A *decentralized network* would connect all sites directly to one another, with no interference or translation by a centralized hub. Jennifer could then fly from her home to marquette, without any involvement of or control by Chicago. Decentralized networks are physically different, they have a different (arguably more democratic) politics, they make for different possibilities, and they have different requirements (in Latour's terms, they prescribe differently).

Few (if any) technological networks are truly decentralized; rather, they are distributed. In a *distributed network* there are no central hubs; and although many different connections are possible, particular connections become tenacious. This is like the ruts that form on a muddy road: if you are driving a car where those before have made significant ruts, you are likely to follow in their path. The example Galloway offers is the highway system built in the 1950s in the United States: "The highway system is a distributed network because it lacks any centralized hubs and offers direct linkages from city to city through a variety of highway combinations."[13] If one route is closed, it is usually possible to find an alternative route. There are, however, main routes, like the ruts that are most convenient to follow, and this is significant. Like lines of tendential force, we are urged by the politics of distributed networks toward particular possibilities and relations of power and agency. For example, some highways receive more investment and are widened, smoothed, and straightened. These do not connect every point, and, with limited on- and off-ramps, ignore many towns.

Alexander Galloway and eugene Thacker have explored the politics of the distributed network further in their book *The Exploit: A Theory of Networks*. While it is tempting to see power and agency as distributed equally across the network, they

[12] Galloway (2004), p. 25.
[13] Galloway (2004), p. 35.

remind us that "Human subjects constitute and construct networks, but always in a highly distributed and unequal fashion,"[14] with differential and unequal effects.

Power works in a network or assemblage through what Gilles Deleuze called *control,*[15] by which he means something a little different than what we covered in Chapter 5. He means by control the constant structuring of possibilities, the tweaking and nudging of choices, a sense of freedom within limits we forget about. Deleuze invokes the idea of the freedom of the road, pointing out that when we drive on the highway, we feel free—though we must go along the highway, on the correct side, restricted by appropriate laws. Control doesn't tell you what to do, but gives you options, choices, and suggestions (as when websites tell you that people who bought the thing you just bought also bought these other things). Control is subtle. Nodes form: that is, contingent articulations that exhibit tenacity, etched by practice and habit, with differential consequences. If, for example, you have a restaurant that is off on a side road beyond the interstate, it is more likely to fail, even if you do serve superior food.

There are moments when control is being exercised, "when the network logic takes over,"[16] when schemes of self-regulation and monitoring become "common sense" (hegemonic), when education is continuing education and one is always at work through the use of mobile computing and communication technologies, when social networks of likes and recommendations are built to be surveilled and manipulated, when we begin to see a new sociotechnical constitution is being written.[17]

Galloway and Thacker do not limit their understanding of networks to computer networks (or highways), but to "any system of interrelationality, whether biological or informatics, organic or inorganic, technical or natural,"[18] with the ultimate goal of demonstrating that assertion of polarity between these terms is illusory. The network is the relationships, not the parts; and the degree to which individual parts have an identity, those identities are bestowed by the network. So, for example, the network bestows the identity of "side road" and "failing restaurant on side road."

Galloway and Thacker argue that "[t]he network, as it appears, has emerged as a dominant form describing the nature of control today, as well as resistance to it."[19] We see, for example, the logic of the network exhibited in new global infectious diseases. These diseases are assemblages of, for example, "microbe-flea-monkey-human,"[20] but also consist of airplanes, hotels, dense urban living conditions, and so on. The responses to such outbreaks are also networked: communication (news, scientific and medical

[14] Galloway and Thacker (2007), p. 15.

[15] Deleuze (1995).

[16] Galloway and Thacker (2007), p. 5.

[17] Michael Hardt and antonio negri have sketched one version of what this sociotechnical constitution might entail. They call it *Empire*. See Hardt and negri (2001; 2005; and 2011).

[18] Galloway and Thacker (2007), p. 28.

[19] Galloway and Thacker (2007), p. 4.

[20] Galloway and Thacker (2007), p. 86.

data, logistical data), transport (of vaccines, health care workers), laboratories, health agencies, and quarantines.

Resisting networks is a monumental task. Consider, for example, how difficult it has been for edward Snowden to resist the surveillance network. What and where exactly do people resist if they want to be effective against networks? Galloway and Thacker explain that one strategy that has been used is the cultivation of *the exploit*: "a resonant flaw designed to resist, threaten, and ultimately desert the dominant political diagram [in our terms, the assemblage]. Examples include the suicide bomber (versus the police), peer-to-peer protocols (versus the music conglomerates), guerrillas (versus the army), netwar (versus cyberwar), subcultures (versus the family), and so on."[21] What we need to find and cultivate is a new—ethical—exploit, which is not limited to the agency of humans: "It will have to consider the nonhuman within the human."[22] This includes nonhuman emergences such as swarms.[23]

These, then, are some of the questions engendered by thinking about politics and technology: How do we design technological assemblages for a politics of the network? How do assemblages become territorialized into networks that are both flexible and rigid? How do we find the exploits, the human tactics and nonhuman emergences, which work to transform the assemblage of bodies? What new arrangements of people, things, agency, and power are possible?

Winner's comparison of our legal constitution and our sociotechnical one should be taken seriously. A technological politics ought to debate over new technologies and technological assemblages in much the way that we debate new laws. This is more difficult than it may seem on first blush. It is not the case that we can simply set a device on a table and conduct a debate about its usefulness, because we need to see the device as assemblage and think of the articulations with assemblages—including devices, structures, languages, and practices. To debate technology, we are required to de-center technology, to contextualize its place in the assemblage.

The amish, famously, do debate about the introduction of new technologies, and even include them in their practices on a trial basis, and consider whether the resulting assemblage hews to the values of their close-knit community, or changes the amish-assemblage beyond their principles. Richard Sclove, founder of the Loka Institute, a nonprofit organization advocating democratic technologies, emphasizes this need to debate technologies. Sclove is committed to the idea of strong democracy, a term he borrows from political scientist Benjamin Barber.[24] Strong democracy advocates that citizens should have a role in making decisions over matters that affect their well-being and way of life.[25] Sclove even created a list of nine design criteria, which specify values and processes for more democratic decision making with regard to technology. But

[21] Galloway and Thacker (2007), pp. 21–22.
[22] Galloway and Thacker (2007), p. 22.
[23] Galloway and Thacker (2007), p. 98.
[24] Sclove (1995a; 1995b). Sclove also discusses the case of the amish.
[25] Barber (1984); see Sclove (1995a).

this direction of technological politics regresses to the conception of politics as (just) decision-making processes. It ignores that all parties here are assemblages, that politics is not just the values a technology reinforces as it prescribes action back on users or that the debate is about what the object should do and how it should be used. The politics at stake is everyday, as much about how a telephone networks from michigan to dubai as about who wins the next election.

How then do we rethink a deliberate politics along the lines of assemblage? One attempt to do so has been made by political theorist Jane Bennett in her book, *Vibrant Matter: A Political Ecology of Things*.[26] Bennett proposes a political ecology. Using (and tweaking) John dewey's notion of a public as a "confederation of bodies" that emerges in response to a problem, and a problem being the result of "conjoint action" by myriad actors, Bennett describes a political realm that is the dynamic interplay of multiple actants (both human and other than human). Bodies congregate and "seek to engage in new acts that will restore their power, protect against future harm, or compensate for damage done—in that consists their political action, which, fortunately or unfortunately, will also become conjoint action with a chain of indirect, unpredictable consequences."[27] as with articulation and assemblage in general, there are no guarantees, only strategic intervention based on sophisticated, concrete knowledge of the dynamics of politics within assemblage.

Economics and Technology

To fully appreciate the economic in technological culture it is necessary to first acknowledge, and then resist, the reduction often performed by understandings of technology that define it as the (willing or unwilling) servant of particular economic systems: capitalism, socialism, communism, etc. For many people, the economic is sometimes as simple as understanding that because we live in a capitalist system, technologies will be designed to be profitable. If they aren't, they will fail. End of story. For critics of capitalism, economic understanding of technology is sometimes as simple as pointing out that, once again, technologies are developed and implemented to extract as much wealth as possible and shuttle it upwards. As Lawrence Grossberg has said, "too often, this becomes simply another occasion to re-inscribe our...critiques of capitalism and suggest rather predictable 'policy' proposals."[28] The solution? eliminate capitalism. Again, end of story. Capitalism becomes the justification or the brutal determinant for all that is desirable or undesirable about technology.

Certainly, both of these positions have merit. Both go a long way to explaining which technologies are developed and which are not, which succeed and which fail, who benefits and who does not, and how—generally—technologies are caught up in

[26] Bennett (2010).
[27] Bennett (2010), p. 101.
[28] Grossberg (2010b), p. 296.

efforts of economic development and/or exploitation. However, from a cultural studies perspective this approach sidelines a richer picture of the emergent economic significance of technological assemblages. Just as the network, discussed above, is more politically nuanced than simply centralized control versus democratic freedom, so too is a technological assemblage more economically nuanced. How, then, do we address the question of economics from the perspective of assemblage?

We begin by recognizing, following the work of Grossberg and others, that the economy, the economic, is not a pre-existing condition. An economy, and even the idea of economics, is produced in and through assemblages. Muniesa, millo, and Callon, following Deleuze and Guattari's original term for assemblage, refer to economic *agencement*. An economic *agencement* (or assemblage) "renders things, behaviors, and processes economic."[29] What is considered economic changes depending on the assemblage. They write, "It seems undeniable that, in so-called advanced liberal societies, 'economic' often refers to the establishing of valuation networks, that is, to pricing and to the construction of circuits of commerce that render things economically commensurable and exchangeable."[30] They continue: "the fact that an institution, an action, an actor or an object can be considered as being economic is precisely the result of this process of economization."[31] not every *agencement* is economic, but an *agencement* can take an economic turn. They give the example of a sexual relation, which can be lived as a biological *agencement*, an affective *agencement*, or an economic *agencement* (when the relation is about exchange and valuation of the act). The economic, in short, is produced by arranging material elements (such as computers, order forms, machines, and so on), discursive elements (for example, naming practices—such as calling something "goods"—or codes, and so on), and, we would add, practices (such as cloning techniques, therapeutic sessions, experiments, and so on) in such a way that they perform economically.

Muniesa, millo and Callon focus on a particular type of economic *agencement* that they call *market devices*. By market devices, they mean "the material and discursive assemblages that intervene in the construction of markets."[32] With market devices, "emphasis is put on the conception, production and circulation of goods, their valuation, the construction and subsequent transfer of property rights through monetary mediation, exchange mechanisms and systems of prices."[33] Market devices include such things as securities analysts' reports, financial charts, purchasing centers, order forms, merchandising techniques, supermarkets, market research focus groups, consumer tests, quotas, financial derivatives, classification schemes, pricing, consumer credit scores, and more.[34]

[29] Muniesa, millo and Callon (2007), p. 3.
[30] Muniesa, millo and Callon (2007), p. 3.
[31] Muniesa, millo and Callon (2007), p. 3.
[32] Muniesa, millo and Callon (2007), p. 2.
[33] Muniesa, millo and Callon (2007), p. 4.
[34] See the essays in Callon, millo and muniesa (2007).

Take, as a hypothetical example, a fairly simple market *agencement*: a fish market. Here we are at the intersection of a number of assemblages, articulated in the market itself: the ship-net-fish-ocean assemblages, the distributor-container-transportation-warehouse-supermarket assemblages, government policy assemblages (for the fish quotas), government regulation assemblages (for licenses for fishing and shipping, for health regulations regarding the handling of fish and inspection for disease, for standards of weights and measures, and others), and (albeit rarely) investment assemblages in the exceptional cases where there is trading of fish futures (in which case, these fish have already been bought and sold months before in a speculative market). The fish market assemblage itself then includes buyers, sellers, inspectors, forms (which stand in for government regulations, the exchange of money via banks, and even the fish themselves), scales (for weight and measure), rubrics for grading quality, trucks, crates, air conditioning, water systems, banking systems, and more. The point here is not that the above assemblages (vastly over-simplified for effect) are working on behalf of the economic, but that they produce an economy by translating fish into value, exchanging product and money, transferring property, circulating value and materials, and so on.

The examples we could address in terms of market devices range from those concerning material goods, like fish in the above example, to those concerning more abstract forms, such as financial derivatives and related investment practices. Indeed, donald macKenzie argues that the financial models at the heart of futures trading do not only operate *within* a market, but work to *create* that market.[35] They are part of the market that they purport to merely describe and respond to, and so perform the economic. MacKenzie speculates that because market devices are technologies that work as "engines" and not "cameras," there is a possibility that markets and economic processes associated with them may get altered so that they better follow the abstract economic model.

In the beginning of this chapter we proposed a broad definition of economics as concerned with the production, distribution, and exchange of three different kinds of resources: human resources (for example, labor), natural resources (for example, copper), and informational resources (for example, knowledge). In the discussion of market devices above, it is relatively straightforward to see how objects and information (such as fish and investment practices) become resources, all of which articulate to produce an economy within which fish or financial instruments are translated into value. Less obvious is the role of human resources, especially the process whereby human labor becomes a resource to perform economics within a technological assemblage. Labor, then, deserves special attention.

To articulate, to make something anew, to transform something, is work, that is, the product of labor. When considering technology, we can think of machines, processes, and discourses in terms of labor: they were created by labor, they perform labor (tasks having been delegated to them), they replace labor, they require labor and resources to

[35] MacKenzie (2008).

operate and maintain (they are prescriptive), and they have differential effects. DNA testing, for example, was developed by the labor of real people, it performs tasks such as identifying presence at a crime scene, it replaces labor such as that of eyewitnesses, and it requires the resources of a laboratory and the labor of real people to perform its work. It also affects people differentially. Death Row prisoners who have been vindicated by DNA evidence and released through the efforts of The Innocence Project will attest to the differential effects of the existence of and access to the technology.[36]

Some labor is waged labor, that is, it is part of jobs as factory workers, government workers, cleaning staff, media producers, and university professors, and we are compensated for it, usually through a wage or salary. Other labor is not waged. Planting our gardens is labor, but typically unwaged; raising children is labor, but typically unwaged. Sometimes very similarly appearing activities can be waged or unwaged, depending on the technological assemblage to which it contributes. One can clean houses for a living as wage labor or as part of everyday unpaid, unwaged home maintenance.

We can also differentiate material from immaterial labor. Material labor works on physical products: one makes *things* (cars, macramé curtains, keys, pantsuits, Hello Kitty coffee mugs). Immaterial labor is labor that works on symbolic products: one makes and manipulates symbols, ideas, and meanings. Economist maurizio Lazzarato argues that we are seeing an increasing presence of immaterial forms of labor today. Such work includes writing, data entry, customer service, web design, and many other types. This is work that shapes cultural attitudes, fashions, tastes, and public opinions. Lazzarato says that immaterial labor includes the "informational content" and "cultural content" of commodities.[37] We can also add to immaterial labor the idea of affective labor: work that produces and manipulates affect,[38] from shaping the mood of an audience to mollifying an angry customer or easing the distress of the infirm.

By pointing to these different forms of labor, we don't mean to argue that one kind is better than another or that all labor should be compensated or have its value calculated (that would be to turn everything into economic exchange, creating a totalizing economic *agencement*). But we should be aware of how—within assemblages—labor performs economically (or not): how it is shaped, transformed, and sometimes exploited, with benefits distributed differentially.

Consider, for example, the labor of online environments. Such labor is variously waged, unwaged, material, immaterial, and affective. Some of it is grueling, tedious, and repetitive, like data entry or call center work, but some of it is creative and cool, like designing webpages, posting on social media, collaborating on wikis, managing discussion lists or fan sites, reviewing products on websites, or contributing to a crowdfunding effort. Many of these activities don't even feel like work; they are enjoyable, fun, and entertaining. Although the labor is contributed willingly, with no expecta-

[36] The Innocence Project. http://www.innocenceproject.org.

[37] Lazzarato, quoted in Terranova (2013), p. 40.

[38] dean (2003), p. 268.

tion of compensation, it is nonetheless economic labor in that it works on behalf of the economic. It does not operate within an economy but produces an economy by translating play into value, performing the assemblage within which it then operates. So significant is this labor as constitutive of the technological assemblage, it merits its own name: "playbor." Tiziana Terranova points out that great swaths of online life depend on this volunteer, unwaged labor, from contributions to open source software like Linux or collaborative knowledge products like Wikipedia, to adding value to sites by providing customer reviews (amazon would not be amazon without its customer reviews).[39] Mark andrejevic points out two ways value gets generated by this labor.[40] The first is when active, voluntary, unwaged participation is appropriated by others for their own profit. An example of this is when the online news aggregator Huffington Post was bought by aOL in 2011. Many of the bloggers who contributed to the site voluntarily and helped create its value were given nothing in the deal, while arianna Huffington walked away with $315 million.[41] a second type of value generation is when information about online activities (what websites you visit, what links you click on, what videos you watch, who you email, what articles you read, what terms you search for, and so on) is collected. These profiling data are quite valuable to marketers (often as an aggregate—Big data—more than just about you) and become their property to buy and sell. Your activity online is making money for someone else. As we go to press, Facebook is expected to roll out a new, big deal with major marketers to sell the data they collect on you. Andrejevic calls this the work of "being watched."[42] It is a huge economic resource to some and is built upon your volunteer, unwaged labor, without your consent.

The take home, so to speak, is that we need to recognize, when encountering and analyzing technological culture, when, where, and how assemblages take an economic turn and, when they do, how they impact possibilities and relations of power and agency. Finally, we might consider how these assemblages, as contingent and variously tenacious articulations, might be changed. As with politics, there are no guarantees, only strategic interventions based on sophisticated, concrete knowledge of the dynamics of the assemblage.

