

“There’s an App for That”: Technical Standards and Commodification by Technological Means

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Received: 23 December 2010 / Accepted: 18 April 2011 / Published online: 5 May 2011
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Abstract Though the term “commodification” is used broadly, a theory of the processes by which goods become exchangeable and in fact objects of monetized exchange reveals a key site for technological politics. Commodities are goods that are alienable, somewhat rival, generally with low exclusion costs, and that are often consumed in use. Technological advances can affect all of these traits for certain goods, effectively bringing about a process of commodification by technological means. However, in order to function with specific contexts, technologies are designed and manufactured according to technical standards, standards that in turn take on features of what David Grewal (2008) has called “network power.” As such, standard setting processes become the potential locus for political argument over the legitimacy of a commodification process. Theorists hoping to develop more democratic theories of technological governance should thus recognize the significance of standards and the role they play in either promoting or controlling social relations organized according to the norms of monetized exchange.

Keywords Technical standards · Innovation · Political economy · Critical theory · Networks · Animals

Clarification of the way that “commodification” (or “commoditization”) is and has been a term of art in social theory could become a project in its own right. In this paper, it is the processes of commodification that are primarily of interest, rather than their results. The phrase “commodification by technological means” is intended to mark off a set of processes that differ from cultural, symbolic, and legislative mechanisms. This is not to imply that these other ways of commodifying are unimportant, but the use of the term in

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cultural studies has become so disconnected from technology that the very idea of commodification by technical means requires some clarification. There has never been any question that commodification is in some way related to technical change. The commodification of labor through a series of legal and policy changes was documented by Karl Polanyi (1944) in *The Great Transformation*, but the rise of industrial manufacturing was the economic driver for these changes. If it had not been obvious from Adam Smith's discussion of the pin factory in *The Wealth of Nations* (Smith 1776), Karl Marx's essay "Wage Labor and Capital" (1978), originally published as a series of newspaper articles in 1849, showed that industrial production efficiencies were critical to the changes in social relations that are now characterized as commodification. More recent work has emphasized "commodification of life" in connection with technological breakthroughs in reproductive technology and biotechnology (Rothman 1988; Resnick 1998; Hansen 1999). However, in this bioethics literature, commodification is analyzed less as a process than as a technological fait accompli that is then subjected to ethical evaluation.

The core meaning of *commodity* that is of interest in this literature is "any good that is bought and sold, or traded under standard rules of economic exchange." To *commodify* is then to convert something *not* customarily traded into something that is, or to increase the intensity or frequency of its occurrence as an object of economic exchange. The basic idea is clarified below by a thought experiment designed to illuminate the way that technical change can alter our understanding of what can and cannot (or ought and ought not) be bought and sold. This thought experiment is then theorized according to a schema that I have adapted from institutional economists in a series of papers (Thompson 2006, 2007, 2008a, b). Needless to say, the commodification process outlined in these papers is only meaningful for technologies that actually work, and in order to work reliably throughout a number of applications, technologies must be constructed according to standards. But, standards are human creations that then structure the reality in which humans live (Busch 2011). When a given standard becomes widespread, the commodifying tendencies of a technology are coupled with network power, yielding the political reality that was not only the target of first-generation critical theorists including Marcuse and Adorno but also the topic of much recent work in the philosophy of technology.¹

1 Commodification: A Vignette

Imagine yourself sitting on a hilltop, relaxing in the shade of a lone apple tree on a warm mid-autumn afternoon. You have collected all the apples that were lying on the ground and from branches that were within reach and placed them in a bag that you brought along with you. Now, you are simply enjoying the autumn breeze and the call of songbirds, when you see a stranger coming up the hill who is also carrying a bag. After exchanging greetings, the person tells you that they are in search of apples, but they notice that you have beaten them to the harvest. "Can I buy half a dozen from you?" the person asks. Evidently, the apples in your bag manifest at least some minimal characteristics of the commodity form.

As told, the vignette suggests that either of you might have harvested these apples, but that having gotten there first you are entitled to exchange them for a

price. There are any number ways that a legal structure or customary norms might support this implication, but the way that these alternative institutional arrangements might intersect or differ from one another is not particularly germane in the present context. There has to be money, of course, for the expression “Can I buy some,” to be meaningful. The fact that both parties have come to gather apples implies that the apple tree is in some customary sense, at least, a commons from which multiple users can benefit, but the details need not concern us here. My point in relating this thought experiment is to call attention to the readiness with which these apples are

¹ The theoretical gap between Smith, Marx, and Polanyi, who do not use the word “commodification,” and the bioethicists who do was created by the collapse of the classical paradigm in economics and the reconstruction of Marxist themes that Marcuse and other first-generation critical theorists undertook in the 1930s. As classical economists, Smith and Marx both presumed that the labor theory of value provided the underpinning for exchange relations. Marx argued that the technology-driven industrialization process that was turning labor into a commodity was also creating unsustainable class relations that would only be resolved through social conflict. For Marx, the commodification of labor adumbrates through the economic system. When machines make it possible for work to be parsed by the hour and any workman’s hour at the distaff is as good as any other, a market is created that drives wages so low that even subsistence needs cannot be met. The mystification of human relations that occurs in conjunction with this market is reflected in commodity fetishism, where the subjective allure of price competition obscures the underlying economic reality of exchanges based on the contribution that labor makes to the value of a good. But, the labor theory of value was being discarded by economists even as Marx was writing his critique of classical theory. Under neoclassical assumptions, exchange value is a function of scarcity and marginal utility. Not only do neoclassical theorists abjure any reference to metaphysical underpinnings for the value of goods, even subjective value ceases to hold any interest for them except insofar as it can be modeled as an arbitrary preference function “revealed” in the actual exchanges that people make. Contemporary economists do not use the term “commodification” at all and tie the term “commodity” to standardized wholly fungible goods such as wheat, corn, or pork bellies.

