

<ch>Afterword

The Network Society: A Cross-cultural Perspective

An Historian's View<chx>

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<A>The Trading Zone of Social Science and History<Ax>

After this *tour du monde*, this *mappa mundi*, this astounding overview of today's world – its economics, politics, communications, cultures, institutions, social movements – how can there possibly be anything more to say? What can an historian add to this rich, fertile, expansive survey?

Historians think in time. As the title of this volume suggests, the contributors are primarily thinking across space: a cross-cultural perspective of the world as it now exists, not presuming to cover the entire globe, but ranging far and wide enough to give a sense of the whole. When I was asked to join this party, at first I assumed my presence would add a vertical dimension, adding the depth of time to the view of the network society, saying a few words about where it comes from and proposing how it resembles or does not resemble earlier societies. It did not take me long, however, to realize that I would not add much to the party if I begin with concepts and issues as they are laid out here (beginning with the concepts of “network” and “society”) and simply project them backwards. Instead, I need to suggest how historians construct things differently in the first place.

Social scientists and historians engage with the same reality – our common world – but in different ways. The differences arise in part from professional training and institutions, but they go much deeper. One of the fascinating complexities of the human mind is the persistent coexistence of two very different modes of structuring human experience: through logic and through narrative. Whether or not this coexistence will endure as long as humanity does, it apparently goes back to the dawn of what we like to call civilization. Most of the earliest examples of writing encode logical analysis, usually in the form of what we would now call “business records”: lists of goods, reckonings, tallies, counting (Robinson, 1995). The earliest examples of poetry encode stories about where people come from, what their identity is, what their collective experience means.

Both modes of organizing experience provide structures for thinking about the significant realities of human life. The quest for understanding, now institutionalized as the history profession, certainly depends upon logical analysis and theories of causality and agency, but it still seeks to understand origins, purposes, and meanings. Social science, on the other hand, gives priority to logical analysis in its quest for understanding; while a story line is often implied, or embedded, it is not the main purpose of the enterprise. Both “mind sets,” despite their vast differences, are apparently necessary for human beings to understand their experience. As scholars, one of our most exciting challenges is to see how they can overlap and interact in exciting ways.

This is not always easy to do. As an historian of technology, I have looked at many books on the recent “information technology revolution” and today’s “information society,” which breathlessly explain the present and predict the future, while lacking any sense of the past. But it can be done. I was happily surprised to open Manuel Castells’s *The Rise of the Network Society* (1996) some years ago and to discover, as early as page 5, citations of some of the leading lights in the history of technology (Merritt Roe Smith, Leo Marx, Melvin Kranzberg), along with those of historically inclined social scientists (Wiebe Bijker, Joel Mogyk), all supporting a sophisticated discussion of the major issues relating to “Technology, Society, and Historical Change”: technological determinism, the social construction of technology, sources of innovation, technological revolutions, technological paradigms, and much more. This dialogue between history and sociology continues throughout the three volumes of Castells’s *The Information Age: Economy, Society, and Culture* (1996–8). Its purpose is to understand contemporary society, but always in the context of the much longer story of the efforts of human beings to shape their physical and social environment.

As demonstrated in *The Information Age*, social scientists and historians can develop a robust “trading zone” where they invent ways of communicating to accomplish a common project, even though they come at it from different professional cultures. This metaphor self-reflexively illustrates the point: I am borrowing it from historian of science Peter Galison, who in turn has borrowed from linguistics (specifically from studies of pidgins and Creoles) to explain how physicists and engineers have developed techno-scientific trading zones (Galison, 1997: 46, 48). I could just as well have cited Castells,

who proposes “protocols of communications between different cultures” as “the cornerstone of the network society” (p. 00).

In this comment, I want to engage in some “protocol development” and “trading-zone building” between social scientists and historians around the project of understanding our common world. Since this volume defines the essential character of contemporary society as one of “networks,” as an historian I begin by asking about the relation between networks and history: what does it mean to identify a stage of history with a stage of technology? I will begin by commenting on the ways in which historians try to connect the past with the present, and vice versa, and then will reflect on the introduction of the concept of “technology” to accomplish such connections. This leads to a discussion of the way the concept of “technology” entered the study of history, beginning in the seventeenth century, leading to a new understanding (in the eighteenth century) of history as the record of progress. The chapter will conclude with a consideration of the ways in which technological activities have altered the conditions of human existence and therefore of history.