Rearticulating Politics, Economics, Technology

The point of this chapter has not been to introduce politics and economics to the discussion of technology but to recognize how politics and economics are performed by technological assemblages. We would like to emphasize an observation with which

[39] Terranova (2013).
[40] Andrejevic (2013).
[41] Ross (2013).
[42] Andrejevic (2003).

we opened the book: how the received view of technology serves a particular political purpose. Arnold Pacey puts it this way:

> When people think that the development of technology follows a smooth path of advance predetermined by the logic of science and technique, they are more willing to accept the advice of "experts" and less likely to expect public participation in decisions about technology policy.[43]

The way we think about technologies affects what we think we can do about them. It makes sense to be passive if we think with the received view, for creative action is not supported by an unreflective commitment to progress, a goal of increased convenience, or a belief in technological determinism. In contrast, a cultural studies approach is capable of supporting creative intervention in the service of rearticulating the technological culture, by working through the critique of technological culture as it is manifested in everyday life. In doing so, it is important that we recognize the tenacity of the articulations that we tackle; the struggle to articulate and rearticulate technological culture is a long and involved one.

Antonio Gramsci describes two types of warfare fought on the political plane, which can be applied to struggles with and within the technological assemblage: the war of movement or maneuver and the war of position.[44] The *war of maneuver* refers to the concentration of forces in an all-out assault on one front that promises to breach the enemy's defenses and achieve a quick and complete victory. Rarely does struggle in the realm of the technological assemblage work this way. Rather, the war of position is the rule. A *war of position* takes place across many fronts, at many sites of struggle and resistance, and no battle is decisive. It is a mostly slow, continuous struggle, with, at times, little movement to show for the struggle. Given the complex nature of the technological assemblage, made up of multiple, sometimes-contradictory contingencies, it makes sense that change is more likely to take place in this way. What is required is a reterritorialization of a complex assemblage: all manner of interventions will need to occur at all kinds of levels in all kinds of situations, to take advantage of emergences, affects, and those aspects of assemblage that can be hard to pin down or capture. Success in a war of position may come slowly, if at all, but what is ultimately at stake is a reconfiguration of a culture.

Our struggle within technological culture is that of a war of position, of small victories, of the slow reterritorialization of discourse, the gradual rearticulation of objects, practices, representations, habits, and affects in which even small moves may be significant. In this struggle, articulation becomes the political practice for engaging the assemblage, whether it be assemblages of genetically engineered seeds, pesticides, and farming practices; Twitter and the arab Spring; or surveillance in its many formations.

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[43] Pacey (1983), p. 26.

[44] Gramsci (1971), pp. 229–239. Hall (1996a) discusses the war of maneuver and the war of position in relation to cultural studies; see especially pp. 426–428.

Part of this struggle is the call for new narratives and new stories about technological culture. Anne Balsamo described the project of feminist cultural studies in terms that apply equally here. The project, she writes, "is to write the stories and tell the tales that will connect seemingly isolated moments of discourse—histories and effects—into a narrative that helps us make sense of the transformations as they emerge." new stories, she continues, "also serve as expressive resources that offer cognitive maps of emergent cultural arrangements."[45] Rather than distanced analyses, such stories are engagements; they provide tools, frameworks, and maps for others to take up, critique, or to use as springboards for new narratives, actions, politics, and economics.

Source: Photograph by Jennifer daryl Slack, 2013

[45] Balsamo (1996), p. 161.

Figure 20: Space and Time

Chapter Fourteen: Space and Time

THE WORLD IS GETTING SMALLER AND TIME IS SPEEDING UP. Technology is to blame; we "know" this to be true. Planes, trains, and automobiles have made anywhere on earth accessible in a very short time. The magic of telephony and the Internet, linked via wire, wireless, tower, and satellite, have made virtually instantaneous communication with that same "anywhere on earth" an everyday reality. Climbers now routinely take mobile phones with them when they climb; they can send on-the-spot photographs of their conquests and they can call for rescue from once-remote mountaintops using that mobile. Digital nomads boast that they can travel to anywhere and work from anywhere on earth; business is global and 24/7. Once delegated to the technology, being connected via mobile and working anywhere 24/7 are prescribed back, required. Globalization, the collapsing and shrinking of space and time, brought to you by technology, is the condition you are now required to live with, live for, and live up to. Some love it; some resist it; but we all must deal with it.

That is the story, and it is a powerful and effective one. But while it is powerful, it is insufficient. By now it should be clear that at the very least this story relies on a problematic technological determinism: it is the planes, trains, automobiles, mobiles, and Internet that are credited or blamed. Where are the assemblages in this story? Where are the economic, political, and cultural contributions to globalization of which technologies are participants, not autonomous agents, but elevated to the status of agent?

Space and Time as Assemblage

Taking seriously our assemblage approach to technological culture means that we approach the issue of time, space, and technology not as the articulation of three separable and isolatable entities: a space, a time, a technology. Thinking in terms of assemblage requires understanding that technological culture is both spatialized and temporalized. These are not elements of an assemblage, but what assemblage achieves.

Consider for a moment a tragic head-on collision of two trains. Is the cause of the crash the space? They should not, after all, both have been *there*. No, they both had to be there, in that space, to get where they were going. That space isn't the problem. Is the cause of the crash, then, the time? The time, after all, 14:06, was the problem, the moment it happened. No, they both had to get through 14:06 if time is to continue. That time isn't the problem. Is the problem, then, the trains? It is true that if there

were no trains, no such tragic accident could have occurred. But, similarly, if there were no space and no time, there would be no such accident. So such speculation is not dealing with the world as we know it, a world within which there are trains as well as space and time. So how do we understand this crash? There is an assemblage here that achieves the crash: a spatialized, temporalized, technological assemblage. In the articulation of this space, this time, and these two trains, the effect is a head-on collision. But we know from previous discussions, that the trains are not trains in and of themselves, but assemblages as well. So the crash assemblage must also consider the contributions of schedulers, engineers, the value of travel, conceptions of progress, and so on. But what about space and time? Would they not also require the same kind of scrutiny? doesn't the understanding of space and time also require thinking in terms of assemblage? We argue that this is the case, in that space and time are as deeply cultural as any other phenomenon. Space is much more than a place, and time is much more than the digital readout on your mobile phone.

Recall from our discussion of assemblage that an assemblage asserts a territory, and, now we would suggest, that a territory is both spatialized and temporalized. That is, it is made to mean and function spatially and temporally. To make that argument we look separately at space and time as they articulate to technological culture. We do that knowing full well that it is as problematic to separate space and time as it is to separate technology and culture. So, note that space and time assert themselves in the consideration of the other. However, there are times when, for purposes of analysis, it is important to focus just on space and technology or just on time and technology, but when we do so we must not forget that they are space-time assemblages. In the end, we explicitly put time and space back together, as intertwined in complex ways, in the story of modes of communication and in the problem of addiction in relation to video gambling machines.

Space and Technology

While space is typically used to mean a physical space, a container within which things happen, it is more appropriate to think in terms of everyday life being deeply spatialized, by which we mean that the spaces within which we live are always cultural; they are the production of relations and effects over time. Greg's book *Exploring Technology and Social Space* has considered the significance of this insight, in what he calls "social space." Here is his explanation of what makes space social:

> What I mean by social space can perhaps best be approached negatively: it is not merely a constructed space like a room in a house or a lobby in a hotel or a city street. Likewise, it is not merely the meanings generated by any single human moving through that space (i.e., that the room seems comfortable, that it reminds one of corporations, that the greens in the

> wallpaper seem soothing, that it is a workplace or a home, private or public, that he or she is in a hurry, at ease, looking for the bathroom, etc.). Social space is the space created through the interaction of multiple humans over time. There is never a single social space, but always multiple social spaces. Social spaces are always open and permeable, yet they do have limits. It is important to remember at this point that the social is not unique to humans. Baboons, insects, and other creatures are social and could be said to move in social spaces.[1]

In addition, as we have seen in Chapter 11 (on agency), any particular concrete local situation (an airport concourse, a classroom, and so forth) involves nonhuman actors as much as the human. Both contribute to the specific shaping of that space.

What does it mean to shape space? again, as we considered in the discussion on agency, one way that technologies shape space is, as Latour put it, by their capacity to bend space. Sometimes a technology bends the space by taking up space that displaces something else. For example, a big screen television might mean that furniture needs to be moved out of the way; a bread machine displaces a blender; a computer displaces a typewriter; and an e-mail displaces a letter. Technologies also contribute to reshaping human bodies and human movement in space. The shape of a keyboard influences how arms and hands move, a sidewalk steers people along particular trajectories, high-heeled shoes render certain kinds of movement more difficult than others, and so on.

The consequences of these processes of shaping spaces affect people differentially. If you are expected to wear high heels, you will be spatially limited in ways that those who are allowed to wear flats are not. For those required to work at computers for long hours, technologically derived complaints of muscle strain, carpal tunnel syndrome, eyestrain, and back pain are realities in ways that they are not for those not so required. The recognition of the power of the embodied shape taken by a technology gives rise to the field of ergonomics, a field of research concerned primarily with movement and spatial relations concerning human–technology interactions.

In addition to these more obvious ways of shaping space through the embodied effects of technological assemblages, there are other ways that space is shaped. French sociologist and philosopher Henri Lefebvre argued that space is shaped on many levels, in different ways, and offered three interrelated concepts of space to help us understand the articulation of space as we practice it, as we think it, and as we experience it. He calls these *spatial practice*, *representations of space*, and *representational space*.[2]

Spatial practice—space as it is practiced—consists of the structures and activities that produce and shape space by articulating it in certain ways. Architecture is perhaps the most obvious form of spatial practice, but so too are practices such as the recurrent behaviors of the people in particular places, including behaviors such as hanging out,

[1] Wise (1997), pp. xiii–xiv.

[2] Lefebvre (1991), pp. 38–39.

walking along a sidewalk, sitting at a computer terminal, and reading the monitors in airports or train stations.

Representations of space—space as it is conceived—refers to the concepts we use to think about space. This, as Lefebvre explains, is the dominant space of our understanding[3] and includes the ways that scientists, engineers, planners, architects, and others understand and represent space as something to be lived. Maps, blueprints, architectural plans, rulers, and light-years are all representations of space that have a relationship to a variety of spatial practices.

Representational space—space as it is lived—is the direct, lived bodily experience of space, which includes how we move in space, move through space, and experience space, including the semiotics of the space, the meanings we make of the signs and images in the space. It is our awareness of space as we variously accept, appropriate, and change space as a lived experience in the intersection of spatial practices and representations of space. It is what space "feels" like.

The particular arrangement of articulations among these three concepts will be unique to a particular technological assemblage. For example, to explore the space of an airport, we would consider spatial practices: the unique architecture, security checkpoints, surveillance machines, television monitors, restaurants, bars, and shops, and how they relate to traffic flows and behaviors such as waiting, sleeping, queuing, shopping, eating, surveilling, selling, and so on. We would consider spatial representations: the attendant concepts of this space as a place of transport, speed, affluence, technological sophistication, the servicing of business travel, or perhaps as a border space (entering or exiting a country), or as a federal space. We would consider experiences of and in the space: what the space feels like, and how those experiences are shaped by the funneling of our bodies into queues, the examination of our possessions and bodies in security checkpoints, the experience of shopping while sequestered in a confined area, and by representations of airports in news, film and television. We would consider how our experiences are shaped by the semiotics of the space: the colors, the signs, the shops, the announcements and ambient music, the scents, the movements of people and planes. What does it feel like? after September 11, 2001, issues of terrorism and security became prominent in the spatialized assemblage, such that airport practices, representations, and experiences have changed dramatically from the time before those events.

This way of thinking about space begins to get at the spatialized work of a technological assemblage in everyday life. But absent from Lefebvre's three levels of space is cultural studies' insistence on how power is spatialized in particular technological assemblages. The airport, as practiced, conceived, and lived is shot through with an economics and politics. It is a space of inclusion and exclusion, a space designed to make you do some things and not others; a space of transit in global struggles over the control of space; a space that asserts a way of living spatially that involves and

[3] Lefebvre (1991), p. 34.

affects people differentially, indeed unequally. The assemblage disciplines and rewards, reflects and resists, empowers some possibilities and disallows others. For example, there are many people for whom the airport is a space explicitly off limits: those, for example, on someone's no fly list, for reasons that can vary dramatically. Those without tickets cannot get very far into an airport; so the space effectively excludes those who won't fly, can't fly, or can't afford to fly. There are those, consequently, who cannot even get to see an airplane close up, let alone get inside one. This is a space that rewards, for example, the business traveler with special access to lounges for refreshment, connectivity, sleep, and similarly vetted company. They are granted freedom from noise, the traffic of the riff-raff, and competition for limited access to recharging stations. They are rewarded (by having the money to pay for it) with special seating on airplanes, special food, special treatment, and the ability to enter and exit the airplane in a marked-as-exclusive way. Other travelers, who nonetheless have not been excluded from the space of the airport, are restricted to other kinds of airport spaces: more noise, more queuing, more traffic, confinement in certain areas, more exposure to the multiple classes of people in the airport and the multiple reasons for being there. For those who work in it, the airport is spatialized differently yet again. There are certain doors they must walk through, with certain tags around their necks, certain places where they stay for the time of their shift, and, ironically, no place to go. For them the airport is not a space of transit, but a space of daily labor. The airport is thus a process of intersecting, multiple, relative, and differential spatial processes, not a container within which things happen. Each of these kinds of movements through space happens in the service of privileging some at the expense of others. For those beings moving in relation to that space, the airport is practiced, conceived, and experienced quite differently: empowering some, and disempowering others, in unique and significant spatialized ways.

Time and Technology

Just as space is typically understood as a place, a container within which things happen, time is typically understood as a uniform, absolute, and shared phenomenon, marked by chronometers as it passes. It too is seen as a container within which things happen. But just as with space, it is more appropriate to think in terms of everyday life being deeply temporalized, by which we mean that the practices, representations, and experiences of time within which we live are always cultural; temporalities are productions of relations and effects in space. Sarah Sharma's book, *In the Meantime: Temporality and Cultural Politics,* explores this insight in terms of what she calls *power-chronography.* Although less marked than the terminology of space offered by Lefebvre, she, like Lefebvre, explores practices of time, representations of time, and time as experienced. But always, her sense of power-chronography explicitly acknowledges the contributions of economics and politics, and the struggles and power-dynamics that are

likely to occur in technological assemblages. Here is her description of this distinctively cultural studies way of understanding time:

> Power-chronography is based on a conception of time as lived experience, always political, produced at the intersections of a range of social differences and institutions, and of which the clock is only one chronometer....[d]iscourses about time maintain lines of temporal normalization that elevate practices and relationships to time while devaluing others.[4]

As with space, particular arrangements of articulations among temporal practices, representations of time, and the lived experiences of time are unique to particular technological assemblages in which power is temporalized differently and unequally.

Although it has become highly naturalized in the West, the understanding of time as marked by the mechanical clock arose as part of what was once a new technological assemblage. Historian Lewis Mumford argued that one of the key places where this assemblage (our term, not his) emerged was in the monasteries of fourteenth-century Europe. An assertion of power over the bodies and behaviors of monks at prayer—in the service of order demanded by the Church—was obtained by synchronizing regularly spaced prayers. A mechanical clock could perform this work effectively, as it was not foiled by the clouds that could obscure the sundial or the cold temperatures that could freeze up the water clock. Mumford writes:

> Within the walls of the monastery was sanctuary: under the rule of the order surprise and doubt and caprice and irregularity were put at bay. Opposed to the erratic fluctuations and pulsations of the worldly life was the iron discipline of the rule. Benedict added a seventh period to the devotions of the day, and in the seventh century, by a bull of Pope Sabinianus, it was decreed that the bells of the monastery be rung seven times in twenty-four hours. These punctuation marks in the day were known as the canonical hours, and some means of keeping count of them and ensuring their regular repetition became necessary.[5]

Temporalized in this way, time might have been experienced by the monks as safe sanctuary from chaos, compartments that one moves through to punctuate the path to salvation. Although we cannot know with certainty what that temporal experience felt like, we can see that, once mechanized, the clock prescribes a highly disciplined body in the service of the ineffable. As Mumford implies, such a body is ideal for the servicing of the industrial revolution, a body in service of an equally ineffable goal, progress: the path to secular salvation. The clock, Mumford argues, is "the key machine of the modern industrial age."[6] It is, he asserts, a "power machine."[7]

[4] Sharma (2014), p. 15.
[5] Mumford (2010/1934), p. 13.
[6] Mumford (2010/1934), p. 14.
[7] Mumford (2010/1934), p. 15.

The drive for precision in the control of and over bodily movements has continued as evidenced in ongoing "refinements" of time. The scientific standard for time measurement is now the atomic clock: cesium clocks, laser clocks, and atomic fountains. An arrangement of such clocks at the United States naval Observatory (USnO) can currently measure frequency to about 16 decimal points. This arrangement of clocks will supposedly not lose or gain a second in 300,000,000 years, making it the "most accurate measuring device operationally ever created by mankind to measure anything." and what is a second in this reckoning of time? according to demetrios matsakis, Chief Scientist for Time Services at USnO, "a second is 9,192,631,770 periods of oscillation of an undisturbed cesium atom."[8]

When addressing the question, what is time?, matsakis says he doesn't really know, but he understands how to measure it, the purpose of measuring it, and the necessity for disseminating it: "It's no good to have the time here and not have it spread to the whole world. The whole purpose of making the time is coordinating the world." While recognizing "that is a circular definition," he uses an example to illustrate the need for such precision in the coordination and control of the world:

> If one GPS satellite is off by 1 billionth of a second, one nanosecond, then the GPS receiver will think it is one foot closer or further away from that satellite, and by the time it does all the math inside of it, its actual position could be off by two or three feet. So if you want to know where you are to the accuracy of two or three feet, so as to find your driveway, you have to have those GPS satellites synchronized to the nanosecond.

The need to know where your driveway is makes for an interesting choice in this example. Measuring time more precisely is justified as a necessary mechanism fixing you in space (How do I get to your house easily becomes how do I find you) and for differentiating spaces (The idea that my driveway is on my property not yours easily becomes this coordinate cannot be crossed by your airplanes). The distribution of temporalized space is critical in this power-chronography, and the effects extend far beyond keeping two trains from head-on collision.

It is important to remember, as Sharma says, that temporality is not universally common or shared. In spite of the hegemony of clock time, there is no universal, common temporality, especially so if you consider the lived experience of time.[9] Scientists at USnO may conceptualize time in terms of atomic time, and the movements of satellites and the work of positioning using GPS may occur in atomic time, but the experience of everyday life is not that of atomic time. At the level of experience, temporality consists in rhythms and intervals that vary dramatically, with differential effects on the bodies in question.