The rise of marginalism left Marx’s remarks on commodity fetishism without foundations in the material world of economic exchange. Yet, Marx’s discussion of the way that market relations invade the psyche and pervade interpersonal relationships has continued to be persuasive for many readers. Deprived of any link to actual production or material practice, early critical theorists drew on aesthetics as well as on Freudian theories of repression to reconstruct commodity fetishism as a theory of culture (Horkheimer and Adorno 1944; Marcuse 1955). As a construct of literary and cultural theory, there is no particular reason why this kind of commodification would be theorized as a process that is closely tied to material practice, economic relations, or technical change. Indeed, a fairly recent trend in the literature substitutes the word “reification” for the aesthetic and politically salient forms of objectification that the critical theorists associated with the commodity form. Yet, as Andrew Feenberg has argued, Marx’s focus on technology lurks in the background of first-generation critical theory, even if theorists of the first generation generally lacked a sophisticated account of how science and technology were effective in transforming human relations (Feenberg 1991).

In support of Feenberg, I offer a theory of technical changes associated with commodification processes that stresses concepts from institutional economics: alienability, exclusion cost, and rivalry (Thompson 2006, 2007). These themes link literatures in critical theory to the way that Bruno Latour characterizes technical artifacts as “actants” that become enrolled in social networks, sometimes functioning as the pivotal node within a network with respect to realization of key network effects (Latour 1997). “Postphenomenology” as explicated by Ihde (1990), Selinger (2005, 2008), and Verbeek (2005) provides a complementary analysis of the way that human agents interact with tools and techniques. Here, as in Husserlian phenomenology, the emphasis is on richly detailed interpretative description of experience but with the difference that the ready engagement with tools and techniques is acknowledged to transform perceptual and agential abilities that are classified by traditional phenomenology as noetic—as the exclusive preserve of subjectivity. In postphenomenology, technology penetrates so deeply into the unity of embodied experience that its alterity is rendered moot (Kaplan 2009). This theme carries over into work by Donna Haraway on cyborgs, as well as work by Feenberg on the multiplicity of possible affordances that engagement with technological artifacts and technical systems might realize (Thompson 2006).

taken to be items available for monetized exchange. Andrew Feenberg (2005) talks about “affordances” in referring to the various ways in which the material characteristics and capabilities of things in the world combine with the habits and patterns of social life to make certain practices and activities possible and even likely. The commodity form is an affordance in just this sense. As noted already, it presupposes the existence of money and the institutions of buying and selling, but some goods in my hilltop scenario do not combine with the institutions of buying and selling to produce this characteristic affordance. If my thought experiment had the approaching stranger inquire about buying the view from the hilltop, the sound of the birds or the warmth of the breeze, the narrative arc would have taken an altogether different direction. We would be wanting to know more about the curious norms at work in this scenario. “Do you mind if I sit under your apple tree?” might have been a natural enough question, but “Can I buy the sound of those birds from you?” would not.

Or maybe this question only seems unnatural to those of us whose imaginations are limited by the technological capabilities of a bygone era. Speaking for myself, it’s very near the last thing I would expect to hear from an approaching stranger. I can flesh out a vignette like this with assumptions about whose land we are on, and I can imagine scenarios in which I have every right to ban the stranger from hilltop, consigning her to a locale where the song of the birds cannot be heard. However, as someone who still carries a device I refer to as a “cell phone” that I use almost exclusively to make and receive communications that I still anachronistically refer to as “telephone calls,” it does not occur to me that I might be carrying something that could record the sound of the birdsongs and that I might, for a fee, Email this recording to the stranger so that she could use them as a ringtone or as musical accompaniment for the photograph she is taking of the view from the hilltop on her own pocket device. Perhaps, the birdsongs *do* avail the commodity form when these possibilities are envisioned, and perhaps were I a bit more up to date, I would respond quite naturally to the query “Can I buy the sound of those birds from you?” with my own question: Is there an app for that?

This reimagined and updated version of the hilltop scenario brings us up to what I have called “technological commodification.” In the limited world of old fogies such as myself, the sound of birds singing on the hilltop is not a commodity, but in the 4G world of my children, it might be. It is not some transformation in our laws and public policy that have brought about this change, nor is it in any straightforward sense a profound difference in the way that my children and I understand the cultural norms of property rights or buying and selling. Rather, it is a relatively recent change in technology, and it is worthwhile to take some care in spelling out what this change has wrought. The focus here will be on the way that technical capabilities embedded in a smartphone transform the birdsong in a manner that allows it to partake of the commodity form. To follow the actant in this particular transformation, it will be useful for all of us to go back to that nostalgic time when apples were readily imagined as commodities, but the song of the birds was not.

2 Technological Commodification

We can start with apples. Apples themselves present certain affordances that incline toward the commodity form. Apples avail or present themselves for multiple uses.