<A>Connecting Past and Present<Ax>

The major contribution so far of historians of technology to the current discussion of “network society” may be summarized in two words: context matters. In Castells’s somewhat longer formulation: “Studies on the uses of information and communication technologies demonstrate, again, what historians of technology established long since:

that technology can only yield its promise in the framework of cultural, organizational, and institutional transformations” (p. 00).

In order to demonstrate how context matters, historians of technology have concentrated on case studies that show the “social construction of technology,” both in design and in use, in a particular context of material, political, and economic constraints and actors (individual, institutional, and networked). Many of these studies are models of fine-grained archival research presented in a nuanced and sophisticated analysis. For all their virtues, however, contextual studies may promote an untenable distinction between a technological core and a social environment, when a deeper understanding of “context matters” demonstrates that social relationships are embedded in technological relationships and vice versa. Case studies of social construction tend to focus attention on contemporary (to the study) players and issues rather than on ones deeper in the past. Both types of case study beg the question of how the actors and forces that are the agents of “social construction” have themselves been shaped by technological forces and events, as is inevitably the case in a reflexive world.

Historians of technology need to make the transition from “context matters” to “history matters.” We need to deploy the case studies to develop higher-order generalizations about history and technology, and to explain to ourselves and to our readers the relevance of history to the present. Most historians want their work to have some degree of generalizability and relevance, but historians of technology seem to want this more than most. The drive to generalize is strong because the question of the relationship between

technological and historical change is one of the deep problems of historical theory: any historian wants to contribute to clarifying such a central problem. The drive to be relevant is strong in a self-proclaimed “technological age.” When the past, present, and future of technology is the subject of so much popular and semi-popular speculation, the “so what” question keeps poking historians of technology in the ribs, so to speak. We feel that WE should have something special to say to OUR own times, and complain when we are not listened to.<1>

In wanting to demonstrate generalizability and relevance, however, we confront an inner conflict. On the one hand, we feel a sense of civic responsibility to remind our readers that history matters, that the present world is rooted in past worlds, and that past experience offers some useful analogies and lessons for the present. Since the eruption of whole new species of technologies – computers, networks, the web, biotechnology – is well within the historical lifespan of most readers, for historians it is an almost automatic professional reflex to write that there is a longer story here, that these things did not appear just yesterday, that purposes of the past have shaped the present. On the other hand, we feel a sense of scholarly responsibility to remind our readers that “the past is a foreign country,” that the world today is very different from that of the past, and that analogies and lessons are always highly limited. The past is present and it is also past.

These conflicting responses and responsibilities are what make history such an interesting profession. History itself is a trading zone between past and present. History establishes communication between storytellers and actors, between what happened and what is

remembered, between the dead and the living. The subject matter of history is by definition weighted toward those who have come before us, their deeds and actions and agendas. By writing history, the living try to push off some of the dead weight of the past, giving themselves a little breathing room, protesting that they are not doomed to carry on with the past because it was so very different. If tyranny breeds resistance (Castells's first law), the tyranny of the dead is no exception (Harrison, 2003).

On the other hand, if resistance to the past is too extreme, it leads to the fallacy of "presentism," in which the reality of the past (not to mention that of death) is denied. Presentism can take several forms. In today's most commonplace version, the past is simply ignored: the present is taken as it appears, as a self-contained reality, as if there were no past realities that have shaped it. Another version connects past with present, but in the manner of what in the historical trade is called "Whig history": constructing the record of the past as a track to the present, a narrative of events leading to the triumph of whatever is deemed most COMMENDABLE today. So, for example, among the Whig politicians of nineteenth-century England, history was a record of the gradual emergence of democratic, liberal politics, as defined by the then-current principles of the Whig party. In current versions, technology stands in for the Whig party. The "information society" is the apogee of the continuum from nomadic to agricultural to industrial societies, so that human history is then the record of "the long march of progress under the guidance of reason" (p. 00). Similarly, the "network society" is hailed as the climax of inevitable technological progress toward more ubiquitous, more rapid, more portable, more miniaturized, more powerful communication.