[8] Atlantic Video, 2014.

[9] Cf. Levine (1997).

The phrase 24/7 captures a belief that there is a reality, a practice, and a lived experience to which we must all conform. The demand to conform to the 24/7 world, within which time is fast, continuous, and without downtime, and in which all time is clock time, is conceived of as a technology-driven world. In the 24/7 world, according to Jonathan Crary in his book *24/7*: *Late Capitalism and the Ends of Sleep*, "the modeling of one's personal and social identity, has been reorganized to conform to the uninterrupted operation of markets, information networks, and other systems."[10] The shared experience of modern life shaped by the 24/7, technology-driven world is, according to Ivor Southwood in his book *Non-Stop Inertia,* one of *precariousness*, in which we are required constantly to mobilize against inevitable change. He calls this "non-stop inertia" and describes it this way:

> This constant precariousness and restless mobility, compounded by a dependence upon relentlessly updating market-driven technology and the scrolling CGI of digital media, together suggest a sort of cultural stagflation, a population revving up without getting anywhere. The result is a kind of frenetic inactivity: we are caught in a cycle of non-stop inertia.[11]

This is a powerfully enforced story, a powerfully enforced temporality. Just think for a moment about how your understanding of what is expected of you in life is driven by the need for speed, for constant contact, for mobility, and by anxieties over unanticipated and unsettling change. But if we believe that this is a universal experience of time, we have made the mistake of taking the experiences of particular segments of a vastly diverse global population and universalizing them. In so doing, we miss that a speed-driven world serves some remarkably well in particular ways, affects others detrimentally in particular ways, and operates apart from the experience of many significant others.[12]

Sharma's explorations of the differential work of diverse temporalities make it clear that the hegemony of 24/7 time requires a variety of temporalities to function at all. The speed-driven world serves and empowers the business traveler. These are the people who achieve pleasure, wealth, and status by being *in time* with the 24/7 world. These are the people the airport is designed to serve. These are the people whose time is precious in service of the accumulation of capital for contemporary global corporations. These are the people for whom the time of many others is expected to support with their time. Other bodies are "recalibrated" to support the operation of the 24/7 world, which demands for its operation an army of workers living shift time or a nine-to-five "normal" temporality. Baggage handlers in airports operate in a nine-to-five temporality, which requires "down time" to restore exhausted muscles in readiness for the physical exertions of the next shift. For those sitting at desks doing

[10] Crary (2013), p. 9.
[11] Southwood (2010), p. 11.
[12] Cf. Illich (1974).

the necessary but tedious data entry, yoga classes for desk workers train bodies to endure the demands of the nine-to-five temporality. Taxi drivers, Sharma illustrates, experience yet another temporal existence. Much of their work time is quite simply "waiting." and often they are asked to "make time," to save someone else's time. Each of these temporal rhythms is peculiar and particular, and none of these is the same as the temporal experience of an ailing person of advanced age longing for death while living in a hospice facility dedicated to sustaining that temporal moment in one's life.

"Time," Sharma tells us "is a structuring relation of power, exercised over the self and others."[13] Time is technological; it is not a technological measurement of what is fundamentally real; it is not a phenomenon caused by technological measurement. Rather, it is the temporal structuring of relations of power in multiple ways. Any "moment" in any "space" can be examined in terms of the articulation of multiple temporalities with multiple effects. Particular technologies—the airport, the factory, the Internet, the mobile—can be examined in terms of their articulation to multiple temporalities with multiple effects.

Modes: The Biases of Space and Time

You may have noticed that despite our intention in the last two sections to analyze space and time separately, time crept into the space section (the airport is as much about arranging and managing time as spatial flow) and space into the time section (GPS is about location and both business travelers and taxi drivers trace trajectories through space). It is important to emphasize space-time as an articulated concept. A space-time assemblage isn't the result of the articulation of a space-assemblage to a time-assemblage but an assemblage in its own right. To consider further the implications of space-time assemblages, we turn now to an extended example of what have been called *modes of communication.*

"No clock runs perfectly. Systems fail when clocks fail." So said USnO Chief Scientist matsakis, in defense of further work to render the measurement of time even more precise. For our purposes here, the statement provokes three significant claims about time as well as space in relation to technology: 1) that there are systems—assemblages—of spatiality and temporality, which can be understood as structuring relations of power exercised over self and others articulated to particular technologies; 2) that these assemblages do not last forever intact, that they can and do "fail" and change, and involve changes in technologies; and 3) extrapolating from the previous claims, that these assemblages are better understood as contested, that is, not as unified systems but as articulations of multiple spatialities and temporalities. Let's look at each of these claims.

[13] Sharma (2014), p. 146.

1) That there are assemblages of spatiality and temporality, which can be understood as structuring relations of power exercised over self and others articulated to particular technologies.

A significant body of scholarship in a range of disciplines has addressed this claim in terms of three systems, ages, cultures, or modes of communication: orality, literacy, and the electronic.[14] Because this scholarship was popularized in the mid-1900s, the term electronic, once appropriate, no longer serves very well. Other terms have been suggested, notably the information age or the digital age. Further, there is a case to be made that we are now entering another, 4[th] Mode: the biotechnological age. What is most useful about these modes is how they are understood in terms of space and time in relation to technology. To explore that, we turn to the work of Harold adams Innis.

Innis, a Canadian economist writing in the mid-1900s, famously described different cultural systems in terms of space-time biases as they relate to different technologies.[15] a culture that is *biased toward time* maintains cohesion by exerting control over time; its goal is the maintenance of society over time. The primary examples of time-biased cultures are those typically called oral cultures, which operate within a limited spatial context, rely on face-to-face, oral-aural communication, and manage memory and activities through keeping and telling stories. Because utterances are not preserved in time, time is said to be collapsed into a perpetual present, obliterating the difference between what we typically understand now as past, present, and future. The technologies that articulate to time-biased cultures are the voice (spoken language, poetry, story, and song) and structures not easily moved (structures made of stone and landmarks made to function technologically). Because it is easier to remember narrative and rhythm than discrete facts, important information, such as when to plant crops, is "stored" in stories, rhyme, song, or carved into stone. Immovable landmarks such as mountains or the way shadows fall on landforms can also serve as memory devices. In such cultures, ritual storytelling is essential and there is an emphasis on the transmission of tradition. Consequently, those who remember (such as elders or designated keepers of stories) are revered and powerful, insofar as they contribute to group cohesion.

An oral cultural assemblage is, then, an aggregate of bodies, sounds, rhythms, stories, structures, and rituals that empowers those who remember and those who have lived long enough to have long memories, and disempowers those who forget and those who are too young to have long memories. It empowers group cohesion. It empowers staying in place (or, at least, for nomadic peoples, staying proximate to one another) and in time and the technologies and practices that keep one there.

A culture that is *biased toward space* is concerned with exerting control over space; its goal is the maintenance of society over distance. The primary examples of space-based cultures are those called literate cultures: cultures of notation, of reading, and

[14] See Innis (1950; 1964); mcLuhan (1964); Ong (1967; 1982); Havelock (1982); eisenstein (1979).

[15] Innis (1950; 1964). The key section on which we draw is "The Bias of Communication" in Innis (1964), pp. 33–60.

writing. The critical technological development is the separation of the message from the sender, which permits the message to move independently in space. For this reason, literate culture is considered the age of empire, for now it is possible for religions, governments, and individuals to exercise influence and domination over individuals and populations at a distance with laws, letters, and records. Small group cohesion is diminished as control over groups and individuals is accomplished at a distance. The control over time is diminished as memory is displaced by the power of the recorded word. The recorded word, subject to interpretation, can now be consulted to serve as authoritative.

Because recorded communication takes different physical forms, the balance between space and time varies in literate cultures. Writing that is slower to produce and more difficult to transport, such as writing on stone, is biased more toward time than space. Writing on lightweight papyrus and later paper contributes to a bias toward space. So significant is the technology of printing in the shift to space-biased culture that the literate mode is typically divided into the script and print eras.

A literate cultural assemblage is then an aggregate of bodies, texts, storage sites, and movements that empowers individuals who can read, write, interpret, and direct the transportation of messages. It also empowers the spaces occupied by messages (such as libraries) and technologies of reproduction and transportation. It disempowers memory, the voice, those who cannot read or write, and those who stay in place and in time. It empowers movement in space over the maintenance of time, and empowers the technologies and practices to get one there, including far-off and imaginary spaces (including spaces known as nations[16]) known only through writing.

The electronic (and digital) mode reconfigures space and time yet again, but not so much by shifting the bias toward one over the other, but by "correcting" the bias toward space in literacy, restoring a balance between space and time and compressing both. The critical technological development is considered to be the separation of communication from transportation.[17] This separation was perhaps first accomplished with smoke signals but electronically with the telegraph.[18] The restored significance of time is illustrated in James Carey's example of the way that the assemblage altered the economy by restructuring national stock and commodity markets. As Carey explains, whereas as once arbitrage prevailed (buying cheap here and selling high there), telegraphy made it possible to level markets in space, because prices could be easily compared in time. Thus, in order to gain advantage, markets shifted to speculating on futures, because the effects of change over time could not be controlled.[19] In this case,

[16] Anderson (1983).

[17] Carey and Quirk (1989).

[18] Headrick (2000), p. 204 discusses the development of the electronic telegraph and morse's contribution of the code.

[19] See "Technology and Ideology: The Case of the Telegraph" in Carey (1989), pp. 201–230, especially pp. 217–218.

time became a resource to control as important as (perhaps more important than) space.

As with literacy, electronic communication takes different physical forms with variations in the production of spatiality and temporality. To the electronic transmission of coded messages, telephony adds the voice, the computer adds the image and physical sensation, and cellular and broadcast technologies add mobility. The computer is capable of transmitting oral, visual, and sensate messages anywhere instantaneously, producing a new kind of space, in articulation with literate spaces: cyberspace, which emerges in relation to networks of cables, routers, and computers but has the capacity to be everywhere and nowhere. The immediacy with which this is possible, articulated to the new cyberspace, produces a new temporality. This articulation is illustrated in the phenomenon of telepresence, where virtual presence has the capacity to command over distance and assert an immediacy analogous to face-to-face communication. Mobile technologies, perhaps the culmination of the digital mode, render this temporality and spatiality mobile. The mobile assemblage is strikingly different from the wired Internet of the 1990s. It affords quite different functions, agency, and affects. It is a different way of being and acting in the world, and a new way of engaging with space and time in the experience of everyday life. In an increasingly mobile world, location becomes both more and less important. Locative functions like "checking in" at different places via smart phone, tracking via smart phone, and communicating and working from just about anywhere at any time become the practices within which power is temporalized and spatialized. The demand for constant contact seems perfectly reasonable.[20] Marshall McLuhan, a student of Innis, predicted in the 1960s that this kind of instantaneous global communication would compel a kind of *global village*, putting us almost literally in each other's backyards, thus forcing us to be as concerned with one another as was the case in traditional oral cultures.[21] However, mcLuhan minimized the ways that, like the head-on train crash, being in the same place at the same time can also cause enmity among neighbors, He also did not yet know that because computer use is most often an intensely individual activity, we are likely to be further physically isolated and distanced from those who are otherwise close to us. This tension between distributed interpersonal connectivity and physical isolation has become one of the striking conditions characterizing the practices, representations, and experiences of the digital mode. McLuhan also did not foresee the mobile assemblage, which permits head-on crashes in virtual anytimes and anywheres.

An electronic (and digital) cultural assemblage is, then, an aggregate of electronic voice, text, sensation, bodies both virtual and real, storage mechanisms from hard drive to cloud, transmission technologies, and practices that empower a temporality based on speed and immediacy and a compressed spatiality that is both real and virtual. It

[20] See Gordon and de Souza e Silva (2011) on locative media, and Gregg (2011) on working at home. See also Farman (2012), mcCullough (2013), and Hjorth, Burgess, and Richardson (2012).

[21] McLuhan and Fiore (1967).

empowers a 24/7 temporality and those with the fastest technologies to act in it in a completely accessible, compressed, global, and mobile spatiality. It disempowers slow, deliberate thought and practice, those with limited access to the technologies of speed. It empowers acting in time over moving in space, yet it empowers using time in the service of controlling space.

2. *That these assemblages do not last forever intact, that they can and do "fail" and change, and involve changes in technologies*

Of the three claims we are making about assemblages of space and time in relation to technology, this is the most straightforward, and should be obvious given the discussion of the first claim. Assemblages do not last forever. We no longer live in a pre-literate, primary oral culture. And if we were to rely on strictly faceto-face communication, we would be ill suited to function, for example, in the digital global business environment. Who or what exercises agency, and the technologies, temporalities, and spatialities they function in to do so, have changed dramatically. The priests of the literate age no longer exercise the kind of imperial control they once enjoyed by teaching people to read the gospels. High speed digital traders now exercise more influence over everyday life through manipulating financial markets than most of us would care to admit.

With a transition from one mode to another, we do not, however, leave the previous mode behind, because no mode is an intact and uncontested whole. Rather, change is better understood as the rearticulation of old modes as new ones emerge. Walter Ong recognized this in relation to the transition from pre-literate, primary orality. As we develop literate and electronic technologies, we do not leave orality behind. Rather, it is reshaped and sustained by technologies that depend on literacy, including printing and electronic technologies. He named this "secondary orality," in which we attend aurally as well as visually to communications aimed at groups. Mass broadcasting is the archetype technology here; Ong argued that it leads to a strong group sense that is more powerful in its size and in its ability to extend across space than is the group, time-bound sense of a primary oral culture. Furthermore, in secondary oral cultures, individuals (at least theoretically) have the choice of independence or group belonging.[22] One may be group minded, but can be self-consciously so. This is not the case with primary oral cultures, where group belonging was a necessity of life. The possible dangers of secondary orality are exemplified in the rise of fascism in the 1930s, driven in part by the effective use of radio as a tool of propaganda. The character of fascism is to draw a dispersed but large population together around a core group identity.

Recall from Chapter 1 that Raymond Williams once postulated that a helpful way to understand cultural change was to recognize that at any historical moment there are dominant, residual, and emergent cultural forms, and that these overlap.[23] This is

[22] Ong (1982), p. 11.
[23] Williams (1980).

a useful way to envision modal changes in spatial and temporal assemblages to avoid the mistake of expecting that one mode disappears and another appears whole cloth. Instead of revolutions, there are processes of disarticulation and rearticulation that account for changing spatialities and temporalities.

3. *That these assemblages are better understood as contested, that is, not as unified systems but as articulations of multiple spatialities and temporalities*

Raymond Williams's insight about the overlapping of dominant, residual, and emergent cultures needs to be tweaked a little bit to emphasize that the very notion of a dominant mode or, for that matter, residual or emergent modes—both of which imply either past or future dominance—mask the fact that multiple intersecting spatialities and temporalities circulate simultaneously. Spatial and temporal practices, representations, and experiences may support, resist, or exist apart from the dominant mode. In cultural studies, we call that correspondence, contradiction, or non-correspondence. For example, in a recent Facebook status update a friend of a friend, wrote, "If you like the idea of being up at night reading, watching stuff, and occasionally comforting a distressed creature, then maybe having a kid is for you."[24] It is a playful and interesting update for several reasons. While we cannot attest to the experience of the poster with authority, the status suggests he is experiencing something unusual, outside his normal temporality and spatiality: staying up late at night, filling time with watching whatever is on, and the presence of a distressed creature who demands attention and comfort in their own time in a confined space of books, screen, and crib. This is neither "normal" nine-to-five time nor get ahead 24/7 time. The experience could certainly be understood in relation to those temporalities: perhaps the status expresses an experience of unfamiliarity, discomfort with, or perhaps even resistance to the disjuncture with whatever time was dominant in the poster's life. But, it also evokes the reality of an alternative, biological time, the time of parenting a newborn, a temporality with a completely different logic and a spatiality that demands presence. While that reality can be articulated to the dominant time, and seems to be in this status, it is in no way reducible to it. It neither corresponds nor contradicts; it simply is another temporality, another spatiality. In relation to nine-to-five or 24/7 temporality, the poster may be disempowered; in terms of newborn time, the poster may be empowered in ways he has never before imagined.

The poster finds himself out of time, but we should also point out that he is out of space as well. He is neither in the 9-to-5 or 24/7 temporal rhythm nor in the geography of the working world either by not being in bed or in the office or in a shop. Analytically we could approach the example from either the perspective of time or space, asking different questions and mapping different insights from each, though ultimately he is experiencing being out of space-time.

[24] Bryan Hadley Facebook Status update (9 march, 2014).

As this example illustrates, not everyone in every instance moves at the same speed and in the space demanded by dominant modes. We submit that it is more appropriate to think with Sarah Sharma's insistence that, to paraphrase her, what characterizes life are the differential and inequitable ways in which both time and space are made to matter and are experienced,[25] what matters is how time and space are worked on and differentially experienced at the intersections of inequity,[26] and how, in any particular assemblage, there are likely to be multiple spatialities and temporalities in articulation. It is thus more appropriate to think about orality, literacy, and the digital, as well as wholly other spatialities and temporalities, as, like the airport, processes of intersecting, multiple, relative, and differential spatial practices, representations, and experiences.