An apple can be used as a paperweight or as part of a festive fall centerpiece. Both of these uses are compatible, though perhaps not necessarily at the same time. Compatible uses are *non-rival*. In contrast, putting the apple in a pie is incompatible with using it for a paperweight. These uses are *rival*. What is more, these uses are rival because the apple is *consumed in use* when we put it into a pie. Rival uses occasion the need for multiple apples, while a single apple might well serve for non-rival uses. The term “rival” is also used to indicate whether other goods compete with the apple. Those that do are *rival goods*. The stranger wanting to buy our apples may want to throw them at something, but they might use many other things at hand on the hilltop equally well. If the demand is for an ordinary projectile, oranges, peaches, rocks, sticks, and clods of dirt might serve that purpose superbly, and apples that must be purchased may compete poorly against these rival goods. Although this package of terminology can be unruly, *rivalry* relates to the commodity form in affecting the way that goods afford compatible and incompatible uses that drive people into the market for said goods. In the case of apples, apple pie is the projected use that will drive a person quite determinedly into the market for apples. And having made the first apple pie, one is once again in the market for apples whenever one hopes to make another.

However, the person ascending the hill had hoped for apples without needing to buy them. Even if we presume that she had apple pie on the brain, rivalry is not a sufficient condition for affording the commodity form. The stranger’s expectations are disappointed because of the commodifying effects of a very simple technology that both you and the stranger possess: a bag. Putting the apples into a bag makes it very easy for you to control access to them. You might have defended a pile of apples lying on the ground, or for that matter, you might have even asserted and successfully defended a property right over apples still hanging on the tree. But, compared with apples tucked unobtrusively in a bag, the effort and trouble you would expend in making these defenses is considerable. An economist would say that putting the apples in a bag lowers *exclusion cost*; apples in a bag avail the commodity form because it is easy and inexpensive to exclude someone else from getting them. Given the existence of money and widespread norms of buying and selling, it would not be unusual for a stranger to make a tender offer for apples already in a bag. Presuming you both have the right to gather them in the first place, demanding compensation for apples still on the tree would be futile.²

² Locke might have told us that it is the admixture of one’s labor with the apples in a bag that establishes your property right in the harvested apples. The connection between property rights and commodities is multilayered and is not my principal concern. Conventions of buying and selling imply at least some minimal notion of property, as do conventions of gift exchange. Locke’s influential theory of property suggests that a universal property right in one’s own person becomes the basis for all property claims in virtue of the way that labor is mixed into artifacts, as distinct from items in the natural world. The chief competitor for this view has been jointly argued by Hegel and by utilitarians. It holds that property rights are pure social conventions, best adjudicated by observing which configuration and assignment of rights serves the social ends for which these conventions are devised. The notion of exclusion cost transects both of these views. Exclusion cost figures in the cost of enforcing a given system of property rights and as such could figure in a calculation of whether recognizing your right to own the apples in your bag serves the larger social end of achieving the greatest good for the greatest number, for example. At the same time, nothing seems more in line with natural law theory than to suggest that items with low exclusion cost are natural candidates for being owned, while the labor criterion simply tells us who owns them. Low exclusion cost is also commensurate with the adage “possession is nine tenths of the law.”

It is especially in contrast to the hilltop view, the summer breeze, and the song of the birds that the apples are goods available for commodity exchange. You could exclude the person ascending the hill from some of these goods by pushing them off, but when the relatively high exclusion cost associated with this laborious and potentially dangerous activity is combined with the fact that their being on the hill with you in no way compromises your own enjoyment of the view, the breeze, or the song of the birds, it is, I dare say, natural to think that bargaining might ensue over the apples, but not over these other goods. And of course, the view, the breeze, and the song of the birds are goods that still exist for others when one person enjoys them: these are not rival goods. Although my characterization of the commodity form so far exhibits a fair amount of vagueness, it is a vagueness that acknowledges the potential for affording the commodity form in multiple modalities and in varying degrees. To bring about commodification is to multiply the modalities or to increase the degree to which buying and selling are typical of the way that people interact with the good in question. Technological commodification is to accomplish this by deploying or inventing an artificial, technical method or material means, as distinct from passing a law, offering an argument, or starting a new cultural trend.

There is something else about the apples, however, and that is the ease with which they can be exported from the hilltop, or the ease with which they can be taken from your bag and put in someone else's. In comparison to hilltop views, summer breezes, and the song of the birds, apples afford as *alienable* goods. They can be separated or detached both from a given locale and from the person of their owner. As alienable goods, the control afforded by low exclusion cost and the affordance of rival uses can be given over to someone else by sale or gift. Since they can be transported to another locale, the same control can be transferred yet again to a third party. The transferability and transportability of the apples is itself an aspect of the way that apples avail the commodity form. This aspect is what political economists of the early modern era referred to as the *alienability* associated with property rights but missing from rights, such as rights to life, liberty, and pursuit of happiness that could not be meaningfully detached from one person and transferred to another.³ Apples are alienable goods with low exclusion costs. As things to eat, they are consumed in use, which means that they must be replenished after use. These features of apples make them good candidates for becoming objects of possession and exchange. When social institutions of buying and selling are added to the mix, they avail the commodity form.