Another version of presentism, already alluded to, involves taking the categories and concerns of the present, shaking (or stirring) them with history, and adding the dimension of time to inquire into their origins. This is an obvious temptation in dealing with the concept of “network society.” As Castells has cautioned, this concept, as he uses it, cannot be freely floated through the waves of history to far and distant shores. It relates to a specific technological paradigm, based on microelectronics; a specific type of technological system, that of linked computers; a specific form of globalization, acting in real time; and other very specific types of information, employment, and other social behaviors. So it is quite possible and helpful to look back, as Castells does, on the emergence of contemporary network society in the unanticipated confluence of three originally independent processes: “the crisis of industrialism, the rise of freedom-oriented social movements, and the revolution in information and communication technologies” (p. 00). But once one moves further back in time, very quickly the gap between the concept of a network society and the specifics of networks in that historical situation grows ever wider.

One can readily see this gap, for example, in the standard work on electrical networks in the early twentieth century – Thomas P. Hughes’s classic *Networks of Power* – where both the specific content of the network system and the context in which it operated are markedly different from that of contemporary computer systems. If one looks back even further – at the Roman Empire, for example – to ask how it might be analyzed as a “network society,” the mismatch becomes even more striking. If the network is composed

of roads and aqueducts, and the labor force is based on slavery, and the social goals are focused on the maintenance and extension of imperial power, this is an entirely different “network society” from the one based on the development of computer networks in a job-holding, market-oriented economy. Concepts, too, have a history, and when one from the present is anachronistically imposed on the particularities of the past, the effort to generalize can quickly become absurd.

That is why historians of technology have to be particularly careful. We have been outspoken in rejecting the types of presentism that would deny the very reality of the past or read the historical record as the grand narrative of technological progress. However, in our very self-definition, we are indulging in presentism of the last sort, by applying the concept of “technology” to the past, especially the distant past. IN THIS RESPECT, the history of technology is one grand exercise in anachronism.

<A>Technology and Presentism<Ax>

“Technology” can be a thing, a concept, and a word. These are easily confused. As a word, technology was almost unknown until a century ago. As a “thing,” “technology” has always been a central and necessary human activity: the reworking of the given world in order to provide the material basis for human life. The concept that these activities are central and necessary in human life goes back at least to the Greek term *techne*, and in English has long been expressed in terms such as “the material arts” or, more lately, “the industrial arts.” But collecting them under the singular, abstract word “technology” is a very recent development. First introduced into English in the early seventeenth century,

“technology” was rarely used until it was appropriated by Jacob Bigelow in 1828 to describe the study of industrial activities. The term first achieved some public prominence when it was used to name the Massachusetts Institute of Technology in 1861 (Bigelow was one of its founders), but even at the end of the century its use was uncommon.

Only in the 1920s and 1930s did “technology” become a commonplace term, in large measure because social scientists found it so useful to describe current trends (for example, William Ogburn’s “technological gap,” or, even more widely, “technological unemployment”). Only after World War II did it become identified as a semi-autonomous, dominant agent of historical and social change, the force with the most “impact” on our lives, the one that defines our historical period: “our technological age.” “Technology” emerged as an historical concept when new technological “things” made it necessary to rethink how history worked – above all, the construction of large technological systems, not always visible in their entirety, but understood as the abstract ensemble of coordinated tools, machines, symbolic representations, material infrastructure, social systems, and human beings (Marx, **Date?**).

The emergence of the history of technology is therefore an inherently presentist application of a category of current importance back into history where technological activities abounded, but where the concept of technology as an historical agent was absent. As such, the history of technology demonstrates the positive role of presentism. Applied retrospectively, the concept of technological history has revealed elements of the

past that were undetected, or underdetected, due to limits either in historical imagination or in the historical record. So, for example, the habit of thinking in terms of technological systems encourages historians to relate a whole set of historical artifacts – tools, settlements, and structures of all sorts – to the systems of transportation and communication that may be less visible in the record but that were necessary to connect and support the artifacts. Because a technological system is always also a social one, the systems perspective leads the historian to infer labor relations, legal codes, education and training, weights and measures, governance structures, and the like, all of which can be analyzed in their relationships to lead to a much richer view of history writ large, especially the social, political, and economic record of the past.

The concepts of “technology” and especially of “technological systems” have therefore helped historians notice and retrieve large parts of the historical record that would otherwise have been neglected. In this respect they have participated in one of what Castells calls the “freedom-oriented social movements” (p. 00) of the postwar years: the movement of historians to liberate retrospectively whole categories of actors and activities so long ignored. Women, children, laborers, sexual outcasts, and many others were not deemed worthy of historical significance in their own times, but have been accorded this dignity by ours.