It's Not Really a Gamble

We have drawn heavily on the work of Greg and Sarah Sharma to argue that power is spatialized and temporalized differently and unequally in technological assemblages. We want to end with a compelling example of intersecting, multiple, relative, and differential spatial and temporal practices, representations, and experiences as they relate to a particular technological assemblage. To do that we draw on natasha dow Schüll's research on video gambling machines in her book

Addiction by Design: Machine Gambling in Las Vegas.[27]

Schüll's research "explores the relationship between the technologies of the gambling industry and the experience of gambling addiction."[28] She rejects the view that video gambling machines are culpable entities that produce addicts as well as the view that there are addictive personalities that find their way to video gambling machines. She thus rejects both technological determinism and cultural determinism to explain the phenomenon of gambling addiction. Instead, she explores what she characterizes as "the asymmetric collusion between the gambling industry and gamblers,"[29] which we would characterize as a technological assemblage within which the contributions and experiences of actors result in differential and unequal effects. The actors in this assemblage include the gamblers and machines, and what Schüll refers to loosely as the "gambling industry" and the "casino." Because it is addiction that most captures her attention, the spatial and temporal experience of the gambler features extensively in her work, yet the research suggests multiple, intersecting spatialities and temporalities that constitute the assemblage of multiple actors in the "gambling industry." This includes—naming just the human actors—casino owners, casino investors, lobbyists, machine designers, factory workers who build the machines, researchers, architects, designers, construction

[25] Cf. Sharma (2014), p. 15.
[26] Cf. Sharma (2014), p. 14.
[27] Schüll (2012).
[28] Schüll (2012), p. vii.
[29] Schüll (2012), p. 165.

companies, carpenters, accountants, tax attorneys, lawyers, addiction counselors, and the plethora of shift workers and nine-to-fivers whose lived experience of the casino is quite different from the two masters they serve: the gamblers and the management. They make change, bring drinks, clean toilets, cook food, park cars, and stand watching. It would be possible and instructive to examine the particular spatial and temporal practices and experiences of each of these groups. Schüll focuses, however, on the practices and experiences of the gambler as existing in an asymmetric relationship with the deployment of the rest of the gambling industry assemblage in the search for profit. So, we too will highlight that particular aspect of the assemblage.

Schüll asserts that because they are human, gamblers come with "a field of potential dependencies,"[30] and, like other consumers, they learn to manage and "recalibrate their actions in response to environmental feedback."[31] For the gambler the "zone" is what keeps them playing, the time and space of pleasure...and, coincidently, addiction: "a zone in which time, space, and social identity are suspended in the mechanical rhythm of a repeating process."[32] It is a world apart, a world insulated from the spatial and temporal demands and anxieties of the "real" world. It is a place of timelessness in an intimate spatial relationship between human and machine (as long as the money holds out). Industry actors understand the power of the zone and exploit it in every way they can.

The casino industry can be seen as the deployment of an assemblage of intersecting spatialities and temporalities in support of a particular configuration of the gambler-machine interface, one in which the industry elaborately provides what the gambler "wants," measured by the ability to work the player to "extinction," that is, to exhaust all the money the gambler has at their disposal. While many of the casino actors operate in the space and time of global capital, the high-finance economic and dizzying 24/7 world, they employ professionals, nine-to-fivers, and shift workers to work both in and outside the casino to engineer the interface. The exteriors and interiors of casinos are designed elaborately and differently depending on the type of gambler who frequents them: whether, for example, they are tourist gamblers or local gamblers. The movement of gamblers through casino space is carefully coaxed by what they see, hear, and smell. They are monitored at play, both to "improve" the casino and tailor "services" for the gambler. The machines themselves are artfully constructed, both internally and externally, to give the gambler the feel of control, while skillfully controlling them. The rhythms and the spaces where the work of management and design takes place are both quite different from the rhythms and spaces experienced by the gambler and are conducted out of sight, thus masking the asymmetry.

Schüll highlights the asymmetry in the differential relations of industry, gambler, and machine, which is also an asymmetry in practices and experiences of space and time.

[30] Schüll (2012), p. 244.
[31] Schüll (2012), p. 256.
[32] Schüll (2012), p. 13.

The casino gambling assemblage as it is currently articulated is coterminous with these asymmetries, with these differential spatial and temporal processes, experiences, and effects. In response to those who call for the promotion of "responsible gambling," Schüll cites an author of a study on responsible gambling as saying "If responsible gaming were successful, then the industry would probably shut down for lack of income."[33]

The zone is not inherently a space and time of exploitation. Articulated differently the zone can be the space and time of creativity, spiritual ecstasy, athleticism, sexuality, music, and so on. The zone, like any spatial and temporal configuration is produced by particular assemblages within which technologies figure and contribute to differential and unequal effects.

Conclusion: Why Space and Time?

Thinking of technology in terms of space and time provides at least three insights. The first emphasizes one of the primary themes of this book: We cannot consider technologies in isolation, but as part of assemblages. In this chapter we see that they exist and function in, and as a part of, culturally specific spatial and temporal relationships with differential and unequal effects. To ignore these dimensions is to seriously misunderstand the role and work of technology in everyday life.

The second insight is an appreciation of practices, concepts, and experiences in technological assemblages. Technologies are not disconnected from the space of our everyday lives, and any analysis of technology should acknowledge what people do, what they think, and what they experience. Technological assemblages are not just about industrial technologies, factories, offices, battlefields, and so on. They are also about temporal and spatial practices, concepts, and experiences of everyday life. To understand a technological assemblage requires that we understand the work of articulation among these aspects of everyday life, with particular attention to their differential and unequal effects.

The third insight to be gained from thinking about technology in terms of space and time, and a consequence of the second point, is the realization that other articulations of technology are possible, both for us and for others. If we recognize the contingency of our practices, representations, and experiences, we are encouraged to question our assumptions about how things are "supposed to be," and call into question the occasions when we accept an assemblage as somehow "natural." We can recognize that others' practices, representations, and experiences of technology may be at odds with ours but are also based on complex articulations that demand understanding and may, to varying degrees, be commensurate or incommensurate with our own. It is empowering to realize that change is possible and technological assemblages can be articulated differently for us and for others.

[33] Schüll (2012), p. 267.

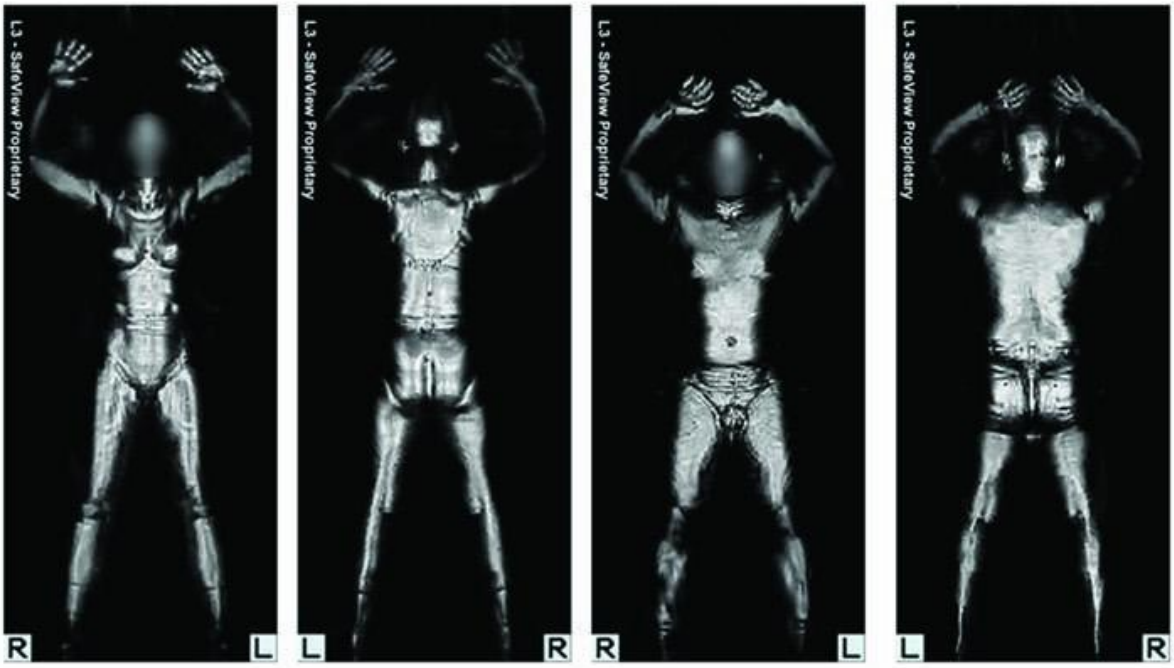

Figure 21: MMW

Source: Transportation Security administration, 2009, Wikimedia Commons: commons.wikimedia.org

Chapter Fifteen: Identity

THERE IS A SAYING IN RUSSIA that predates even the Soviet union. A Russian is body, soul, and passport. That is, an important aspect of who one is, is a technology, in this case, a passport: a system of identifying and tracking citizens. David Lyon, the pre-eminent scholar of surveillance studies, updates this by saying: today, we are body, soul, and credit card.[1]

What these sayings are pointing to is the entanglement of identity and technology in technological culture, in this case the development of a second self, a shadow self made of data. Our data selves consist of all the dossiers, files, records, and reports kept on us by a dizzying array of public and private entities: government agencies in charge of voter and driver registrations and various licenses, not to mention passports; insurance companies; medical providers; marketing firms; credit reporting agencies; supermarkets (and, indeed, any business with a frequent shopper card); schools; Facebook and other social networking sites; your mobile phone company, and more. As these records have become digitized, they have also become increasingly interconnected, cross-referenced, and mined for what they may predict (for good or ill) about our future health, wealth, or lifestyle.

The data self arose from a need for technologies of verification. Once we move beyond life in a simple village, where everyone knows, and can vouch for, everyone else, we need what Lyon has called "tokens of trust."[2] Id cards of all sorts become ways of verifying our identity, at the very least, of establishing our qualities (as in the case of a credit report). Entire institutions, bureaucracies, and technologies have been created to manage the verification processes (from credit reporting agencies like equifax to state and federal agencies such as the division of motor Vehicles, the Social Security administration, or the Transportation Security administration). The documents attest to who we are. Trust is the key word here (and recall our discussion of trust in Chapter 5). Today our society has built systems that trust *only* this data self—the numbers appear to be objective, so they must be the truth; the person before you is obviously self-interested, and therefore cannot be trusted. Lyon argues that surveillance systems bypass the speaking subject to trust/rely on only more "objective" accounts of who you are: computer files or chemical or biological markers (such as dna, fingerprints, or other forms of biometrics). Systems based on science and technology are deemed to be neutral and objective and therefore more reliable than the subjective assessment of

[1] Lyon (1994). On passports, see also Robertson (2010).
[2] Lyon (2009).

a human agent—though research has shown significant biases built into science and technology, like biometrics, especially when it comes to issues of race.[3] Significant decisions about you, your family, your life, and your future are made solely by referring (and algorithmically manipulating) the data self, despite the fact that such information is often inaccurate (please check all your credit reports carefully!) or biased. A consequence of this situation is the rise of identity theft. Though we know, when we talk about identity theft, that *you* cannot be stolen (it's kidnapping if it's your body and something else if it's your soul), we must acknowledge that some piece of you—something that helps make you who you are and allows you to live as you do—is gone.

The lesson here is simple: identity and technology are intimately related. In this case, technologies of verification, data storage and analysis, finance, risk management, and others, both directly and indirectly impact our lives and indeed set the conditions and parameters for our existence: what type and amount of loan you can secure for education, housing, transportation, business; what insurance you can get; what resources are located near you; how you are regarded by police and other civic services; and so on. Indeed, even who you are determined to be (what race, gender, class, sexuality, citizenship, ability, and so on) is entangled in technological assemblages.

Identity as Assemblage

Taking our assemblage approach to technological culture seriously means that we approach the issue of identity and technology not as the conjoining or articulation of two different artifacts (person and technology), but as an emerging assemblage. Identity *is* assemblage, it is the expression of an assemblage. It is not an element of the assemblage, not a product (effect) of the assemblage. It is what the assemblage achieves.

What do we mean by identity? Identity is a sense of unity and coherence that can be felt, lived, and attributed. Personal identity consists of names, biography, features, and sense of self (that is, there is a me here, a you there). Broader identities include categories or groups that one belongs to, like race, nationality, gender, and so on (I am also American, I am human, you are nicaraguan, you are an illegal immigrant, you are a corporation, you are a person). A sense of self, these senses of identity, do not exist a priori. Rather they are the expressions of assemblages. Deleuze was fond of writing that there is no "I," only the habit of saying "I." Similarly, there is no you, no them, only assemblages within which both you and the other is constructed.

We focus here in this chapter on one's sense of self in relation to the technological assemblage because where the assemblage is currently most culturally salient has to do with what is a person. What am I? What am I as a human being? What we mean by identity or the self is always already caught up in assemblages of technology.

[3] Magnet (2011); Pugliese (2010).

Consider, for example, the idea that gender is an assemblage. That is, one's gender is a *performance* of scripts, signs, and codes. A gender is not what someone *has*, but what someone *does* (this is the insight of Judith Butler[4]). We are continually performing our versions of gender in our fashion, movement, language use, and interactions with others (where we may seek to police gender categories as well, by affirming or critiquing others' performances). An individual does not perform gender in a vacuum, but that performance is an expression of an assemblage: bodies of discourses, codes, and social expectations that we take up, inhabit or challenge in some way, but also bodies of technologies which bend space, mediate action, and translate will. Technologies, for example, afford (suggest) certain uses by certain types of bodies. Gender assumptions are even built into our technologies. To explain this point we can reflect on the prescriptive aspects of technological agents (to use Latour's language).

Those who delegate to a technology are not the only ones impinged on by it; once a technology is in place, it acts on all those who encounter it. Though this sounds egalitarian, remember that technologies are designed with sets of assumptions about their users: what they weigh, how tall they are, their abilities, their intelligence, and other demographic factors. The technology, in turn, assumes that all users match this profile, in spite of the fact that they will not all do so. For example, though we might think of a technology like photographic film as being neutral in that it simply captures the image of what is in front of the camera, Richard dyer has persuasively argued that the chemical composition of what became standard film stock for still photography or films, plus standard lighting fixtures and practices and the structure of cameras, presume that the subject being photographed is white (that is, Caucasian), and so this assemblage does not capture the images of people of color as effectively.[5] Similar constraints plague contemporary digital image-capture technologies, hampering (and adding substantial bias to) efforts to use biometric technologies like face recognition, which have significant problems with non-white faces.[6]

Technologies make two kinds of assumptions: what we will call *design assumptions* and *system assumptions*. Both figure significantly in matters of identity. By making assumptions, technologies not only prefer certain uses and users over others, they prescribe certain cultural (including gendered and raced) behaviors, attitudes, and practices. In other words, they contribute in very particular ways to the performance of identity. *Design assumptions* are the basic assumptions of an individual technology about the people using it, in other words, which users the technology seems to prefer. These assumptions usually go unnoticed unless you are someone for whom the technology was not designed. If you are left-handed, you know exactly what we mean: ladles pour from the wrong side, doors close from the wrong side, handle grips feel awkward, and writing on most school desks is a challenge. In another example, very tall, very

[4] See, e.g., Butler (1990).
[5] dyer (1997).
[6] Pugliese (2010).

large, or very short people can easily spot the limitations of automobile design. Most automobiles are built to accommodate "average"-sized people, discriminating somewhat against women, whose average height tends to be shorter than men. Seatbelts don't fit, the mirrors are placed wrong, and the steering wheel is at the wrong angle, to list a few problems. Modern automobiles allow users to adjust the seat, steering column, and mirrors, but only within a limited range of possibility.

By their very design, computers shape how we use them. Beth e. Kolko writes that, "technology interfaces carry the power to prescribe representative norms and patterns, constructing a self-replicating and exclusionary category of the 'ideal' user."[7] Most computers are constructed with the assumption that you have the use of both hands to type and use the mouse, that you can see the screen, and you have the mental capacity to negotiate its technical challenges. But computer design makes assumptions about more than just the physical and mental abilities of this ideal user. In fact, computers assume an awful lot. The computer assumes that you have a consistent and reliable power source, the money to pay for that power, a place to put the computer, an internet connection, reliable service, the money to pay for that service, the money to purchase software, the time off from work and other activities (making food, raising children) to learn how to use the computer, and so on. It also assumes that you have access to someone who can fix it when it breaks and update it when it's obsolete. Computers assume, in short, much more than is accurate about the majority of the world's population. But this discussion has moved us from a consideration of design assumptions to the second kind of assumptions that technologies make: *system assumptions*.

Because technologies are not isolated tools but parts of systems of technologies, we can detect the work of *system assumptions*: the assumptions made by the system within which the technology functions. We can begin by looking at support systems (fuel costs, replacement costs, repair costs, supply costs) and how some technologies are connected to others.[8] Fast-food systems provide an interesting and extended example of the consequences of systems assumptions. Think of the mcdonald's restaurant chain as a technology, or rather as a series of technologies connected together in a technological assemblage, the goal of which is to provide inexpensive hot food to a maximum number of people in a minimum time.[9] This system works quite well for most of the population. As sociologist Susan Leigh Star puts it:

> Mcdonald's appears to be an ordinary, universal, ubiquitous restaurant chain. *Unless* you are: vegetarian, on a salt-free diet, keep kosher, eat organic foods, have diverticulosis (where the sesame seeds on the buns may be dangerous for your digestion), housebound, too poor to eat out at all—or allergic to onions.[10]

[7] Kolko (2000), p. 218.
[8] See Star (1999) on studying infrastructure.
[9] See Ritzer (1996) for a discussion of the way the system of mcdonaldization works.
[10] Star (1991), p. 38.

If mcdonald's recognizes a significant market demand, it will alter its system to cater to these particularities: vegetarian burgers in some places, mutton burgers in others. However, no matter how many niche markets one identifies, there will always be people outside the system who are inconvenienced or even harmed by the system. Star was allergic to onions, even if cooked, and found that getting any food establishment (not just mcdonald's) to omit the onions (to not even put them "on the side") an endless task. Greg is lactose intolerant and needs to police his food for milk products; *you* try ordering a pizza without cheese and see the looks you get. However, lactose intolerance in recent years has been more widely recognized as a common disorder and has become a niche more readily catered to than onion allergies.

Star raised the point about being allergic to onions, not simply to draw attention to the potential cruelty and inconvenience of large-scale systems, or even to remind us that there will always be people outside the system, ignored by design practices, though these are important points. She emphasizes instead that we are all affected by such technological systems, that we must begin with "the *fact* of mcdonald's no matter where you fall on the scale of participation, since you live in a landscape with its presence, in a city altered by it, or out in the country, where you, at least, drive by it and see the red and gold against the green of the trees, hear the radio advertising it, or have children who can hum its jingle."[11] Technological assemblages thus impose and *impinge* on people who do not even consciously participate in those assemblages.