Although there are still things to say about apples, it may now be appropriate to consider birdsong and its potential transformation into a commodity good. When smartphones are added to the hilltop mix, it becomes possible to make a digital recording of birdsong. This possibility makes the sound of birds singing into a good that *can* be alienated from the hilltop locale and transferred from place to place and user to user through the medium of a digital file. Any particular recording of

³ Today, we take the phrase "inalienable rights" to mean something close to "super important rights" or rights that shouldn't be taken away. There was, however, a reason why Jefferson shifted Locke's phrase "life, liberty and property" to "life liberty and pursuit of happiness" in the *Declaration of Independence*. Property rights govern alienable goods and, like the goods themselves, can be transferred from one owner to another. It would have been absurd for Jefferson to classify property rights as inalienable, since alienability (and exchange) is part of what makes a property right important and valuable.

birdsong is also a good that has relatively low exclusion cost, at least so long as it remains on one's phone. If posted to an unprotected Internet bulletin board, the file has high exclusion cost, which goes to show that it is generally, if not always, an *ensemble* of tools and techniques that create affordances rather than a single device. A digital file of birdsong is a relatively non-rival good in that it is not consumed in use, and the same file can potentially serve as a soundtrack or a ringtone. What is more, if any given recording of birdsong is an adequate substitute for any other and anyone with a smartphone can get the app for making birdsong recordings, using the file recorded on our hilltop for a ringtone or a soundtrack may turn out to be a comparatively non-rival use. It is thus not clear that digital files of birdsong have a huge market potential. Even with robust social institutions for capitalist entrepreneurship and profit-seeking, birdsong imperfectly avails the commodity form. Nevertheless, the creation of an app for birdsong is an instance of technological commodification, if only because of the way that the alienability of birdsong becomes available as a result.

3 Commodification and Technical Standards

Of course, simply digitizing a birdsong does not mean that you have something that another person can use, even if they are willing to spend money to get it. Whether one person's recording of birdsong is compatible with another person's smartphone or digital media player depends on the technical standards that each device uses to create and access digital media. Technical standards are the hidden transcripts of commodification. The arenas in which technical standards are developed, implemented, and policed may well be the undiscovered hot zone of twenty-first century technopolitics (Busch 2011). Technical standards are created by human beings, albeit human beings who work in groups that are aided and abetted by a plethora of technical devices. The most common technical standard for digital audio files has been MP-3, though new devices are increasingly advertised as MP-4. A quick glance at Wikipedia advises that the term MP-4 "...itself is a misnomer, since most MP4 players are incompatible with the MPEG-4 Part 14 or the .mp4 container format. Instead, the term symbolizes their status as successors of MP3 players (Wikipedia 2010)." MPEG-4 Part 14 refers to the specific version of a standard named ISO/IEC 14496-14:2003 developed for use by the Motion Picture Experts Group (MPEG) as a format for storage of digital video and audio streams. ISO is the International Organization for Standardization, based in Geneva. ISO is composed of representatives from various national standards organizations. The relevant body in the United States is the American National Standards Institute (ANSI). The IEC is the International Electrotechnical Commission, a standards body that has been meeting since 1906. The technopolitics that has been occurring in relation to standards development and implementation has a long history, and it is high time that political philosophers paid some attention to it. Here, I will focus narrowly on the way that technical standards contribute to the commodification of goods to which they are applied.

The first and most basic contribution of the technical standard has to do with functionality. When Alexander Graham Bell spoke the words "Watson! Come here. I

need you.” into a device that translated the movement of a diaphragm into a series of electromagnetic pulses carried over a wire to a tubular metal can caused to vibrate by a second electromagnet, no specific technical standards were involved. However, functional telephones were only made possible by the development of standards specifying the frequencies and other performance levels of the devices that succeeded Bell’s laboratory apparatus. Critically, these devices had to “work,” which meant initially that they had to produce an electronic signal from the vibrations in the air caused by ordinary speech. This signal needed to be capable of being transmitted across a wire and then operate a device on the opposite end that would reproduce the vibrations of speech well enough so that listeners could understand. Unlike radio and later television standards, telephone standards had to allow this series of physical events to occur in both directions. In fact, there is fairly long and detailed history of the standards developed for telephony, and the criteria for “working” changed over time, with clarity, tonality, and efficiency of transmission of the audible product gradually altering the criteria of functionality demanded of the device. One could say that there are in fact two standards working here. One is the informal normative standard being applied to decide whether or not the device works or does not work; the other is the actual technical standard that specifies performance criteria for operational features of the device. Anyone who uses a phone can articulate and apply the informal normative standard, but one would need to become conversant in acronyms such as E and M, BRI, and PRI to even have a meaningful conversation about the technical standards that make telephones work. There is, however, some pretty straightforward give and take between these two types of standards, and this give and take determines whether there is any kind of good at all that could become the basis for commodity exchange. A device that does not work does not contribute to the commodification of anything.⁴

Yet, technical standards involve much that goes far beyond the sheer functionality of technical devices. Some of the most critical aspects have to do with the way that standards underlie the process of standardization. Standardization is *not* simply the use of standards in the development of an artifact or manufactured good. Standardization is associated with the use of standards to assure compatibility and fungibility of goods and technical devices. Compatibility, of which much has been said already, has to do with assuring the functionality of devices or parts that must function as an ensemble, even though they are made separately. Fungibility has to do with ability of any random sample good to function as well as any other for the purposes at hand. Fungible goods are thought to have a kind of uniformity; one can