In the case of the history of technology, however, this retrospective liberation is particularly radical. By giving “technology” a place of honor in historical studies, we are not just bringing new actors onto the historical stage, but redefining the stage itself. What

we now call “technology” has not just been neglected as part of history, but has been deliberately omitted as unworthy of historical remembrance. And what is most intractably presentist about the whole enterprise of the history of technology is not the temptation to compose a Whiggish narrative of technological progress, not the temptation to impose current concepts (such as the “network society”) back into times where they do not fit, but the assumption that “technology” has any place in history at all.

For the Greeks and Romans, history was the record of great deeds and great words; for the Christians of the Middle Ages, it was the record of God’s revelation in the world; for both, the practical arts were the background against which these significant dramas, whether human or divine, were played. For historians until the seventeenth century, technological activities – technology as a “thing” – were self-evidently necessary to provide biological support for life and to construct a world for human dwelling.

Historical activities were a different thing altogether: they were rare words and deeds that stood apart from the everyday, that rose above the level of repetitious life-sustainment and material world-building (Arendt, 1998: 42). The idea that technology has a role in history, much less that it has a leading role – or even becomes the measure of history – was unthinkable. “Prehistory” could be defined by technology – early stone age, late stone age, bronze age, iron age – but history begins where epochs cease to be defined primarily by tools.

Have we come full circle, returning to technology as the way to categorize phases of human activity, so that prehistory and post-history reconnect now after a long interlude of

history defined as great deeds and words? How has “technology” come to dominate the historical consciousness? How did technological innovation and organization come to dominate the reading of the past and predictions of the future?

<A>Technology Enters History<Ax>

The assertion that technology deserves a leading role in the historical record was first articulated long before the cluster of events normally called the Industrial Revolution of the late eighteenth century. The historiographical revolution that brought technology into the writing of history began in the seventeenth century, with two declarations of independence from the past. The first declaration was that of René Descartes, who, in *Discourse on Method*, “takes his stand against tradition the moment he decides to doubt its authority and to rely upon his own personal resources in the quest for truth” (Harrison, 1992: 111). Descartes detaches himself from the past in order to become “methodically self-reliant in matters of action and knowledge” and also in order to achieve “the mastery and possession of nature” (Harrison, 1992: 108).

The second declaration of independence came from the moderns in the so-called “battle of the books” between the moderns and the ancients, which demonstrates how supposedly literary quarrels – or, as we might say now, “culture wars” – can raise fundamental conflicts with meaningful implications for more than just intellectual elites. The seventeenth-century “moderns” might concede equality or even superiority to the ancients in philosophy and the arts, but they felt they clinched their arguments for the superiority of modernity in pointing out that only their age possessed the compass, the

printing press, and gunpowder. Furthermore, the moderns claimed, they could be confident that such technological achievements would continue because the modern age possessed the experimental method: not a body of knowledge, such as the ancients had bequeathed, but a method for acquiring and improving knowledge that no longer depended on individual genius (Jones, 1936).

Descartes and the moderns converged, then, in claiming a break in history through the discovery of a method that would enable them to defy the tyranny of the past and open the way to the development of a new mastery over nature through reason. They redefined history as the record of increasing superiority in areas where the moderns had an advantage. In a move that would be repeated over and over again, Europeans shifted the ground of the debate to “machines as the measure of man” to proclaim to others and to assure themselves of their own superiority (Adas, 1990). The value system emerges in response to a perceived advantage and becomes the basis of further development of that advantage.

The historian-philosophers of the eighteenth century went even further. Because enlightened Europeans claimed superior methods of advancing knowledge and attaining power over the natural world, they proposed that history itself would begin to work differently. The first important statement of this claim was the *Discours sur les PROGRES [WITH AN ACCENT GRAVE OVER THE “e” IN PROGRES] successifs de l’esprit HUMAIN* (A Philosophical Review of the Successive Advances of the Human Mind), a speech delivered by Anne Robert Jacques Turgot at the Sorbonne in 1750, when

he was only 23. In it, Turgot advanced three novel assertions about history. First, he redefined its scope: history is global, he claimed, the story of “the human race,” which to the “eye of a philosopher” appears as “one vast whole.” Second, Turgot redefined its content: history is not the record of political or diplomatic events (which he dismissed as motivated by “self-interest, ambition, and vainglory”), but the gradual and enduring enlightenment of the human mind. Third, Turgot redefined the direction of history. The past was composed of cycles, countless rounds of routine and repetition, as each successful civilization succumbed to internal vices and external invasion, and as individual genius was swamped by waves of mediocrity or buried in obscurity. Hereafter, thanks to the power of reason as expressed in scientific inquiry and technological achievements, history would move forward in a linear track.