The ways that we enter into assemblages, or are swept up in them, shape possibilities of behavior, thought, and language. If we think of the modern home as an assemblage, we can begin to see how the assumptions of that identity affect men and women differently, affording particular performances of gendered identity. In Chapter 3 we introduced Ruth Schwartz Cowan's classic study, *More Work for Mother*, which traces the history of what have been called labor-saving technologies in the home: electric dishwashers, clothes washers and dryers, refrigerators, vacuum cleaners, and appliances in general. The purpose of these technologies was to accomplish strenuous tasks with less effort and time, and make life easier. Although most of these technologies were developed by men working outside the home, they affected women in the home. Since the tasks addressed by these technologies have traditionally been women's tasks, these technologies impinged on women much more than on men. What Cowan discovered is that these technologies actually *increased* the amount of time women spent laboring in the home. They did not save labor, time, or effort for these women. Instead, the men's inventions placed more demands on women and their work. How did this increase happen? many tasks once outsourced to others, such as laundry and ironing, could now be done—and therefore *had* to be done—at home. Tasks that once included children and other family members—in such family efforts as "wash day"— could now be done by one person, and inevitably that one person was the mother. Furthermore, these technologies contributed to creating a higher standard of cleanliness than had been

[11] Star (1991), p. 39.

previously appreciated and expected. Because we could now conveniently and easily launder clothes on a daily basis, the technology contributed to the notion that we *must* launder them after every wearing to be considered clean. Carpet cleaning had once been a communal annual or semi-annual activity for the family. Carpets were rolled up, hauled outside, and beaten. With the introduction of the vacuum into the household, the carpet could suddenly be vacuumed and cleaned more frequently, a fact that contributed to the belief that it *must* be vacuumed and cleaned more frequently. Sweeping the floor was no longer good enough. Now carpet cleaning with a vacuum is a solitary activity that can be performed far more often, even weekly or daily.

The technologies certainly did not achieve these effects "on their own." The *gendering* of specific tasks (delegating tasks to one gender more than another) is definitely reinforced by advertisements, social expectations, habits, and cultural understandings. A technology is always developed in, or rises out of, particular circumstances, and its use is always introduced into a gendered environment. Ann Gray, for example, found that when videocassette recorders (VCRs) were introduced into homes in Britain in the 1980s, their use matched established gendered patterns for the use of household technologies.[12] Specifically, men tend to use technologies at home for specific limited tasks, such as fixing a leak, making bookshelves, or changing an automobile's oil; whereas women tend to use technologies for ongoing day-to-day chores, such as housecleaning. In addition, "high-tech" devices tend to be male territory.[13] although leisure technologies in general tend to be gender-neutral, Gray found that it was the men who usually learned how to use the VCR first and remained the household experts on more advanced functions such as timed recording. Though the women in her study learned how to record, playback, and rewind a tape, they usually turned to their male partners if the machine needed to be programmed to record at a later date and time. Control issues are especially evident in the observation that if more than one person is watching television, the remote control is almost always in the hand of a male adult, or, if not, then a male child (this may be changing, *finally*).[14] Further, the VCR became an element in a long-shifting negotiation of leisure space and time within the domestic environment, an environment in which it is much easier for men to establish "time out" for relaxation than it is for women, who are constantly concerned with domestic chores.

A similar set of issues arose when the personal computer became a fixture of many homes in the 1980s and 1990s. Marsha Cassidy describes how the personal computer was marketed predominantly to men in the 1980s, but with slowing sales and a desire to make PCs a common domestic appliance, marketers began targeting women in the 1990s.[15] Following Cowan's work, Cassidy points out that the PC was advertised as a labor-saving device, in particular saving the labor of women in the home. It did so

[12] Gray (1992).
[13] Gershuny (1982), cited in Gray (1992), p. 188.
[14] Gray (1992), p. 248.
[15] Cassidy (2001).

by emphasizing the PC's role in allowing women to work from home (telecommuting), manage the household (keeping track of shopping lists and family schedules), and enhance the children's education. Like other domestic technologies before it, the PC also makes more work for mother by increasing her responsibilities (and potentially moving the working mother back out of the office and into the home, concentrating paid and unpaid work in the home).[16] Cassidy's research also touches on the spatial dimensions of technology in that she raises the question of where to put the PC in the home. Because there are few spaces in a typical home that are exclusively a woman's (versus a man's "den" or the children's own rooms) the location of the PC and the gendered responsibilities for its use raise key questions about gender, labor, and technology in the domestic environment.

These examples show how gender expectations and performances emerge alongside assemblages of devices, expectations, and so on, that is the domestic realm. We are often not aware that our senses of self and our way of life are expressions of our assemblages, though we become aware from time to time of how systems impinge on us.

Differentiating Machines

Assemblages are discriminatory. That is, they are differentiating machines. And we see this nowhere more clearly than the case of identity. Identity gets caught up in technologies of categorization. For example, take the case of Caster Semenya, a young South african runner who won the women's 800-meter race at the World Championships in 2009. She had to be submitted to a number of medical examinations to answer challenges that she was, indeed, female. The case sparked debates over what constituted femaleness and maleness, and what were appropriate means of testing one's sex (physical features? dna?). Semenya was eventually declared female, allowed to keep her medal, and continues to compete.

One of the legacies of the eighteenth century European enlightenment was the idea that modern science was rational, ordered, and morally superior. It was believed that the world could be understood through rational means, by detached objective observation, and by the labeling and categorization of all things.[17] everything was said to have a distinct identity and to be related to other things in distinct ways. The grand schemes of scientific nomenclature derive from this era. For example, Linnaeus attempted to categorize all living things in terms of kingdom, phylum, genus, species, and so on. As rational and logical categories, these divisions were thought to be absolute: you were a plant or an animal, not both. (Scientists have since accepted several grey areas as categories, although that is not widely known.) among the most obvious categories were male and female, though not all species made this distinction. In terms of hu-

[16] See Gregg (2011) on the "convenience" of working from home.

[17] See Bowker and Star (1999), especially the Introduction, pp. 1–32.

mans, the male/female division seems self-evident. But this is not always the case. For example, a number of children are born each year bearing some physical characteristics of both sexes, and occasionally quite distinctive physical attributes such as the "wrong" genitalia. These children are referred to as being "intersexed."

This is where technology steps back into the picture. The scientific schemes for knowing and labeling the population become technologies of standardization and normalization, techniques for identifying the normal and the deviant through medical inspection. A child is declared normal or deviant, and those declared deviant have to be normalized. In the case of intersexed children, this can be as simple as purposefully ignoring the difference if it is slight, utilizing techniques to socialize the child "properly," or using treatments as complex and radical as hormone therapy and corrective surgery. The chances of a child being intersexed in some way is one in two thousand (or about 65,000 per year).[18] until a few years ago, it was standard medical procedure to immediately perform corrective surgery on the infant—without even informing the parents.

The presence of the "deviant" would suggest there is actually a continuum of body types from traditional male to traditional female (and not just a continuum of body types—there is a wider variety of chromosomal pairings beyond the XX and Xy that most of us were taught in school). Cultural and medical technologies of normalization (and we mean those of categorization much more prevalently than those of surgery) work against that continuum and on the general population to identify, characterize, and reinforce discrete categories of physical characteristics and behavior. So when we identify ourselves as female or male, we do so as products of technological assemblages of cultural conditioning and medical technique.

Like gender, race has been the object of intense scientific speculation and research. Despite the accepted scientific categories (Caucasoid, negroid, and so on) there is no scientific, biological basis for racial differentiation. There are no physical traits that fall absolutely in only one category, and there is no DNA marker by which to differentiate the population. Racial categories and the characteristics attributed to different races are purely cultural.[19] However, this does not mean that schemes of racial categorization don't have real effects on real people. The technological assemblages of racial classification have tremendous impacts on citizenship, immigration, and quality of life within different countries.[20] From access to jobs, education, and housing, to freedom of movement and rights within the legal system, racial classification systems have significant effects.

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[18] nussbaum (2000). German law now recognizes "indeterminate" as an option on birth certificates. See agius (2013).

[19] For an example of work on the social construction of race, see Omi and Winant (1986).

[20] See, for example, Bowker and Star (1999) on race classification under apartheid, pp. 195–225. See also Omi and Winant (1993) in which they argue that the fact that race is socially constructed does not mean that it is pure ideology. Rather, race is "a fundamental principle of social organization and identity formation" that is always relational and in process, pp. 5–6.

Not only are there technological assemblages that produce the categories of race, gender, and class, and place us within them, but other technological assemblages discriminate based on these categories. Let us look at an example discussed by Langdon Winner: the case of Robert moses, the architect who designed some of the major public works of New York from the 1920s through the 1970s.[21] Moses was responsible for parkways, bridges, and other large constructions that we often take for granted. Indeed, we often do not consider such structures as technologies, though of course they are. One might assume that public works impinge on all users equally. After all, how can a road discriminate? Can't we all drive on them equally? ah, there is a lesson here in how we can be so easily deceived by the appearance of things.

We focus on one of moses's public works: the bridges over the parkways on Long Island. These overpasses are amazingly low, in some places leaving only nine feet of clearance overhead. This does not hinder anyone driving a standard automobile, but the bridges effectively hinder the passage of taller vehicles, like trucks or busses. Therefore, the bridges discriminate against those who drive trucks or ride busses. Those who ride busses are less likely to own their own cars and more likely to come from the lower classes. Consequently, the lower classes have a more difficult time getting to Long Island. Minorities are also more likely to make use of public transportation, so their access is restricted as well.

Are these bridges an unfortunate mistake or a thoughtless error? according to moses's biographer, Robert a. Caro, the bridges were deliberately designed to hinder poor people and blacks, not only from using the parkways, but also from accessing Jones Beach, a park moses designed. In this case, the task delegated to the technology was in part that of racial and class discrimination. The bridges continue to impinge this particular lesson back on all who drive (or who cannot drive) down the parkways of Long Island.

Mobilizing Technologies to Rearticulate Identity

Until now in this discussion, people, individuals, seem relatively passive—and are categorized, gendered, raced, classed, controlled, and manipulated based on gender and race. But at times people take up technologies more directly to address questions of

[21] For discussion and examples of the impinging work of moses's design work, see Caro (1974), especially p. 318. For discussion and examples of the impinging work of moses's and others' design work, see Winner's "do artifacts Have Politics?" in Winner (1986), pp. 19–39 and p. 180 (fn 7). For unusual evidence of moses's explicit intentions to discriminate based on identity, see Hoving (1993), p. 245. Thomas Hoving, writing about his time as director of the New York metropolitan museum of art, consulted moses about building an underground garage. According to Hoving, moses said: "design it in such a way that no school buses or campers can enter. Buses drive away revenues and, besides, all bus drivers pocket the money they get for parking." Campers had to be discouraged because "squatters will stay for life." moses's solution, which was adopted by the museum, was to lower the height of the entrance to the garage.

identity. For example, technologies can be used to alter identities to either conform to or rebel against cultural norms. These "technologies of the body" range from makeup to surgery. Makeup is used to alter one's appearance to fit within cultural norms of attractiveness and to exaggerate or emphasize gendered characteristics of appearance, such as the eyes or lips. But makeup is also used to alter racial characteristics. For example, skin-lightening cream is used to change the color of one's skin so that it better meets the cultural ideal of fair skin and "white" identity. Other cosmetic technologies that work to alter identity include surgical technologies such as liposuction, collagen implants, breast augmentation and reduction, face-lifts, nose jobs, and penis enhancement. Women are the predominant users of procedures like these, but men also use them. These surgeries can reinforce cultural standards of attractiveness.[22] Cosmetic surgeries also alter racial characteristics. For example, such procedures are relatively common in Southeast asia, where asian women have cosmetic eyelid surgery to rid themselves of their epicanthic eyelid to take on the rounder eye shape of Western (Caucasian) standards of beauty. However, this example is more complicated, since women may undergo the operation in order to minimize the racist reactions that their epicanthic eyelids elicit (as a marker of racial difference) rather than explicitly to look white.[23] as genetic science and technology become more sophisticated, the technology will be used to alter these identity characteristics on a genetic level by selecting out or altering the human genome.

Another sphere where we have been taking identity construction into our own hands has been online. For example, we create online versions of ourselves all the time, at times with characteristics and habits quite at odds with the "real" us. We have Facebook pages, Instagram profiles, Twitter feeds, webpages, blogs, avatars in the World of Warcraft, minecraft, or Second Life, usernames with distinct identities in online forum on news sites, popular culture sites, and on and on.

The construction of online identities has been a topic of much discussion since the 1990s. In her influential book, *Life on the Screen*, social psychologist Sherry Turkle interviewed students who spent a great deal of their time online.[24] She found that text-based interactive environments such as muds (multiuser dimensions), mOOs (mud, Object Oriented), and even chat rooms allowed the students the opportunity to "be" someone else, occasionally several other people, because such environments are created solely by textual description. Online a person can describe their appearance, feelings, actions, and environment however they choose. They can be tall, handsome, well built, beautiful, funny, smart, and self-assured; they don't even have to be human. Beyond the initial description, they simply have to interact with others online according to their purported personality (confidently, quickly, intelligently, belligerently, humorously, and so forth). In engaging in these interactive role-playing scenarios over time, people often

[22] Balsamo (1996).
[23] Yamamoto (1999).
[24] Turkle (1995).

develop entirely different lives and identities for themselves. Some individuals run multiple characters on a single site, or different characters in different environments. In an oft-cited passage, early on in her book, Turkle quotes "doug," a midwestern college junior:

> I split my mind. I'm getting better at it. I can see myself as being two or three or more. And I just turn on one part of my mind and then another when I go from window to window [on my computer screen]. I'm in some kind of argument in one window and trying to come on to a girl in a mud in another, and another window might be running a spreadsheet program or some other technical thing for school... And then I'll get a real-time message [that flashes on the screen as soon as it is sent from another system user], and I guess that's RL [real life]. It's just one more window... RL is just one more window, and it's not usually my best one.[25]

Online experiences such as these illustrate the limitations of the assumption that each of us has only a single core identity; although we didn't need computers to point out that we have many sides and aspects to our identities and personalities. We only need to observe our own and others' behaviors in different situations to witness dynamically different personalities coming to the fore. For example, you might be focused and serious in class, but fun and flirty in a bar. But the Internet allows you to completely rework appearance in an online environment by controlling nonverbal communication. You are free to describe how you look, your expressions, posture, gestures, reactions, and so on. You can "try on" other appearances and personalities that would be impossible (or embarrassing) to carry off in real life. So this rearticulation of identity goes far beyond dressing and acting differently for a particular occasion or event, where you would have far less control over the nonverbal aspects of who you are.

The mode of communication facilitated by the Internet raises to new heights old questions about the cohesion of identity. Are we single selves or multiple beings? Can we change who we are? Online identities often seem independent and autonomous, just as cyberspace is sometimes seen as an independent and autonomous space. However, from the perspective of assemblage, we have to consider the myriad articulations between online happenings and offline events and how identity is challenged in and by this reconfigured space.

Digital You

As Internet use becomes a daily activity for people, it is no longer a radically distinct, compartmentalized activity; and the play, experimentation, and activity that

[25] Turkle (1995), p. 13. The first and third editorial brackets are by the authors, the second is by Turkle.

flow through these modes are surely sites of significant change in the shape of identity in technological culture. For example, now that we can access social networking sites such as Facebook or Twitter (or the hundreds of other networking sites) on our mobile phones, and not just at our desktop computers, they not only permeate, potentially, more hours and aspects of our waking day, they are seen less and less as being an "online" activity, separate from "offline" activities. Think of the number of ways that you may maintain your identity technologically: you may have created an avatar on a platform such as Second Life, World of Warcraft, or minecraft; you may craft your Facebook Page with care; or you may maintain a blog or Twitter stream. These activities entail at times a significant investment of time and emotional energy to produce and maintain a particular version of you through the words of tweets or blogs, or the videos you post to youTube or Vine, or the images accompanying your profile. This is the seemingly endless burden of reputation management. Some young people, for example, are continually updating their profile image as their mood or situation changes and have become quite adept at self-portraiture. But the maintenance of a carefully crafted image can also entail your commentary on friends' pages and your involvement in the social network at large. It also entails a certain level of vigilance, since aspects of our online identity are outside of our control. For example, others can post comments about us or photos in which we are tagged, all of which go into the online profile of you. Students talk about searching out and untagging pictures from parties and other events with which they don't necessarily want to be permanently associated.

And that's another aspect of this online identity. It's relatively permanent: Though you may delete comments, photos, even entire profiles, copies still exist on servers or in other databases of which you have no knowledge. And it continues after your body perishes. Indeed, one of the tasks now left to heirs once someone has passed on is hunting down and extinguishing traces: bank accounts, licenses, subscriptions, email accounts, Facebook pages, and more. And as more material goes online, such as old newspapers, yearbooks, and other documents, the Google search result, which is the way we are increasingly represented to others, incorporates all these. And the digital you grows, a digital you that is inseparable from the nondigital you. Online affairs have real world consequences on relationships. And online comments can open one to be fired from one's workplace or even to be denied employment in the first place (employers Google prospective applicants routinely). And while we may want to discursively separate "us" from our data, they are inevitably entangled and pragmatically and materially articulated.

Now, not everyone thinks that this accumulation of personal information is a problem. Marketers especially are more than happy to follow the digital trail of your habits, likes, and relations. But some researchers, such as microsoft researchers Gordon Bell and Jim Gemmell, argue that there can be personal benefit to the digitizing of your life.[26] In a project they call myLifeBits they attempt to record every aspect of Bell's

[26] Bell and Gemmell (2009).

daily life. A camera and microphone record his encounters with others and all images and sounds he comes across (from muzak to TV). All books and documents he reads are scanned, as are all receipts and photographs he collects. This practice is called *lifelogging*. All of this is then available to him as a searchable database. He can look up an acquaintance's name that he's forgotten, access old papers or passages whenever or wherever he needs them, or search for patterns (of relationships, health, spending...). Bell and Gemmell write that such a database provides a more objective view of your life which can help you make good decisions.