⁴ What is more, basic functionality—what a device or system of devices can do—relates very closely to what Feenberg has in mind in talking about affordances. In a somewhat confusing adaptation of terminology, Feenberg refers to a particular configuration of affordances arising from a given technical system as the “technical code.” He argues that this code is the source of coercive political power we associate with technical systems (Feenberg 2002). In contrast, the word “code” is used in the technical community to indicate that a technical standard has legal force. The difference between a code and an ordinary standard is that codes are standards that have been adopted as legally enforceable mandates. If the Congress were to decide that digital audio devices should all utilize the MP-4 format, that standard would become a code. Digital devices using alternative standards could not be sold. Codes are commonplace for features of buildings or products that are crucial to safety and are less frequently adopted to ensure compatibility among devices.

of Campbell's tomato soup is just like any other; one boxcar load of no. 2 grade hard red winter wheat is just like any other. Importantly, goods traded on so-called commodity markets are presumed to be fungible in just this sense (Busch 2011). One can buy or sell hard red winter wheat on commodity markets whether one has any or not. Eventually, some wheat actually gets delivered, and it is the fact that any delivery meeting the commodity standard satisfies the terms of a commodity contract that makes the speculative feature of commodity markets possible. In contrast to hard red winter wheat, Steinway pianos are built to a plethora of technical standards, but the goal is assuredly not to produce a standardized good. The Steinway Company takes great pride in announcing that each of its concert grand pianos has a unique sound and personality.

If one downloads an MP-3 file of birdsong for use on one's digital media player, one is obtaining a highly standardized good. While concert pianists will try out a number of Steinways to see which one is best for the particular venue and program of music they plan to perform, one does not "try out" two or three downloads of the same media file to see which one most adequately meets one taste. Each tweet from a real live bird may vary in tone, character, or melody, but when a celebrity sends a digital Tweet to their many followers over Twitter, it can be read by any device capable of processing signals meeting one of the appropriate gateway standards designated for SMS messaging, and any one tweet is just like any other. If you want to receive Tweets, you download the app for that. Tweets are, in almost all the senses I have described above, fully representative of the commodity form. Their only weakness is that they are not consumed in use, though the technical standard for Tweets could certainly be revised in ways that would make this possible. Tweets afford the commodity form. And yet, they are not bought and sold. Sending or receiving a Tweet is free.

4 Standards and Network Power

The reason Tweets are free is that technical innovators in the digital world have learned a powerful and deep lesson about technical standards. Sometimes, the way you make money from goods that depend on technical standards is not to buy and sell commodity goods. The models for profitability (and it is far from clear that Twitter has solved this problem) revolve around the idea of *network power*. Irrespective of intrinsic goods obtained by the functionality of devices built in accordance to the standard, utilization of the standard becomes mandatory if one is to have access to the networks of suppliers, manufacturers, retailers, and users that are bound together by the standard (Grewal 2008). Thus, although it is perfectly legal to sell software designed to run on the TRS-DOS operating software that came on the 8-bit Z-80 microcomputers that were sold between 1976 and the early 1980s, hardly anyone is writing software for this operating system today because of the network power associated with MS-Windows and the MAC-OS operating systems. Battles fought over the technical standards for home video playback devices might provide a better example. In the 1970s and 1980s, Sony's Betamax system battled JVC's VHS system. By most accounts, the technical functionality of Betamax was superior, yet JVC came to dominate because many companies manufactured the

VHS machines, and so many were sold that, when the videotape rental market started in the late 1980s, consumers and rental entrepreneurs alike were forced to go VHS.

As analyzed by David Singh Grewal, network power is unlike conventional forms of political power because it does not depend upon the threat of violence or coercive force. No one was literally coerced into buying a VHS machine in the 1980s, just as no one is forced to buy a Blue-Ray format for playing DVDs today. Nevertheless, I just bought one, despite the fact that I already owned a HD DVD player that plays the half dozen HD DVDs I own with spectacular fidelity and picture definition. I bought the Blue Ray machine because, like VHS before it, this technical standard for video playback won out in the marketplace, and new or rental DVDs in the HD format are no longer available. Of course, no one is coerced into buying any kind of DVD player at all, but there are other places where technical standards have forms of power that are more pervasive and absolute. If one wants to earn a living producing texts in the twenty-first century, one had better be prepared to produce texts that comply with one of a handful of technical standards indicated by the file extensions for electronic documents, standards such as .doc, .txt, or .pdf. The way that one makes big money in the digital arena is to build applications that one gives away for free, then to generate revenue by charging other profit-seeking actors for the right or ability to access and participate in the network. But, it is the ensemble of technical standards that constitute the backbone of the network. Such standards can become deeply embedded in proprietary products such as computer operating systems or word processors, or they can be promulgated by organizations such as ISO or IEC, where the human actors undoubtedly see themselves as collaboratively negotiating the architecture for creative work in service to the public good. In either case, digital entrepreneurs have become quite savvy about network power.