In his *Discours* Turgot reviews crucial turning points in history, ones that have decisively changed circumstances so that not only can humanity innovate, BUT it can also accumulate its innovations. These turning points are technological ones: Turgot rewrites history as a sequence of great inventions, all of them vastly increasing humanity’s ability to communicate. The first is language: the sounds which “have made of all the individual stores of knowledge a common treasure-house” (Meek, 1973: 41); the next is writing, which lifted humanity from the surface of the earth, seeming “to give wings to those people who first possessed it” (Meek, 1973: 44); the climactic invention is that of printing: the art which makes it possible to “wing to every corner of the earth the writings and glory of the great men who are to come” (Meek, 1973: 57). This slow process of enlightenment, Turgot says, proceeds to the extent that, through these inventions, human

beings are in contact with other social groups, and especially as “separate nations are brought closer together” (Meek, 1973: 40–1). Henceforth discoveries will accumulate, in a universal library, available to all: progress in time depends upon the extension of knowledge in space.

If Turgot’s 1750 speech marks the opening of the high age of Enlightenment, the death in 1794 of Marie Jean Antoine Nicolas Caritat, marquis de Condorcet (b. 1743) marks its end. After the deaths of his mentors and heroes Voltaire, d’Alembert, and Turgot, the younger Condorcet saw himself as carrying on their political and intellectual legacy. Its implications for historical theory he expressed in the most influential summary of the Enlightenment ideal of historical progress, the *Esquisse d’un tableau historique des PROGRES [WITH AN ACCENT GRAVE OVER THE ‘E’ IN PROGRES] de l’esprit HUMAIN* (Sketch for an Historical Picture of the Progress of the Human Mind), WRITTEN IN 1793-1794, at the height of the Terror, when he was in hiding from the Jacobins, just before his capture and apparent suicide.

Like Turgot, Condorcet defines history as the global extension of knowledge among humanity as a whole. Also like Turgot, he is a technological determinist. The titles of the ten chapters of the *Esquisse* correspond to major steps in technological progress, beginning with the invention of the alphabet, and culminating in the invention of printing, when for the first time the human mind was truly freed from spatial limits: “Men found themselves possessed of the means of communicating with people all over the world ... The public opinion that was formed in this way ... operated with equal strength on all

men at the same time, no matter what distances separated them” (Condorcet, 1955 [1795]: 100). Condorcet reaffirms Turgot’s conviction that progress will now continue indefinitely because, for the first time in history, technical innovations prevent regression and decline (see Williams, 1993):

<ext>The strength and the limits of man’s intelligence may remain unaltered; and yet the instruments that he uses will increase and improve, the language that fixes and determines his ideas will acquire greater breadth and precision and ... the methods that lead genius to the discovery of truth increase at once the force and the speed of its operations. (Condorcet, 1955 [1795]: 185)<extx>

According to these historian-philosophers of the Enlightenment, the historical record traces the evolution of an intellectual world system, based on rational thought, and expressed through the logical, nonmetaphorical articulation of universally valid information. The global system has a hierarchical though dynamic arrangement of cores and peripheries, linked together by lines of transportation and communication: this spatial organization of history makes historical progress possible. There is a tendency for the global system to keep expanding in scope and for the rate of circulation to become more rapid. The inventions that make this system possible – speech, the alphabet, writing, printing – also make a new mode of history possible. Technology not only enters history, but redefines what history is. Instead of great words and deeds that achieve immortality for individuals but fail to interrupt the cycles of history, history becomes the

accumulation of great discoveries and inventions that permit a linear development of ever-increasing knowledge and mastery of nature.

<A>History Enters Technology<Ax>

Anyone reading these predictions in the twenty-first century does so with a mixture of déjà vu, wistfulness, and irony. Déjà vu, because this historical vision sounds so familiar: the belief that history has reached a point of major discontinuity due to unprecedented technological capabilities, especially capabilities that make it possible, for the first time, for information to be quickly and easily communicated around the globe. Wistfulness, because the Internet incarnates as technological reality the means of which Turgot and Condorcet dreamed to advance human civilization. Irony, because the technological means now at our command are so disconnected from the civilizing ends that they believed in.