MyLifeBits and lifelogging parallel a movement that goes under the name of The Quantified Self. Proponents of this movement argue that using mobile devices to monitor and record aspects of your body in everyday life (from your blood pressure and blood glucose to the miles you walk or run, the food you eat, the hours you sleep, your changing mood, your productivity) can provide accurate and objective data that can be used to diagnose health conditions, monitor fitness or weight loss, or alter habits. For some, such self-tracking (self-surveillance) is specific and goal-oriented: I want to lose weight, I want to quit smoking, I need to manage diabetes, I want to run a marathon. For others, the goal is a form of self-knowledge, almost self-actualization. We should note that the "self " being explored or actualized here is one based solely on physiological processes; we are our bodies and no more. This is a similar notion of "self " to what is used in biometric surveillance schemes: you are your body and the data your body generates.[27]

Identity is an expression of an assemblage, in this case an assemblage of bodies, devices, data, and ideologies of individualism, self-reliance, and efficiency. It is an assemblage that renders aspects of identity quantifiable, visible, circulatable, and analyzable. Gilles Deleuze once wrote that we are no longer individuals in contemporary assemblages, but *dividuals*, a collection of endlessly fragmented and circulated bits that are tweaked, tracked, and controlled.[28]

The Distributed Self

In the previous examples of assemblages of identity we can see how our sense of identity is produced, extended, challenged, or managed by the arrangement of things and languages that make up the assemblage. Our digital doppelgangers prowl the Internet; our appliances reinforce gender norms, and so on. But if we are to take the idea of identity as assemblage seriously, we need to go a step further. It's not just that we (our selves and our bodies) are caught up in assemblages, but that our very sense of self is already an assemblage, it is already an arrangement of things, expressions, affects, and so on, a part-hardwired/part-contingent collaboration of body, technology, and environment. In terms of the idea of self, this would include the idea that our sense

[27] cf. Pugliese (2010).
[28] Deleuze (1995).

of self extends beyond our mind and even beyond our bodies, to encompass tools and other features of our environment.

For example, when we use a tool, from a stick to an automobile, at some point doesn't it become part of us, part of our identity? marshall mcLuhan once wrote of technologies as extensions of humans: the wheel is the extension of the foot, and so on; that is, these technologies become an extension of our functioning.[29] But in a felt sense as well as a functional sense, don't we become part of the car when we sit in the driver's seat? a classic example of this is from the philosopher maurice merleau-Ponty who talks about the use of a walking stick. After a while, we perceive that we are feeling the ground, when we are "actually" just feeling the vibrations through our hand of the impact of the stick on the ground. "The stick is no longer sensed for itself. For the person, the stick has ceased to be an object; it becomes part of the body."[30] another way of thinking about this is the fact that we are often not aware of our shoes, they are just part of our feet, though our choice of shoe affects how we stand or move, affects our height or even how our feet relate to the ground (e.g., at an angle, through thick padding, and so on). As psychologist naoya Hirose put it "Tools shift the boundary between the body and the environment."[31]

To continue the shoe example, think of the running shoe. If you are a runner, you are most often unaware of your shoes; they are extensions of you, of how you run. And while running seems natural, there are a number of different styles of running (which include posture, foot-strike, stride, and so on). Like almost anything having to do with our body, we need to learn how to run. Anthropologist marcel mauss once wrote that our bodies are the first technologies that we need to master. These "techniques of the body" (how we walk, swim, talk, run) are learned and relearned and become habits.[32] In running you can "heel strike" (land on your heel and roll forward), "forefoot strike" (land on the ball of your foot), or "midfoot strike," and there is a debate over which is more "natural" and/or less prone to injury—and there is little scientific evidence either way.[33] Landing on the heel produces more force that the leg must absorb, but the great majority of runners today heel-strike.[34] However, the great majority of runners also wear, and grew up wearing, what we might call "normal" running shoes: shoes with a higher heel with thick cushioning and arch support. These shoes were invented in the 1960s; before that runners ran in shoes much flatter and thinner. There has been a movement in the running community (inspired in part by Christopher mcdougall's

[29] McLuhan and Fiore (1967).

[30] Hirose (2002), p. 290.

[31] Hirose (2002), p. 291.

[32] Mauss (1973).

[33] See, for example, the website of Harvard's daniel Lieberman et al. On the biomechanics of foot strikes, which has videos of each technique, presenting research funded by Harvard and Vibram, a maker of minimalist shoes. barefootrunning.fas.harvard.edu/index.html.

[34] Reynolds (2013).

bestselling book, *Born to Run*[35]) away from mainstream running shoes and toward shoes that approximate running barefoot, with a fore-foot strike. Mainstream running shoes, it is argued, delegate cushioning and balance control to the shoe itself, encouraging the runner to heel-strike. When many people run barefoot on a hard surface, they may avoid heel-striking because, simply, it hurts. Barefoot running (or running in flat, "minimalist" shoes), with a fore-foot strike, it is argued, distributes the function of cushioning and balance control across the muscles and tendons of the feet and legs. In addition, we could argue that running barefoot (or nearly so) allows one to feel closer to the environment. To shift to the new minimalist shoes means becoming aware of how you move your legs, how your foot contacts the earth, and the nature of the surface and environment in which you run.

So we have two assemblages, each with different postures, foot-strikes, shoes, relations of joints to stress, and discourses (stability, comfort, cushioning, and control on the one side and natural, health, and awareness on the other). Each argues that the other assemblage may cause more injuries (and given that about 30% of runners are injured each year, this is a significant issue[36]), though evidence on either side is slim. In may, 2014, Vibram, a maker of minimalist shoes, settled out of court a class-action lawsuit stating that the benefits of their shoes promised by their advertising (including increasing foot strength, decreasing injury rate, and others) lacked any scientific evidence and was therefore false. This led many to state that minimalist running was altogether fraudulent, a "scam."[37] However, that would be overstating the case.

The most recent, and most extensive, study of minimalist shoes stated that, according to a review of the medical literature, "From a clinical perspective...footwear minimalism (running barefoot) may be protective for injury."[38] This study went on to put a hundred runners in "regular," minimalist, or quasi-minimalist shoes for 12 weeks. Runners in the minimalist shoe had more pain and injuries than those with regular shoes (who still had injuries), but less than those with the quasi-minimalist shoes. The authors decline to speculate on why the "half-way" shoes might cause more injuries, but perhaps with too little padding to cushion a heel-strike and too much padding to warn runners not to heel-strike, the shoes caught the runners between assemblages. In that the study was ultimately about the transition from one running assemblage to another, the authors cautioned runners moving to minimalist shoes to be aware of the danger of injury. To be fair, minimalist running websites (even Vibram's) always caution a very slow transition from regular shoes to minimalist to allow your body (with its assemblage of muscles, bones, tendons, and joints) to adjust to the new uses and relationships. As the *Atlantic's* James Fallows wrote, responding to the Vibram settlement: "If you're a heel-strike runner, as many people who learned in the era of

[35] McDougall (2009).

[36] The incidence of injury among runners in general is high, but numbers vary. Taunton et al. (2003) found about 30%, Lieberman's Harvard site mentions a range from 30– 75% (see note 33).

[37] See, for example, Schlanger (2014).

[38] Ryan, elashi, newsham-West, and Taunton (2013).

fatly padded shoes are destined to be, these are not the shoes for you." But "if you run in the way these shoes favor, or if you're able to shift your gait to a 'forefoot-strike' style, they're great."[39]

What this extended example is meant to point out is that assemblages can be tenacious, deeply embedded in the body, and can't be changed on a whim. Even a seemingly superficial technology like a running shoe is an extension of our body's functioning, and change deeply affects the body so extended (just as mcLuhan argued that as our media extensions change, we change).

Martin Heidegger once called "transparent equipment" those tools which we use with such skill we no longer notice (like a hammer in the hand, or a shoe on a foot).[40] However, what we are talking about is not just that we begin to ignore our technologies, but that they extend our actions, our perceptions, and our perceptions of self. Technologies extend our bodies and how we act in and perceive the world. In this way, our identity always has a fluctuating boundary. Some technologies are more persistent additions (walking sticks, shoes, glasses, clothes) and some are temporary (automobiles), so our identity (in this case, our sense of body-self) is an ever-changing assemblage.

In the body of literature that addresses the intermingling of human and machine, the key figure is that of the cyborg. A *cyborg* (short for cybernetic organism) is an entity part human and part machine. In popular culture, cyborgs can be found in science fiction films and television shows (like the Terminator franchise). But we are all already cyborgs of one sort or another. Many people have artificial hips, some have artificial hearts or heart valves, and some are periodically hooked up to dialysis machines that filter their blood. But on an even more banal level, many wear glasses or contact lenses, and there are few people who haven't been subject to the technology of inoculation. Even more fundamentally, we wear clothes and shoes. To be a cyborg is not something new. Indeed, arguing from the logic of articulation and assemblage, which insists that we consist of a range of connections to language, technology, bodies, practices, and affects, we have always been cyborgs.[41] Our bodies can change and incorporate technologies (this alters action and perception). We can grasp that idea pretty easily. Even more radical, however, is the idea that technologies extend how we think; that they are extensions of our mind.

Language is a technology—it is an artificial system that we have to learn—and if we agree that language profoundly shapes the way we think (not to mention the things we think about, or even think we can think about), then our cognition depends on a technology. Once we take writing into account, it's easier still. Complex (and at times not so complex) math equations or long sums are easier to figure out if we use pen and paper than if we keep it all in our heads. The same goes for mapping out an intricate logical argument or remembering what to buy at the store. The process of thinking,

[39] Fallows (2014).

[40] Heidegger (1961/1927); cited in Clark (2008), p. 10.

[41] For a discussion of the concept that we have always been cyborgs, see Clark (2003).

then, doesn't occur solely in the brain but in an assemblage of brain, body, and various external objects and processes we've marshaled to the task: slips of paper, notebooks, encyclopedias, iPhones, computers.... Philosopher andy Clark puts it this way:

> What the human brain is best at is learning to be a team player in a problem-solving field populated by an incredible variety of nonbiological props, scaffoldings, instruments, and resources. In this way ours are *essentially* the brains of natural-born cyborgs, ever-eager to dovetail their activity to the increasingly complex technological envelopes in which they develop, mature, and operate.[42]

Clark terms our interactions with these external objects as *scaffolding*—together we build possibilities. Many help us figure things out (pen and paper, computers, models), many more help us remember (from sticky notes reminding us to buy cat food to libraries), and many help us move about or achieve other actions.

Dovetailing is his term for the *processes* that the brain partners with to get things done. The pen and paper contribute to the scaffolds, but the process of writing and manipulating numbers on a page is what dovetails with our thoughts to solve the problem. The danger, people fear, is over-reliance on external processes to the detriment of our own cognitive abilities. To follow Clark's example, he writes, "the reliable presence of such resources may become so deeply factored in that the biological brain alone is rendered unable to do the larger sums."[43] This parallels an ancient dilemma from the birth of the written word: over-reliance on writing, it was feared, would ruin our ability to think. Clark is not worried, however, since such dovetailing (and outright outsourcing) is one of the things the human brain has always done best, usually to its own advantage.

Let us look at an example of all this scaffolding and dovetailing. Syndicated columnist David Brooks wrote an article a few years ago about the car he bought with GPS.[44] With a GPS navigation system you can enter the address you wish to go to and the device verbally guides you there ("Stay left. In 100 yards, turn left on elm."). Brooks realized that the device relieved him of a tremendous amount of thought—from remembering addresses and routes to even the overall street layout of the city. He was ecstatic. Now, as with any technological system, we should always beware of accidents, and not just car accidents. If his device breaks, Brooks is not only lost, but lost without his previous knowledge and skills in navigating the city. Similarly, if our mobile phones break, do we remember anyone's phone number? Further, such dependency can lead to disaster by allowing our reliance on technology to eclipse our ability to encounter what is before us. There have been several news reports of drivers following GPS instructions into bodies of water. The challenge to identity is this: amidst these

[42] Clark (2003), p. 26.
[43] Clark (2003), p. 6.
[44] Brooks (2007).

assemblages of scaffolded thinking and dovetailed processes, it's still possible to believe in a core, essential human mind coordinating it all, or at least one core executive cognitive process that all this answers to – *me*, in other words. But Clark and many others (such as daniel dennett, Francisco Varela, and alva noë) ask, why? many of our processes of coordination and action (e.g., reaching for a glass and picking it up) happen without our full conscious awareness. To the contrary:

> There is *no self*, if by self we mean some central cognitive essence that makes me who and what I am. In its place there is just the "soft self ": a rough-and-tumble, control-sharing coalition of processes—some neural, some bodily, some technological—and an ongoing drive to tell a story, to paint a picture in which "I" am the central player.[45]

In a highly renowned essay, donna Haraway argued that such couplings and combinations of humans and technologies are potentially politically progressive because, in refusing to be just technology or just human, the cyborg rejects the cultural dichotomy between technology and human.[46] When asked, "what are you, machine or man?" the cyborg states, "both and neither." Haraway argues that in refusing to choose, the cyborg acts as an ironic political model for challenging other divisions of identity like race, gender, sexuality, and so on, thus overcoming the technologies of categorization we have been discussing. She makes "an argument for *pleasure* in the confusion of boundaries and for *responsibility* in their construction."[47] a key insight of an assemblage approach to technology and identity is that humans have co-evolved with our technologies and with other animals and environments. One of the boundaries that Haraway has been seeking to critique is that between human and animal. In *The Companion Species Manifesto*, she argues that humans and companion species (like dogs) have co-evolved.[48] There has never been a human apart from its relationships with technologies, companion species, or the environment. Indeed, the human body itself is an assemblage of various relatively independent creatures—how far would you get without mitochondria or intestinal flora? Indeed, scientists have begun talking of the human body as an ecosystem with different habitats or biomes. It is estimated that of the 100 trillion cells that make up each body, only 10% are human.[49] Some might raise an objection stating that there *is* a biological essence to our bodies, despite all the bacteria—our dna. Aren't we told that each of us is unique, that if there is one thing that's mine, it's my dna? after all, we use it to identify remains, solve crimes, and so on. Well, actually it is more common than you'd expect that a person would have

[45] Clark (2003), p. 138.
[46] Haraway (1985).
[47] Haraway (1985), p. 66, emphasis in the original.
[48] Haraway (2003).
[49] Stein (2012; 2013).

more than one genome (or DNA sequence). For those people, what DNA is identified as theirs depends on from where the sample is taken.[50]

Conclusion

It should be clear by now that identity is an important lens through which to address our technological culture from a cultural studies perspective. What is at stake in how technological assemblages of identity function is nothing less than the social and political structure of our culture, not to mention our sense of who we are and what we can accomplish (that is, our agency). While some technologies can reinforce the most pernicious discrimination, others can be taken up to challenge these same categories of identity. An assemblage view of identity helps us question the boundaries of who we think we are. It should also help us realize the ways technologies change our notions of life and death.

For example, technologies of monitoring fetuses in pregnant women (electronic monitoring of fetal heartbeats or ultrasound imaging) have helped to change the status of both fetus and mother. Presenting tangible evidence of fetal life (Here's the heartbeat! Here's the 3-d video!) creates a technological quickening of the fetus much earlier than felt fetal movements and attributes subjectivity to the fetus much earlier as well. In other words, the fetus is more likely considered a person—from a medical standpoint a patient, and from a political standpoint a subject—long before the final trimester of pregnancy, long before the fetus is at a stage to survive outside the womb. As a consequence of these technologies, the pregnant woman herself can become more invisible, making it possible to restrict her rights in favor of the fetus's.[51] and on the other end of life's journey, machines can extend the body's functions to the extent that we now can question when someone should be considered alive or dead. And technological futurists associated with the Singularity movement plan for the day that our consciousnesses can be uploaded to a machine, or to the Internet, where we can live forever. But would such an existence be considered that of being alive? Would we still be human?

How could it be any clearer that technologies are not mere tools that we take up to accomplish particular ends? How could it be any clearer that technologies are not mere causes that have effects on what we do? In fact, the very (changing!) idea of who we are, how we think, and how we act is *articulated within*, *caught up in* a changing technological culture.

Source: Photograph by Lewis Hine, 1920. Wikimedia Commons: commons.wikimedia.org

[50] Zimmer (2013).

[51] Balsamo (1996), pp. 80–115; Cartwright (1998); Lupton (2013); and mitchell and Georges (1998) raise this and related issues.

Figure 22: Power House Mechanic Working on Steam Pump

Chapter Sixteen: Critical Conjunctures

SOMETIMES SCIENCE FICTION HAS THE CAPACITY to engage interest in technological culture more effectively than books such as this one. Science fiction has the benefit of being articulated to entertainment, disarticulated from any obligation to truth, but articulated historically to the reputation of prescience. We still use novels such as *Frankenstein* and *1984* and films such as *Blade Runner*, *The Terminator,* and *The Matrix* to look for insight in navigating the present. Each of these works articulated the culture of its present in significant ways, and like good science fiction often does, each still speaks to aspects of both contemporary technological culture and possible futures.

M. T. Anderson's *Feed* provides one such a vision for our time, a vision that has proven quite useful in provoking thought and discussion in our classes.[1] This 2002 young adult science fiction novel resonates in instructive ways with the challenges we face. Set in the far off future, mobile social media devices are embedded in the heads of most children at birth, so that phoning, texting, blogging, searching, and streaming music or video occurs directly in their heads. Almost everyone is in constant contact with their friends but also in constant contact with a feed that monitors thoughts, feelings, and behaviors, and responds accordingly. The feed sends out targeted advertising (it whispers in your head about sales of your favorite pants, or of the pants you just glanced at in the shop window) as easily as it sends out the police (you perform an anti-social behavior, it sends out the authorities) or a technopharmaceutical (you have a headache, it sends out a nerve block). At a loss for words? The feed will suggest something. It is an autocorrect for the mind. A record of memories, thoughts, feelings, and behaviors is kept, so that playback, sharing, broadcasting, and surveilling a person's life are readily accessible. Not everyone in this world of the far-off future is implanted, resulting in an oppressive hierarchy. Those without implants are in some sense free, but they are also denied connectivity, educational and employment opportunities, and acceptance; they are the outsiders and the outlaws. The events of the novel take place against the backdrop of a world so completely polluted and toxic that there is nothing of the natural landscape left: oceans are dead and burning and the air is not safe to breathe. The characters develop lesions that would lead to death without the intervention of advanced medical technologies, available to those who are

[1] Anderson (2002).

connected. The feed distracts the public from worrying by making lesions fashionable, even marketing fake lesions. *Feed* thus entertains us with a mixture of some very real conditions and challenges characterizing contemporary technological culture involving surveillance, privacy, freedom, constant contact, consumerism, environmental degradation, healthcare, what it means to be human, and inequality. All of these are integral in some form to contemporary technological culture.