Grewal argues that the network power of technical standards does not rely on violence, as a former generation of critical theorists might have had it. There are, however, ways in which network power looks very much like the power that Marxists and neo-Marxists associate with capitalist control over employment opportunities or more subtle forms of power such as social stratification. In these cases, power relies on the violence implicit in the system because the state must use its police to enforce peaceful and stable social relations in order for these forms of power to operate. One reason to think that Grewal may be at least partly right in dissociating standards from the implicit violence of state power is that, even if the oppressed peoples revolt and seize control of the machines, they will still need to accede to the network power of the technical standards that assure functionality and compatibility of these devices. It is entirely possible to imagine the ensemble of devices being deployed in service to collective goals other than those of ever-greater capital accumulation. That is, I take it, one of Feenberg's main points in developing his theory of secondary rationalization (Feenberg 2002). Yet, this rationalization is *secondary* precisely because the technical standards are in place to perform the primary rationalization that is needed to make a device do anything at all.

Indeed, one of the main reasons that Feenberg distinguishes between primary and secondary rationalization (or instrumentalization) is to correct for overstatements in the philosophy of science developed by first-generation critical theorists, especially Marcuse. Along with Max Horkheimer and Theodor Adorno, Marcuse launched a sustained attack on the extreme logical positivism and claims of value neutrality

embraced by certain analytic philosophers and by many practicing scientists. The details of this debate are not relevant in the present context, for in the post-Kuhnian era, extreme views on the value neutrality of science have ceased to be defended, even if they are still implicitly influential in many scientific disciplines. However, in making their critique, the first-generation critical theorists at times seemed to suggest that the basic principles of physics and chemistry might change in a socialist state. Feenberg's critical theory of technology characterizes primary rationalization as the process of developing, articulating, and theorizing the basis for those material processes—generating aeronautic lift, converting an electron beam into a visible image, making cement—that are subjected to human design and control in the achievement of technical means. Though not really “value-free”, the formulae, principles, and theory that are developed in primary rationalization and that will be developed or applied in building artifacts are, in Feenberg's view, pretty much going to look the same under capitalism or socialism.

However, the dicta of primary rationalization can be realized as technical means in any number of different ways. In particular, they can be deployed according to priorities that reflect capital accumulation and military conquest, on the one hand, or peaceful cooperation and egalitarian betterment, on the other. It is at this level that technology becomes the target of political critique for Feenberg. What is more, the claims made in Feenberg's main argument, if not Feenberg's specific version of it, have been endorsed by mainstream analytic philosophers of science such as Phillip Kitcher, who acknowledges that even the priorities reflected in a national science budgets may reflect political value commitments in just the way that first-generation critical theorists suggest. Like Feenberg, Kitcher rejects the suggestion that scientific theories and the truth claims that ride on scientific theories might be overturned by radical political change (Kitcher 2003). But, the sheer proliferation of technical standards for doing things like controlling the way an electron beam creates a visual image shows that *this* domain is far more flexible and open to alternative constructions than are the basic theories of the natural sciences. My point here is that someone who is naïve about the role that technical standards play in the transition from general theories of chemistry, biology, and physics to working artifacts will overlook arenas in which technological politics occurs.

5 Technological Politics in the Contact Zone

I might argue that technical standards are an important *contact zone*. This is Donna Haraway's term for the point at which human and non-human actors as well as technological actants come flesh-to-flesh. Haraway's 1997 book *Modest-witness@second-millennium. FemaleMan-Meets-OncoMouse* taught us to question assumed dichotomies, including the supposed divide between nature and technical artifacts, adapting lessons of feminism and taking feminists where many of them had refused to go. Her 2008 book *When Species Meet* subjects the human/animal dichotomy to the same kind of deconstructive analysis, suggesting that close observation of the exchange between human beings and individuals from other species reveals an interactive co-production of being and identity. Haraway borrows the term “contact zone” from the sport of agility training and uses it to

indicate the key points at which this mutual shaping of experience and identity occurs. Feenberg's term "affordance" is useful here as well. The contact zone is what it is because human and animal subjects encounter one another within environments in which technological artifacts—Latour's actants—are pervasive. It is perhaps overly deterministic to suggest that technical actants structure the way that species meet. Indeed, Latour's goal in using the term was to shroud the difference between human agents and technical artifacts in ambiguity. But certainly, the interactivity of human actors occurs within a system of affordances. Haraway describes the way that the technical apparatus of agility affords a particular set of connections and possibilities that are realized by herself and her canine partner Cayenne. Species capabilities are themselves affordances realized in a multiplicity of ways by different individuals, interacting among one another in distinct contact zones.

The rules for agility themselves represent technical standards of a sort, though not the kind of standard that is tightly connected to commodities or commodification. However, technical standards are increasingly crucial to the rendering of human/animal relationships in commodity terms. Animals, I would submit, are among the oldest commodities. It is not as if technology transforms a set of transactions in the human/animal contact zone that have never been known to afford the commodity form. It is virtually certain that various human/animal contact zones antedate the existence of monetized exchange, yet animals were certainly among the earliest goods to be bought and sold once money became available. The technology needed to keep animals captive included fences, ropes, and harnesses. All tend to lower exclusion cost. Many of the most important uses humans make of animals are rival: draft power, transport, and food. Richard Bulliett (2005) argues that religious slaughter of animals was probably the progenitor of domestication for most species, and as in using animals for food, in this practice, animals are consumed in use. What is more, domestic animals are not only alienable goods, their very animation—their ability to walk under their own power—actually facilitates their transfer from one place or purpose to another, or from one human master to a new one. Although the technological transformations that were undoubtedly needed for domestication are characteristic of commodification, it is very likely that they actually occurred before institutions for commodity exchange were commonplace. It is thus at least curious that a number of scholars have seen commodification of animals as a phenomenon unique to capitalism (see Wise 2001; Guthman 2002; Franklin 2007; Shukin 2009; Warkentin 2009).