To be sure, elements of the Internet approximate their vision of a universal library of text, images, and sounds, GLOBALLY and instantly available, and endlessly empowering through providing new forms for creativity and social participation. But the Internet is also the site of spam, snooping, child porn, and property rights, and far from being GLOBALLY available it highlights vast disparities of opportunity generally summarized as the “digital divide.” The way in which the web has evolved in the past generation is a dramatic illustration of the “social construction of technology” in a society of economic and political disparities. Context matters.

And so does history: what is striking here is the way in which belief in technological progress has parted company with belief in historical progress. In current raptures about the Internet, we still hear the echoes of the Enlightenment and its conviction that a new phase of history is nigh, thanks to the universal circulation of information accumulated through reason-based inquiry. The echoes are faint, however. Belief that technological progress will inevitably lead to general historical progress has faded as events have repeatedly demonstrated otherwise. A quick capsule history of the twentieth century – the Great War, the collapse of the world financial structure, the rise of fascism, the Second World War, the Holocaust, the use and proliferation of atomic weapons, the economic and public health collapse of Africa – is enough to undermine belief in inevitable historical progress.

But events do not necessarily subdue beliefs: the narrative of progress is too important to the identity of the West to collapse entirely in the face of these events. When the concept of technology was brought into the study of history beginning in the 1600s, and confirmed as a revolutionary agent in history in the 1700s, history became redefined as the record of human progress. The idea of progress, based on scientific and technological evidence, was extrapolated to history in general. Since the Enlightenment, the idea of progress has retreated from history in general, where evidence is lacking, back to the more restricted realms of science and technology, where it can be marshaled. The Great War may have mocked any notion of historical progress, but all the time Henry Ford's assembly lines were turning out cheap cars. Earthly cities may be a mess, but men have walked on the moon.

At the beginning of the twenty-first century, historical change and technological change have diverged. Old-fashioned political, military, and diplomatic history continues, as difficult and as painful as ever. Technological progress also continues, making money for some, improving medical care for others, churning out consumer products for many. The belief persists that if we can somehow avert environmental or military catastrophe, technology may make life better for most people. Technology has not transformed history as we have known it, but has set up a parallel track of development that seems “progressive” on its own terms, without apparently altering the course of history. This is not a logical conclusion, but it does allow people to maintain a conviction in scientific and technological progress, while accounting for the evidence that history seems to go on without discernible improvement.

Given this state of confusion, it is worth returning to the question that engaged the *philosophes* of the Enlightenment: how has human-generated technology changed the conditions of human life and therefore, possibly, the way history operates? Without necessarily signing up to their optimistic answer, we can accept the importance of this question. Will technological change alter history as we have known it – not necessarily by creating a new kind of history (linear progress rather than cyclical stagnation) but by changing how history as we have known it works? If historians of technology address this question, we may achieve a level of generalizability and relevance above that of discrete contextual case studies. We may also do the case studies better, by showing how the society that largely forms the “context” and does the “constructing” is itself evolving as a

result of technological change. The best way to proceed is to focus on the large but answerable question of how technological activities have altered the conditions of human existence.

In her extraordinary book on the subject, *The Human Condition* (first published 1958, 2nd edition 1998), Hannah Arendt proposes that there are three elements of “the human condition”: labor, work, and action. She uses these categories to survey human experience from antiquity to the present. The categories remain constant, but in each case she shows how technological change has profoundly altered the human experiences of labor, work, and action – in short, has altered “the human condition” and therefore the conditions of historical change. What follows is a much too brief summary of and gloss upon her rich contemplation of the ways in which the human condition has been transformed through human-generated technological conditions. As she says, “ ‘What we are doing’ is indeed the central theme of this book” (Arendt, 1998: 5).

First and foremost, new sources of energy and new modes of production have vastly multiplied the productivity of human labor. This unprecedented increase, primarily in the past two centuries, is a new fact in human history – something new under the sun, as it were. In the nineteenth century, despite all the tragedies and miseries that accompanied industrialization, the possibility of universal abundance and opportunity was central to historical, political, and utopian thought of all varieties.<2> In the twentieth century, despite continued tragedies and miseries and ever-growing anxiety about environmental limits, the possibility of globalizing abundance and opportunity, made possible by

exponentially greater labor productivity, is still an article of faith for many elites (who do not hesitate to exploit the deep hope it inspires) and, more important, for people around the world (who cling to this hope).