As good science fiction does, *Feed* resonates with our present, it makes affective sense; but it doesn't explain the mechanisms whereby this fictional world is put together, and it doesn't provide something for us to focus on, to fix, to envision a path forward. It casts a spell (like the marketing of fake lesions?) that provides some solace in its knowing that we are living in hard times, but we don't really know what to do about it. The heroine, Violet, is dying in the end from complications from her too-late-in-life implant of the feed. It is as though her family's resistance to progress by delaying giving it to her is what kills her. Violet herself has been resisting the feed by doing her best not to be profiled by the marketing software of the feed. But without a coherent profile, no organization will risk funding the treatment that would save her. Her own resistance kills her as well. As he watches her die, her boyfriend, Titus, discovers the desire to tell her a story (their own), which is one of the only creative acts in a world where the public is groomed to be unthinking, passive consumers. A creative act is an act of resistance. But given that the world in this novel is also in its final death throes, and that the feed is deeply imbricated in the functioning of that world, it is difficult to imagine what good this might do. Resistance here is mere affect, not a strategy to be emulated. Affect *can* certainly be articulated to constructive intervention, but not if it just sits there at the bedside of a dying heroine and a dying world. In reality, there must also be the hard work of understanding how the world is put together *and* moving forward.

So, while imaginative flights like *Feed* can provide images *to think about*, they leave us without tools *to think with*. To do that, we need, once again, to take a detour through theory. As Stuart Hall once said, "Theory is always a detour on the way to something more important."[2] That is what we set out to accomplish with this book: to work with what we know theoretically to engage technological culture constructively, to be able to think forward. In this chapter we specifically address the matter of thinking forward. To do that we need to introduce another concept: the *conjuncture*.

From Articulation to Conjuncture

As we introduced in Chapter 12, "articulation can be understood as the contingent connection of different elements that, when connected in a particular way, form a specific unity." In thinking about the unities that involve technology, we introduced the concept of the technological assemblage: "the ways that ... practices, representations,

[2] Hall (1991).

experiences, and affects articulate to take a particular dynamic form with broader cultural consequences." We have also seen that these articulations and assemblages change, and we have characterized the process of change as sites of struggle. Every culture in any historical moment (by which we mean more than a moment in time, but as occurring in a particular historical space and time) has its problems, crises, contradictions, and instabilities, and these are often the places where articulations and assemblages are on the move, where change is happening, where resistance is manifest, and where effective intervention might be possible. But of all the problems, crises, contradictions, and instabilities, how do we decide which is important to focus on? What is important to address in the interest of moving forward?

Cultural studies provides guidance by suggesting that what we do is map a conjuncture and the problematic or set of problematics that constitute it. *Conjunctural analysis* identifies and maps the connections among problems, crises, contradictions, and instabilities that appear across what might otherwise seem disparate issues and locations. Conjunctural analysis maps what is called the problematics, or problem spaces, of a culture. Not every problem in culture achieves the status of a problematic. A *problematic* is a "theme," or set of "themes," that emerges in a social formation, across a variety of sites, struggles, and concerns. It is therefore a "general" crisis," but one that is "fought across the full spectrum of social issues and differences**."**[3] a problem, crisis, contradiction, or instability that achieves that magnitude of breadth and depth, or could have ramifications of that breadth and depth, is worthy of extensive cultural analysis.

While a problematic appears "at almost every point of the social formation: it does so in multiple forms."[4] Because a conjuncture—with its attendant problematics—is constituted of numerous articulations and assemblages that manifest in local forms at different sites and locations, it is never a simple unity, but a complex and dynamic one. It is one in which there will always be relationships among what is old, what is new, and what is rearticulated.[5] It is, as Lawrence Grossberg puts it, "a mobile multiplicity, the unity of which is always temporary and fractured**."**[6] an insistence on the complex multiplicity of a conjuncture cannot be overstated. As explained by Grossberg,

> A conjuncture is constituted by, at, and as the articulation of multiple, overlapping, competing, reinforcing, etc., lines of force and transformation, destabilization and (re-)stabilization, with differing temporalities and spatialities, producing a potentially but never actually chaotic assemblage or articulations of contradictions and contestations. Thus, it is always a kind

[3] Grossberg (2010a), p. 42.
[4] Grossberg (2010a), p. 41.
[5] Grossberg (2010a), p. 60.
[6] Grossberg (2010a), p. 41.

> of totality, always temporary, complex, and fragile, that one takes hold of through analytic and political work.[7]

Mapping a conjuncture is a way of understanding context, a way of coming to a better understanding of "what's going on." methodologically, you can accomplish this by, first, identifying powerful articulations that constitute a particular cultural problem, second, identifying the work of particular assemblages, third, identifying the problematic or problematics that appear across sites and locations, and, fourth, considering how these articulate in the complex conjuncture of a particular historical moment. Part of that process is always to understand, as we said above, what is changing: what is old, what is new, what is rearticulated. Mapping a conjuncture makes it possible to begin to see where and how intervention might be desirable and successful, and how different interventions might influence change in one direction or another.

We use the term "mapping" the conjuncture because the cultural theorist asserts that the articulations, assemblages, and problematics are significant, that they are connected in particular ways and that they merit attention and intervention. We map what we claim to be the multiple, overlapping, competing lines of articulation; we map powerful assemblages; we map what we see as connected across sites and locations. This work has been described by Grossberg as telling a "better story" about what is happening, which means that it aims to offer a convincing account of the relationships that constitute the "complex realities of the context."[8] We map claims about what is desirable and undesirable in that story, and how change is possible. A better story might also "open up new possibilities, perhaps even new imaginations of possibilities, for changing that context." Cultural studies thus tries to contribute to expanding what we can hope for.[9]

This is difficult conceptual and empirical work, which in the very act of mapping contributes to the articulation of the conjuncture; that is, a cultural study in itself becomes a force articulating the struggles that have been identified. In this way, cultural studies acknowledges that scholarship does more than merely report on or describe what is supposedly already out there, but always necessarily intervenes in the production of knowledge about the struggles that constitute the social formation, thereby contributing potentially to cultural change.

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[7] Grossberg (2010a), p. 41.

[8] Grossberg (2010a), p. 27.

[9] The concept that a culture can, in part, be understood in terms of what can be hoped for is explored by Grossberg (1992) and Hage (2000).

The Current Conjuncture and Emergent Problematics

This book has attempted to model what cultural studies does. We have mapped significant articulations that constitute the context within which we practice, represent, and live technological culture, and we have considered how these articulations have changed. We have tried to tell a better story about how technology articulates to progress, convenience, determinism, control, politics, economics, space, time, and identity; about how these articulate to the practices, beliefs, experiences, and materialities of technological culture; about how these have been rearticulated over time; and how these historical trajectories have contributed to the shapes of our lives. Each in relation to the other contributes significantly to what our culture believes about technological development (it is good; it is the cause of the good life); what we do with technology (support it, fund it, prioritize it; embrace it or be left behind); and how we experience it (cool; new; awesome, a sign of superiority). Each in relation underscores what we believe is possible or not, and what we can and can't hope for (you can't stop progress; technology can fix any problem we face, even those brought on by other technologies; if you do not embrace advanced technology, you have little to hope for). We have also considered along the way the inequalities that articulate to technological culture, who or what benefits (new media CeOs; the biotechnology industry) and who and what is left behind ("underdeveloped" nations; people with "outdated" skills).

Technological culture changes, which is perhaps the most difficult insight for us mere mortals to grasp. It is not just technologies that change, but much more significantly, technological culture that changes. The Luddites, the appropriate Technologists, and the Unabomber understood that and in their ways (if not always effectively) they attempted to influence the direction of change. Other contemporary movements, groups, and individuals (Greg and Jennifer among them) continue to work consciously to influence the direction of technological culture, to disarticulate elements of it they find a problem and rearticulate more desirable ones.

One of our intentions, that is, the intention of Greg and Jennifer, in writing this primer is to contribute to that work, by telling a better story. But this primer offers something less than the whole story. As a primer, we have self-consciously tried to provide, first, an introduction and, second, a preliminary mapping. We have not mapped the contemporary conjuncture fully, in a way that considers and connects all the relevant problematics. We can, however, offer direction for additional mapping that would contribute to that work. Building on the pieces we have put together, and drawing on our collective knowledge of technological culture, several problematics emerge. These, we submit, deserve our attention, for these do seem to be general crises that are being fought in multiple, interconnected forms across the full spectrum of the social formation. We refer to each as a "problematic" as shorthand; each, however, contains elements of problem, crisis, contradiction, and instability. Each portends enormous

change in the cultural formation and thus warrants attention to where and how intervention might be advisable. We offer only the briefest of sketches for each; these are meant to be suggestive, urging future work.

The Problematic of Knowledge Production

Cultural studies itself responds to and contributes to a general crisis involving what constitutes knowledge, who produces it, and how it is produced. Cultural studies' assertions that no element, neither knowledge nor even "truth," "can be separated from its relations," and that "those relations can be changed, and are constantly changing,"[10] contribute to a radical rethinking of knowledge. This view and practice disarticulate knowledge from purely scientifistic conceptions of knowledge: descriptions of the natural world using tools of observation and experimentation presumed to be neutral. Scientists are presumed to be rational seekers of the Truth, and scientifistic knowledge assumes the ability to accurately and objectively "trace" what is already there, rather than map a convincing story within a particular context. The innocence of, and therefore the dominance of, this view of scientific knowledge has been challenged by what has been called the "cultural turn," as well as, beginning in the 1960s, by science itself.[11] In a dramatically different form, a challenge to the preeminence of scientific versions of knowledge has also emerged in relation to fundamentalist religious movements. Many of these movements reject scientific knowledge outright and maintain that authoritative knowledge can only come through some (technological) manifestation of their god: be that a book, a prophecy, or a revelation. From a slightly different direction we could point to a long history of populist anti-intellectualism in the United States, current manifestations of which are caught up in this problematic.

The emergent popularity of the 2.0 and dIy conceptions of knowledge and knowledge production also respond to and contribute to the general crisis in a more obviously technological sphere. Web 2.0 is a term that, according to Wikipedia,

> Describes World Wide Web sites that use technology beyond the static pages of earlier Web sites.... A Web 2.0 site may allow users to interact and collaborate with each other in a social media dialogue of creators of user-generated content in a virtual community, in contrast to Web sites where people are limited to the passive view of content.[12]

Is this entry authoritative? In a 2.0 culture, the production of knowledge shifts from what were once considered "experts" and "professionals" to anyone who can generate content, which is made considerably easier than it was before the Internet, the World Wide Web, copying technologies, and mobile media. So, yes, in 2.0 culture the entry

[10] Grossberg (2010a), p. 20.
[11] See, for example, Thomas S. Kuhn, *The Structure of Scientific Revolutions* (1970).
[12] "Web 2.0," Wikipedia. Wikipedia.org, accessed 15 march, 2014.

is authoritative, because it is there at the moment of this writing, even though it may be challenged, changed, and be a different expression of authoritative knowledge tomorrow. Importantly, such knowledge production is done publicly so that every edit, deletion, or addition is visible on the history page.[13] dIy (do It yourself) culture, we are told, once again by Wikipedia, is "the method of building, modifying, or repairing something without the aid of experts or professionals."[14] 2.0 and dIy privilege knowledge produced by anyone with access to a platform and who is not defined as an expert or a professional. To some extent, then, the technological platforms themselves (blogs; radio programs) bestow that authority.[15] Other locations in the social formation where the crisis in expert knowledge versus user generated knowledge is emerging (in a variety of forms) are in the rise of alternative medicine and a corresponding resistance to traditional medicine (including vaccinations); in the popularity of technologies of collaborative learning in education; and perhaps even in the comfort with which people share knowledge about themselves.

The appearance and general acceptance of the term Big data point to another site in the crisis of knowledge production. New kinds and massive amounts of data are being generated using new technologies, much of it machinically generated without the intervention of individuals and beyond the capacity of individuals to manage. The search for new technological solutions to storing, managing, and mining Big data has become an industry in itself. What is perhaps the most interesting aspect of Big data is that it suggests a technology that is newly "out of control," a materially and affective form of knowledge that requires whole new ways of thinking and being, when, in fact, the crisis is far less new than the discourse suggests.

Academic attention to the exploration of knowledge production has proliferated, which includes scholarship in the social sciences, the humanities, cognitive sciences, and brain sciences. It is as though, in this moment of crisis, work in the academy that argues that knowledge is produced and works in new ways gains in prominence, developing concepts such as collective intelligence, swarm intelligence, and collaborative learning to explain and explore this form of knowledge. Some in the academy, in this moment of crisis, "discover" that knowledge has always been produced in relation to technology, and that the brain has always evolved in a technological relation with technologies external to the body.[16] despite the variety, the problematic is a coherent unity.

To intervene in the problematic of knowledge production requires engaging particular articulations at sites where intervention might make a difference. We don't "resist

[13] See danah boyd on this point: http://www.danah.org/papers/talks/Pearson2007.html; cited in Rheingold (2012), p. 185.

[14] "dIy," Wikipedia. Wikipedia.org, accessed 15 march, 2014.

[15] See, for example, andrew Keen (2008*), The Cult of the Amateur*. See also Howard Rheingold's (2012) *Net Smart: How to Thrive Online*, where he argues for key literacies for this 2.0 culture including, crucially, what he calls "crap detection," the skills to filter and fact check online sources to determine authority and credibility.

[16] Cf. Clark (2003); Wolf (2007).

the feed" or, in this case, resist 2.0. Rather, we work to rearticulate relations at a particular site or location. If, for example, I am an educator concerned that the practice of collaborative learning is counter-productive in part because it relies on its articulation to a belief that knowledge is fundamentally user-produced, I might engage in or use research to convince educators that creativity relies more on individual activity, as is argued in the book *Quiet* by Susan Cain.[17] The argument might be successful in that rearticulating learning to creativity is a reasonable articulation to make in the conjuncture that values creativity; and that rearticulation would disarticulate collaboration as a privileged path to learning.

The Problematic of Privacy and Surveillance

While they could be treated as two separate problematics, privacy and surveillance have become so closely articulated that they almost demand being considered together (although all issues of surveillance are not necessarily about privacy, and vice versa). Assemblages involving new technologies, especially mobile devices such as smart phones, wearable computers like Google Glass, and technologies of electronic surveillance, raise pressing questions about privacy and surveillance— tantamount to a profound crisis. Unless we are hermits, we now live under the almost constant gaze of others and their devices. What we might characterize as a surveillance assemblage renders what the gaze sees recordable, persistent, and readily sharable, as *Feed* so effectively illustrates. We are urged by the assemblage to adjust to the constant potential of being observed and recorded, just as we have been adjusting to the potential to be contacted via mobile phone by anyone at any time.

Big data, which articulates to the issue of knowledge production discussed above, are used to manage and exploit the level of surveillance that is now possible. Big data can be used to establish patterns to locate terrorists, to assess health behaviors and risks, and to target individuals for marketing purposes. It is gathered at the institutional level for both government and corporate organizations as well as by individuals. Edward Snowden's leaks of massive amounts of information about the scale and types of surveillance being conducted by the US national Security agency offer a dramatic example of institutional power at work, as well as individual power, in that a single individual was able to access and share the information.[18] Online firms such as Google conduct surveillance by tracking and mining search histories, email, and social media exchanges. While this is conducted in the service of commercial goals, it has the potential to be used by governments as well as by corporations to control populations in ways that escape protections afforded by government.[19] Big data are also gathered at the personal level; we do it ourselves. In what has been called the Quantified Self movement, discussed in the last chapter, people track their own activities, biological

[17] Cain (2013).
[18] Greenwald (2014); Kirk (2014).
[19] See Smith (2014); eggers (2013).

data, moods, and so on, in a belief that the emerging self-improvement ethos, which articulates to dIy, can be actualized by producing what is ostensibly the cold, hard truth of numbers: How far did I run? How much did I eat? What did my sleep patterns look like? How has my blood pressure fluctuated throughout the day? How much work did I do?. Lifeloggers record, in addition to those data, all images, sounds, and events they encounter, making a permanent record of their everyday lives.[20]

Subjection to surveillance and access to online resources, social networks, and rapidly circulating media are becoming what sociologists, following durkheim, call a *social fact*, an accepted and assumed part of what it means to be a member of society.[21] We are trained to accept, as explored in *Feed*, that there is little possibility or hope to opt out. Those who don't have a coherent profile lose access to the resources available to those with established profiles within the social formation. Living as far "off the grid" as possible is a form of resisting the surveillance assemblage, but doing so puts you increasingly outside access to social interactions, insurance, media, healthcare, and even money itself.

To intervene in the problematic of privacy and surveillance requires engaging particular articulations at sites and locations where intervention might be effective. The diversity of such sites and locations is revealed by the analysis, and the kind of intervention possible is suggested by assessing what might be possible to disarticulate and rearticulate. For example, whether he has studied cultural studies or not, edward Snowden is working to disarticulate NSA surveillance activities from the concept of safety, as in the belief that its activities are necessary to keep us safe. He is actively trying to rearticulate NSA surveillance activities to the violation of our personal freedoms, which could well be successful, given the power of the articulation of personal freedom to the identity of being American. We can also imagine rearticulating surveillance issues to discourses of justice, dignity, or human rights.

The Problematic of Environmental Degradation

Given the powerful influence of the equation of the development of new technology with progress, it is not surprising that most people are incapable of taking seriously the environmental costs of technological assemblages. Richard maxwell and Toby miller write:

> Perhaps the obsession with immediacy and interactivity via networks induces an ignorance of the intergenerational effects of consumption, inhibiting our awareness of the long-term harm to workers and the environment. Could constant connectedness be actively diminishing our ethical ability

[20] Bell and Gemmell (2009); Lupton (2012).
[21] Ling (2012).