Nevertheless, technical standards for animal welfare have become a crucial contact zone for a number of animals whose lives are heavily influenced by commodity exchange. This applies to zoo and laboratory animals, for example, but it is perhaps most critical for animals kept for food production. Although these animals have been bought and sold routinely for centuries, if not millennia, it is only recently that their husbandry has come to be specified through exercises that closely resemble the activities of the MPEG or the IEC. In the late 1990s, the McDonald's Corporation decided to develop animal welfare standards for their suppliers, and by the year 2000, expert groups had been convened to develop standards for the production of eggs and pork. The egg standard has been particularly influential, consisting primarily in a minimum space allotment for hens producing eggs to be

used in McDonald's products. Prior to this effort and with no standards, the average space allowance for hens in American production systems was 48 in.². After this effort, McDonald's as well as other restaurant chains adopted a minimum standard of 68 to 72 in.² per bird. This standard, along with mechanisms for certifying that producers were meeting it, was eventually adopted through a separate standards process put in place by the United Egg Producers and now applies to roughly 80% of the hens laying for the shell-egg market in the United States today.

The example of animal welfare standards is not a case in which technology facilitated commodification of relationships between the species that were afforded differently in the past. Breeding technologies have made chickens much more fungible than in the past, and other technical changes have made eggs into goods that are not only heavily standardized but also available on a year-round basis (Friedberg 2008). But, laying hens and their eggs have been bought and sold as commodity goods for a very long time. Animal welfare standards seem to be a case in which social expectations that arose with industrialization, processes that first-generation critical theorists (as well as Marx himself) associated with commodification, have now penetrated so deeply into the human/animal contact zone that specifying a technological standard has become the expected way in which to address and resolve a problem. The technical standard in this case is less a case of facilitating a monetized exchange relationship than a means to discipline the unwanted consequences of a fully commoditized industrial animal production industry. Whether or not this is a good thing must await further discussion, and in this context, it may prove useful to examine one more case study in the development of affordances through technical standards.

Lawrence Lessig has contributed one of the most powerful and sustained critiques of technical standards in recent years. Lessig focuses on the technical standards for Internet Transfer Protocol, the technical standard that allows digital signals to be transmitted across the Internet through a variety of more specific applications that include Email, File Transfer Protocol, the World Wide Web, and an ever-growing list of features developed to interface with browsers such as Firefox, Safari, or Explorer. There are, in fact, multiple standards for signals moving over the Internet, but a standard called Transmission Control Protocol (TCP) lies at the core. Lessig notes that this standard was developed in 1974 by technicians whose goal was to create a method for linking computers that would be extremely robust during potential disruptions such as natural disasters or armed conflicts. Standards that, like those used for telephones or video cables, route signals over a designated physical route or wireless bandwidth would be less robust because they would be vulnerable to disruptions at the critical control point. Standards for signal transmission define control functions for routing the transmission. In the case of radios or television sets, these control functions are design features of the physical device itself. This means that signals received by a radio or a traditional telephone must match the control functions built into the design. If you send a telephone signal to a radio, it just sits there and does nothing. What is more, telephone signals have to go to a particular location. The control standards for accomplishing this mimic the actions of old-fashioned telephone operators who sat in front of a large board, physically connecting callers on a single line. Technicians who developed the Internet wanted computers to talk to one another, but they were looking for a way to do this that

would be less vulnerable to disruptions in service, that, while not common, were certainly familiar enough even in the 1970s (Lessig 1999). People of a certain age today will recall the phrase, “The phones are down.”

It is possible to encode instructions for performing these control functions and to embed these instructions within the signal to be transmitted. The actual information to be transferred is referred to as “the payload,” which, aside from needing to be encodable in electronic pulses, is arbitrary. The control instructions can be decoded at various points along the signal’s journey, sending it from server to server until it reaches its destination. Indeed the “message” or payload is broken up into numerous packets with distinct control instructions, each of which finds its own way across the numerous possible wired and wireless transmission routes between or among computers. The control standard then instructs the receiving computer how to reassemble the packets. Presuming that the receiving computer has the app needed to utilize the payload, the transferred data can be used to perform any of the myriad functions of which computers are now capable. This means not only that the system is more robust, which is what the designers wanted, but also that any number of different payloads can be sent: Emails, webpages, numerical data, text files, or movies. Unlike the radio, which just sits there when it gets the wrong kind of signal, a properly programmed computer can utilize all these different payloads. Lessig notes that this alleviates any need for those who manage the transmission control system to also manage or even be able to interpret the technical standards associated with the content or payload (Lessig 1999).