Second, technology has rebuilt the world – the relatively durable, objective, shared world of things, produced by work, which houses individual LIVES and which “is meant to outlast and transcend them all” (Arendt, 1998: 7). In Arendt’s analysis, work is not the same as labor. While labor arises from the body, in never-ending life cycles of production and consumption, the world is constructed by humans from what nature gives us through fabrication (Arendt, 1998: 136). The world is therefore always to some degree “artificial,” but what has changed in the past two centuries is the dominance of the human-built world in relation to the natural or given one. The world is now a hybrid environment – part nature, part technology, with no one able any longer to tell where one ends and the other begins.<3>

The challenge of managing this environment is even more complicated than that of controlling nature. Its scale, scope, complexity, and pace of change are all unprecedented, as well as the consequences of mismanagement. The transformation of the world from one that is primarily given to one that is primarily human-constructed is, like the increase in labor productivity, a dramatic and concretely measurable transformation of the human condition. Many of the measures are provided in the study of twentieth-century environmental history by J. R. McNeil (2000), the title of which succinctly summarizes the evidence: “something new under the sun.”

Third, more difficult to measure, but arguably most important of all, is the transformation of action because of technological change, or in this case more properly because of techno-scientific change. Like the productivity of labor and the dominance of the human-made world, the fueling of human actions by natural forces is “something new under the sun.” Arendt begins her analysis by reminding her reader that processes of change are now being inserted into the world, formerly the site of durability and stability:

<ext>we no longer use material as nature yields it to us, killing natural processes or interrupting and imitating them ... Today we have begun to “create,” as it were, that is, to unchain natural processes of our own which would never have happened without us, and instead of carefully surrounding the human artifice with defenses against nature’s elementary forces, keeping them as far as possible outside the man-made world, we have channeled these forces, along with their elementary power, into the world itself.(Arendt, 1998: 148–9)<extx>

Writing in the late 1950s, Arendt used automated manufacturing, scientific research in general, and atomic energy in particular as examples of humanity channeling natural forces into the world. We would now add two even more powerful examples: irreversible environmental processes (especially those associated with global warming) and all the techniques of biotechnology that remove the quotation marks from her reference above to the human ability to “create.” The elementary forces of creation and reproduction now being harnessed through biotechnology only underscore her argument that human action

is redefining the boundaries of what we think of as history. “Only because we are capable of acting, of starting processes of our own, can we conceive of both nature and history as systems of processes” (Arendt, 1998: 232). As techno-scientific action becomes part of history, the line between history and nature becomes blurred: acting into nature becomes part of acting in history.

As already noted, Arendt admired the Greek understanding of history as the record of heroic action in great words and great deeds. With this new variety of action, however – “acting into nature” by starting processes – outcomes are uncertain, responsibility is diffused, and possibilities for starting anew are diminished. In this new type of historical action, “uncertainty rather than frailty becomes the decisive character of human affairs” (Arendt, 1998: 232).

Humanity may have hoped that technology and science would enable it to “tak[e] charge of the conditions for its own existence[ADD COMMA HERE]” in Castells’s words (p. 00). If anything, however, the opposite seems to be happening. The uncertainty of science and technology are being LEVERAGED into new forms of action. For example, what are usually called acts of terrorism may be defined as the exploitation of unpredictability for political ends. Historical action has always been tied to deeds of violence, but those deeds have typically been reserved for special groups of people acting in special circumstances. Now, the conditions for large-scale violence are available to many more people, in many more situations. This democratization of violence, as it were, is also “something new under the sun,” and it is one of the most troubling novelties of our age. (Perhaps because

it is so troubling, it is the aspect of network society that is relatively absent from the pages of this book.) Networks alter conditions of labor, work, and action – all three. In all of them, networking starts processes that alter the context of further technological change, and, by starting processes, networks therefore “act” as well as “build” and “labor.”