> to dwell on the interconnections between the present and future, between media and the earth?[22]

From industrial technology to virtual technology, technological assemblages involve mixtures of mining and using natural resources, building structures and machines, occupying the electromagnetic spectrum, disciplining bodies, and generating waste.[23] In addition, the 24/7 lifestyle of on-demand media and Big data means that massive datacenters use (and waste) staggering amounts of electricity for the computer servers and the air conditioning systems to cool them, the generation of which leads to additional pollution.[24] There is a moment in *Feed* when the American president addresses the people and reassures them that American industry would not, could not, be responsible for the degradation of their health (for the lesions that have resulted from the degradation of the environment). He states that "we need to remember that America is the nation of freedom, and that freedom, my friends, freedom does not lesions make."[25] We would only add the invocation of progress to that story: "freedom and progress do not lesions make." By invoking freedom and progress, which happens all the time in contemporary technological culture (from, for example, defending fracking to defending gold and silver mining), it is possible to overlook entirely a whole range of other articulations that warrant our attention.

Attention to the crisis of environmental degradation is emerging in numerous spheres in diverse forms in contemporary technological culture. Locations that depend on tourism for their economic well-being are often the staunchest defenders of maintaining the health and diversity of the environment, as are hunters and fishers who want to protect the environment inhabited by the animals they hope will continue to be around so that they can kill them. Chefs often speak out in defense of environmental health and diversity in the interest of the continued availability of ingredients with which to cook. Scientists increasingly are concerned with preserving biodiversity in the interest of assuring access to possible cures for disease or biological organisms that might benefit the biotechnology industry. Even certain fundamentalist religious sects advocate for an unpolluted environment, because the food their god would have them eat should be pure and unsullied. The concerns and motivations of these groups differ wildly from the stereotypical "tree-hugging" environmentalists who defend the ideal of a wild and pristine wilderness over and against the perceived interests of human beings. Yet they all express versions of the problematic.

That the environment is being degraded has been quite widely accepted as a crisis, perhaps most notably expressed in concern over global climate change. Yet, articulated as they are to science, the arguments of climate scientists bump up against the blindness that accompanies the unexamined belief in progress and the powerful shifts in

[22] Maxwell and miller (2012), p. 4.
[23] See, for example, Royte (2005); maxwell and miller (2012); Gabrys (2013).
[24] See, for example, Glanz (2012); maxwell and miller (2012); mosco (2014).
[25] Anderson (2002), p. 70.

beliefs and practices of knowledge production we discussed above. Interestingly, however, the "non-believers" are as actively caught up in the struggles over climate change, as demonstrated by their persistent efforts to offer alternative explanations for climate phenomena.

Again, intervention requires, first, careful analysis of the articulations that constitute the problematic at particular sites and locations, and then, the identification of locations where intervention might be successful. It could be, for example, that organizing hunters and fishers of north America would be more effective in working for remediation of climate change than working with self-identified environmental groups. Hunters and fishers articulate to powerful affects and practices of freedom and American identity and may be better connected to the political and corporate sources that produce and regulate offending technologies.

The Problematic of Being Human

Initially it may seem odd, even misguided, to elevate the question—"what is it to be human?"—to the status of a problematic of technological culture. However, it doesn't take too much looking to see that what constitutes humanness is contested in diverse ways across the full spectrum of the social formation and is deeply connected to the technological.

Take, for example contention over the legality of abortion. Much of this entails the question: Is a fetus human? different answers to, or different ways of understanding, that question (yes; no; yes, but...) circulate in different forms at different sites in the social formation. The fact of the question's importance in contemporary culture can be understood in terms of emerging technological assemblages.[26] The ultrasound, sonogram, amniocentesis, and assisted reproductive technologies contribute to creating and seeing something that was heretofore non-existent and invisible. Its newly visible existence demands a name and attendant concepts, practices, and affects, over which there is considerable cultural struggle, as we mentioned at the end of Chapter 15. Just as we have been taught to accept that images of the earth from space changed our perception of our place on the earth and in the universe, seeing the fetus through a sonogram in a particular setting works to shape perception and behavior in significant ways. A technological assemblage provides the framing, the editing, the story, and the affect.

In a different way, technologies deployed at the "end of life" contribute to questions about what is and is not human. The point at which a person is "dead" and when certain functions can/cannot/should/should not be supported by machines has become highly contested and of considerable concern for individuals, families, the medical profession, hospitals, insurance companies, and the law. Each has different motivations, concerns,

[26] Cf. Deborah Lupton's discussion of "unborn assemblages" in *The Social Worlds of the Unborn* (2013).

and ways of framing the problematic. A recent case in which a pregnant woman "died" but was for months kept "alive" with technological intervention because she had a "live" fetus within her that "was not viable" provides a salient example of the degree to which struggles over the meanings of humanness are variously contested and entangled in overlapping and competing technological assemblages.[27]

Biotechnology, both as an industry and as a science, contributes dramatically to the contested ground over what constitutes humanness. If the human body can take on new forms with pharmaceuticals and prostheses, is it still human? Is a human with a cow heart still human? If the body takes a new form through genetic manipulation, is it still human? Is a clone human? Is there a point where a line is crossed? These questions are struggled over, if not in explicitly philosophical form, then indirectly in a range of social practices. For example, the question of whether or not an athlete can compete under the influence of technopharmaceuticals (aka, drugs) or with prosthetic body parts is a struggle over whether or not these rearticulated creatures are "fully" human. Health insurance companies make determinations about humanness all the time in the exercise of their routine delineation of what is covered and what is not. While the logic of what they will and won't cover doesn't always seem "commonsensical," they are more likely to cover what is considered restorative to "normal" human functioning, as in covering the cost of a prosthetic to replace an amputated limb, than to cover what is considered an "enhancement," as in covering the cost of a breast enhancement or prosthetic legs to help an athlete run faster by replacing otherwise functioning (but inferior) legs.

Typically we think of being human as having a body over which we have ownership and control. Classifying animals and despised races as not human has been used to justify ownership or control over them by those who *are* human. Surprisingly, those of us not-animal or not currently a despised race do not have ownership and control over our own bodies to the degree that we generally expect. The biotechnology industry, commerce, and the law are quietly participating in disarticulating that relationship between you and your body. In a pivotal legal decision in 1990 (*Moore v Regents*), the US Supreme Court upheld a California statute regulating the disposal of biological waste, a statue that "eliminates so many of the rights ordinarily attached to property that one cannot simply assume that what is left amounts to 'property' or 'ownership' for purposes of conversion to law."[28] To translate: what your body sheds or what is removed from your body is not your property but can be claimed as property for research and commercial purposes. You do not own your amputated leg, the hair cut from your head, or the cells harvested from your organs. This is interesting given that in most states mechanics are required by law to return to owners parts removed from your automobile. A particularly famous case of the medical and scientific exploitation of body parts is that of the african American woman Henrietta Lacks, who died of cancer in 1951.

[27] Hellerman, morris, and Smith (2014).

[28] See Bowen (2005) for a discussion of the case.

While under treatment, her cancer cells were—without her knowledge—harvested and cultivated in the lab, creating what is now known as the HeLa cell line, which has become an invaluable global resource in medical research and commerce. People have become rich exploiting the HeLa cell line; Henrietta Lacks died in poverty.[29] after her family learned of this treatment of Lacks's body, they sought to gain some control over the cell line. After years of legal wrangling, they obtained only limited control over use of the cell line in 2013.[30] In the meantime, harvesting organs for profit has become a global industry, even in countries such as the United States, where organ donation is strictly regulated. The practice is sufficiently common that it was covered by *Newsweek* in an article titled "Organ Trafficking Is no myth."[31]

Cultural anxieties over the technological disruption of the human have been evident in popular culture at least since mary Shelley's *Frankenstein*. Science fiction novels and films are filled with images of cyborg beings. As we mentioned in Chapter 15 (on identity), a considerable segment of popular culture addresses the intermingling of human and machine. Films such as *The Terminator (*1984*)*, *The Matrix (*1999*)*, *The Island (*2005*),* and *Transcendence (*2014*)* take up the theme of what it means to be human. These popular expressions suggest a widespread engagement with what seemed initially an esoteric problematic.

The academic world has responded and contributes to the emergence of this problematic with conferences, such as one on "The non-Human Turn,"[32] a body of scholarship on the cyborg,[33] and a range of philosophical and theoretical explorations of what constitutes human life and human subjectivity.[34]

Intervening in the problematic of being human, as with all the problematics discussed above, requires engaging particular articulations at sites and locations where intervention might make a difference. When we point out that the biotechnology industry, commerce, and the law are quietly participating in disarticulating a particular relationship between you and your body, we are pointing to the fact that these forces *are* intervening, though perhaps not in desirable ways. They *are* making a difference that, when examined closely, might not seem so innocent. From that realization, alternative ways of intervening might come into focus.

Ending with Moving Forward

The problematics discussed above are not all those that constitute the current conjuncture, just the ones that seem most salient to us at this time. They all consist of sites

[29] Skloot (2010).

[30] Ritter (2013).

[31] Interlandi (2009/2010).

[32] The non-Human Turn, 3–5 may, 2012. Center for Twenty-First Century Studies. University of Wisconsin, milwaukee.

[33] Beginning with Haraway (1985).

[34] See, for example, Rose (2007); Bennett (2010).

and locations where problems, crises, contradictions, and instabilities are in evidence. And regardless of whether or not a person has studied cultural theory, intervention–both effective and ineffective–happens all the time. Remember that a conjuncture and its problematics do not constitute a fixed unity, but a site of struggles. That means that alternative positions, forces, and practices are always in play somewhere. By looking closely at these sites *as sites of struggle*, a person should be able identify potentials for effective intervention. Intervention, like all those identified above, can take many forms. It might look like any of the following: fighting a legal battle, singing a song, lobbying congress, teaching a class, writing a book (such as this one), making a film, passing a law, blowing a whistle, and on and on. Intervention does not take a single prescribed form, and the same action may be effective in one context and not in another. And there are no guarantees that any particular intervention will have its desired effect. So how does one go about "intervening"?

The concept and practice of *resilience* increasingly occupy talk about how to respond to changes in the social formation at sites as diverse as new media, education, and climate change. Try an Internet search for resilience and a topic of interest, and you will see this is so. So pervasive are the various manifestations of this talk that resilience could qualify as a problematic itself. We discuss it here, however, as a strategy for moving forward, in part because it strikes us as a sadly inadequate response. By comparing resilience to the potential available if you work with the kinds of mapping strategies we have sketched above, you can see that the latter is far more likely to generate better stories for moving forward.

The typical story of resilience goes like this: When faced with challenge, disturbance, problem, or crisis, some people fail, others thrive. Those who thrive have the capacity to bounce back because they have learned to adapt; they are resilient. After reviewing the use of resilience in both academic and popular literature, a group of scholars found that most conceptions of resilience

> 1) prioritize the heroic (self-sufficient) individual; 2) constitute resilience as a psychological or social property rather than a process; 3) fail to radically contextualize resilience...4) over-emphasize a return to a previous state or equilibrium...5) neglect relationally and mutuality as constitutive dynamics.[35]

Resilience thus has much in common with the symptomatic approach to causality we discussed in Chapter 10; both are reactive, responding to what already is and over which we have no control. All that we can change are our responses to circumstances beyond our control. In the case of resilience, the response is individual, rendering this approach even less culturally attuned than the symptomatic approach. The challenge, the disturbance, the crisis is inevitable; you can "adapt or die" (or "fail," in current parlance). To adapt successfully is to "create new normalcies" according to a theorist

[35] Flynn, Sotirin, and Brady (2012), p. 5.

of resilience.[36] This logic is observable in discussions of climate change where remedies such as the following are all that is proposed: building higher sea walls, learning to live with less fresh water, not insuring structures in tornado alleys, developing plants that can survive drought, and so on.

We are not suggesting that resilience is somehow pernicious, although it can be. Rather, resilience is an insufficient response, in that it deflects attention away from the articulation of the challenge, disturbance, problem, or crisis to begin with. It does so because it accepts the condition as given or inevitable rather than understanding it conjuncturally, as constituted by articulations and assemblages that are contingent and non-necessary, and recognizing that they may be open to disarticulation and rearticulation in significant ways. In other words, resilience adjusts to the problem rather than intervening in the problem in order to change it. An interesting and easy example illustrates the difference: The demand for speed and constant contact in the 24/7 world is often blamed for high levels of increased stress that lead to health problems for many people who do the desk work in that world. A resilient response finds ways to manage the stress. Sarah Sharma, in her research on corporate yoga, as we discussed briefly in Chapter 14, argues that corporate yoga helps the body cope with stressful conditions by making "life at the desk temporally maintainable" but it also "further institutionalizes the space and time of work as being fundamental to a person's identity."[37] So corporate yoga does not address the stressful situation at the source; instead, it institutionalizes its management in service of corporate profits.

With regard to the problematic of privacy and surveillance, to take another example, a resilient response might be to strive to stay ahead of surveillance technologically by constantly installing new encryption programs on your media. A conjunctural response might be to recognize the ways that surveillance is being built into the infrastructure of everyday life through the engineering of devices and software. Because those structures are contingent and non-necessary, we could undertake efforts to assure that those devices are designed otherwise. They don't have to save data the way they do (or at all). They don't have to save information to the cloud. The cloud doesn't have to be a for profit off-site storage site that can mine your data. The technologies don't have to have the capacity to track our locations. These are all choices and decisions that were made, and continue to be made, justified by commitments to progress, convenience, and control, as well as by the desire for security, efficiency, and profit. By carefully mapping these articulations, we might be able to locate places where they can be disarticulated and rearticulated; the assemblages can be assembled differently. Only by doing that work can we even comprehend that there are other ways our technologies and technological assemblages could be designed.

That this is hard work cannot be denied; it is easier to retreat to the symptomatic position of resilience. But doesn't the potential to make the world a better and more

[36] Buzzanell (2010).

[37] Sharma (2014), pp. 105, 106.

equitable place for all of us who occupy it make it worth the effort? Stuart Hall once said that

> There are few short cuts or ready-made recipes. It does not follow that, because our hearts are in the right place, we will win the struggle for "hearts and minds." and even the best analysis of the current situation provides few absolute guidelines as to what we should do, in a particular situation.[38]

As Hall said many times in his life, there are no guarantees; but we have written this book in the belief that the work is worth the effort.

Source: Photograph by Theodor Horydczak, ca. 1920–1950 Library of Congress, Horydczak Collection: `http://www.loc.gov/pictures/item/thc1995009227/PP/`

[38] Hall (1981), pp. 28–29.

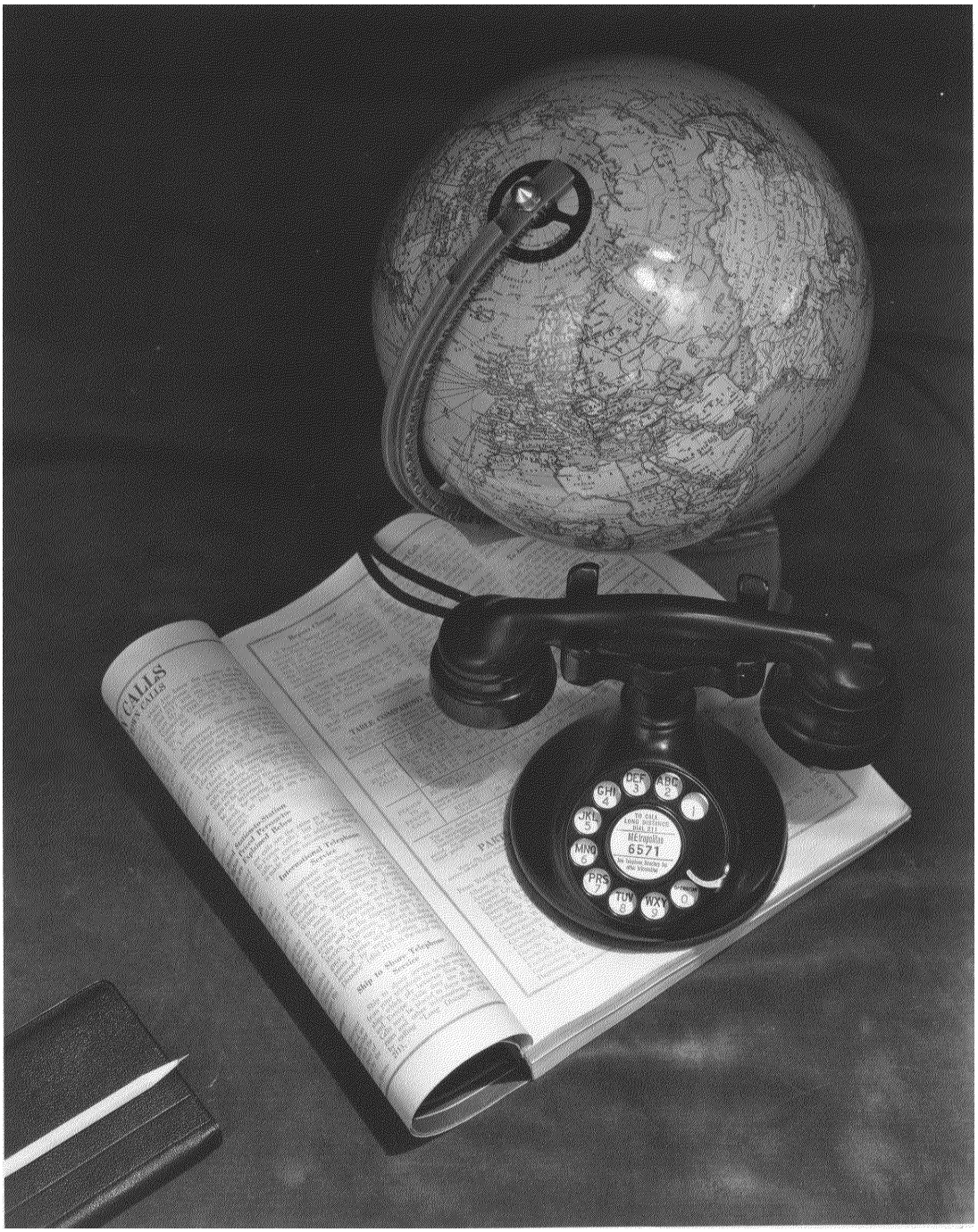

Figure 23: Miscellaneous Subjects: Telephone, Directory and Globe

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