Lessig’s point is that, had the standard for Internet Transfer Protocol been defined in the same way that more standard transmissions of the 1970s were, not only would the system be less robust, it would be much, much easier for an authoritarian or hegemonic power to control. Since *any* kind of standardized code can be transmitted in the packets, the standard for Internet Transfer Protocol does not constrain the kind of applications that computer users at either end of the pipe, so to speak, can utilize. So, Lessig argues that the underlying architecture was inherently democratic both in being virtually impossible to monitor and restrict (save by real-time monitoring of each and every computer connected into the network) and in leaving the eventual uses envisioned for file sharing totally up to the imagination and control of computer users (Lessig 1999). On this basis, Lessig argues that an obscure tract known as RFC 675 (Cerf et al. 1974), where the basic ideas behind the TCP standard are laid out, is in fact one of the more important documents in technological politics of the twentieth century. We can thank the authors of this document, Vincent Cerf, Yogen Dalal, and Carl Sunshine for their creativity and vision, yet Lessig’s point is also that these men could not have realized the eventual political significance of the technical standard that they were developing. Feenberg himself writes favorably of the affordances associated with the Internet, suggesting that they might well be realized in forms other than capital accumulation and military dominance (Feenberg 2002).

All of this notwithstanding, the network power of technical standards is, in every sense, an extremely potent source of old-fashioned political and economic power. Indeed, whatever insight Lessig brings to the critique of technical standards, it is far from clear that RFC 675 actually has the democratizing effect that Lessig asserts. Grewal, who has studied the relationship between technical networks and globalization, argues that people in the developing world have little choice but to

adopt the technical standards already put in place by actors from technology companies in the developed West. They must develop facility with a host of standards and then create capabilities and apps that interface smoothly with existing networks of users linked by computers and mass media as well as by standardized technical practices that underlie the social networks of scientists and engineers. He emphasizes how facility with the English language is a de facto component of these technical standards, so that one of the key aspects of network power from the standpoint of anyone hoping to better themselves by participating in global networks is that they are forced to learn English. They do not do so under threat of violence, to be sure. Nor is this power wielded by native speakers of English in a manner that native speakers could in any way modify or control. It is the power of a network that binds millions of non-native speakers into common technical projects. Grewal argues that the non-complicity of native speakers is little consolation or salve to the resentment felt by those who find themselves outside the network looking in (Grewal 2008).

6 Concluding Remarks

The term “commodification” is used so frequently in some domains of the social sciences and so infrequently defined that one must presume it to have infiltrated into the jargon of this tribe. Perhaps, its usage demarcates one’s belonging to the tribe, or at least some vaguely related group of tribes, as the word is almost never used among mainstream economists who study commodities, exchange, and the transformation of institutions that regulate and structure exchange. Neither has the word become standard in ordinary language. The Online Etymology Dictionary traces the origins of the word “commodification” to 1968 and defines it thus: “Originally in Marxist political theory, ‘the assignment of a market value,’ often to something the user of the word feels would be better left without one.” (Harper 2001–2010). The year 1968 seems a bit too late to me. The date almost certainly refers to the peak of iconic student protest demonstrations, but it was also the year in which a collection of Herbert Marcuse’s essays from the 1930s and 1940s were published in English translation under the title *Negations: Essays in Critical Theory*. Marcuse’s translators do not use the word “commodification,” though several of these essays do indeed discuss processes at work in capitalism that bring social relations ever more deeply into the marketplace of cash transactions (Marcuse 1968).

Features such as exclusion cost, alienability, and rivalry can be readily linked to the sense of commodification that brought people into the streets in 1968. When changes in the material world brought about by the creation of technical devices affect exclusion cost, alienability, and rivalry, goods that might once have been thoroughly embedded within a given place or social environment are pried loose and potentially placed into the domain of buying, selling, and markets. Whether these transactions will take the form of gift or profit, seeking monetized exchange will depend heavily on broader aspects of the social world (Thompson 2010, pp. 123–135). Yet, an account of how these characteristics of goods can be altered by technical change shows several important things. First, it shows how a crucial dimension of social relations can be altered with virtually no opportunity for political discourse in the

usual sense. While a change in law or policy that altered basic elements in the structure of property rights would be an obvious target for political discourse, technical transformations that have identical effects can occur as pure fait accompli. Second, it brings the active component of the material world into relief and shows how things form a crucial component of our networks. Finally, it highlights some especially sensitive areas where technological designs and innovations can have implications that warrant resistance and political consciousness-raising.

Although some aspects of standards and standardization augment trends that are usually seen as regrettable by people who use the word “commodification,” others rather significantly reshape and reconfigure the contact zone in which commodification occurs. To the extent that standardization is associated with the rise of the factory system and the deskilling of work, it is a phenomenon very much of a piece with the critique launched by Horkheimer, Adorno, and Marcuse, not to mention Marx himself. However, the potentialities associated with network power and alternative functionalities made real through alternative standards may suggest a turn in the trajectory of commodifying practices. As noted, profit and power seem to hang less on actually buying and selling of commodity goods. Network access is everything. Thus, the power of standards seems to reside less in conventional forms of violence and coercion than in a side-effect of coordination and compatibility. Finally, the rise of technical standards for animal welfare can be seen as an attempt to discipline the unwanted consequences of market forces. It is thus less clear in what precise sense we should regard the processes associated with technological commodification as unfavorable. Nor does it seem that revolution or transfer of control over technology could be a reasonable or functional response to the resentments and oppressions that derive from the network power of technical standards.

There are, of course, many more things that one might say, especially in regard to technical standards for living things. We have long had technical standards that apply to apples as well as to apps. My goal has simply been to bring this area of the contact zone a little more clearly into view.

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