<A>Conclusion: Making History as well as Technology<Ax>

Technological change has not made history jump onto a new track. However, by massively altering the human condition, technological change has intensified the processes of historical change. History has always been a web of circumstances into which we are born, a web of relationships that involve a multiplicity of selves and conditions. The historical condition is one of multiplicity, complexity, and unpredictability. Because human beings have created a technological world of tremendous inertia, its multiplicity and complexity seem more daunting than ever. The ability of any one person to affect the larger situation seems more constrained than ever. Because of “what we are doing,” it is tempting to let technology become the narrative, the story line, the process that drives human affairs. When hope for progress is invested in technology, then humanity looks not to great deeds and actions but to great inventions as the basic story line. Technology becomes the substitute for history itself.

But the possibility of effective historical action diminishes as people assume that the story is about technology, not them. Historical consciousness is a source of habits such as responsibility, trust, and forgiveness, which are essential for effective historical action. In

a collective life dominated by large technological systems, each of these habits becomes less useful and less practiced. When the systems are so large and complex, personal responsibility is increasingly less evident. When they are so unpredictable, trust among people becomes at once more important and more difficult to maintain. And when the technologies are so unforgiving, the human possibility of starting anew by forgiving mistakes seems increasingly remote and strange.

Jean-Paul Sartre reflected on the need for historical consciousness when he recalled his experiences in the French Resistance during World War II. There the events that mattered involved courage and physical endurance, which in retrospect seemed to him a myth, a false experience:

<ext>After the war came the true experience, that of society. But I think it was necessary for me to pass via the myth of heroism first. That is to say, the prewar personage who was more or less Stendhal's egotistical individualist had to be plunged into circumstances against his will, yet where he still had the power to say yes or no, in order to encounter the inextricable entanglements of the postwar years as a man totally conditioned by his social existence and yet sufficiently capable of decision to reassume all this conditioning and to become responsible for it.

<ext>For the idea which I have never ceased to develop is that in the end one is always responsible for what is made of one. Even if one can do nothing else besides assume this responsibility. For I believe that a man can always make something out of what is made

of him. This is the limit I would today accord to freedom: the small movement which makes of a totally conditioned social being someone who does not render back completely what his conditioning has given him. (Sartre, 1970: 22)<extx>

The necessity of a “myth of heroism,” even if it is not “real,” returns us to the apparently irreplaceable need of we humans to structure our experience through narrative as well as through logic. Because historical narrative is always grounded in experiences of time and place, I wish to conclude these comments by speaking from my own historical experience as a citizen of the United States at the beginning of the third millennium. From here, I observe a deep fear of history: the wish for the historical story to stop, here and now, at the pinnacle of American power. The American empire appears designed not so much to increase its power in the world as to maintain a world where it is safe from the change, safe from the future, safe from history. At the same time, I observe a deep desire for the technology to continue, with indefinite expansion of devices and systems that promise enjoyment, security, health, and wealth. These irreconcilable wishes – wanting history to stop, wanting technology to continue – can be summarized as an extreme form of presentism: fear of the past, fear of the future, longing for the present to continue indefinitely, as the eternal moment that alone seems to favor us. They can also be the most extreme form of regression: a desire to return to prehistory, defined by technological stages, so that technological change rather than historical change defines civilization.

But technology and history cannot be separated, and we are destined to create history as well as technology. History cannot be transcended or avoided. It has no pause, mute, or reset button. On the other hand, while it never entirely disappears or begins anew, history is always starting again in more modest ways. People die, babies are born, children grow up, things change. Acting historically means making decisions in ever-changing, highly constrained situations, clearing a pathway through the thicket of circumstances. Thinking historically means reflecting on the thicket and making a narrative out of the pathway. By acting and thinking, we make history.

<X>Notes<Xx>

- 1 For example, the 1996 Presidential Address of the Society for the History of Technology by Alex Roland (1997).
- 2 “The various historical systems of the nineteenth century with their ‘laws’ – whether progressive, evolutionist, dialectical, positivist, or not – were all, in spite of their endless deficiencies, efforts to cope with this new history” (Shklar, 1966: 107).
- 3 In the words of historian of technology Elting Morison (1966: 16): “We are well on the way, in our timeless effort to bring the natural environment under control, to replacing it by an artificial environment of our own contriving. This special environment has a structure, a set of tempos, and a series of dynamic reactions that are not always nicely scaled to human responses. The interesting question seems to be whether man, having succeeded after all these years in bringing so much of the natural environment under his control, can now manage the imposing systems he has created for the specific purpose of enabling him to manage his natural environment.”

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