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RECONSIDERING TECHNOLOGY ADOPTION AND RESISTANCE

OBSERVATIONS OF A SEMI-LUDDITE

Brett Lunceford

The question of how and why people adopt technologies is an area that has received great scrutiny, but less attention is given to those who willingly choose to avoid particular technologies. This article considers current models of technology adoption and explores how technology influences us as a society and individually, paying special attention to how large-scale shifts in technological change come to bear on individuals who choose not to adopt specific technologies. By combining scholarship in the information sciences with observations from media ecology theorists, this article proposes a more nuanced view of technology adoption and resistance.

My lack of a cell phone had never been a hindrance—an inconvenience at times, but nothing I could not live without. The perceived benefits of not having an electronic leash outweighed the benefits of being able to contact others at will. After all, there are always pay phones available if I need to call someone from a location away from home. Or are there? When I attended the 2006 Media Ecology Association convention at Boston College, I found that my views concerning the availability of pay phones were outdated. On returning from dinner, I decided to call my wife to let her know that I had made it to the convention safely. I asked the students who worked in the dorm in which I was staying for the location of the nearest pay phone. One student told me that there may be one at a convenience store a few blocks away, but that there were no pay phones on campus. I was shocked—surely there had to be a pay phone somewhere on campus! But the student informed me that the administration had recognized that the students all had cell phones, so there was no point in keeping the pay

Brett Lunceford is Assistant Professor of Communication at the University of South Alabama. An earlier draft of this article was presented to the Media Ecology Association at the 2007 convention of the National Communication Association. I am grateful to Corey Anton and the anonymous reviewers for their thoughtful comments.

Direct all correspondence to: brett@brettlunceford.com or Brett Lunceford, Department of Communication, University of South Alabama, Mobile, AL 36688

phones. Pay phones had become more of a liability than a service, so the administration simply removed them. The student then handed me her phone and told me that she had free long distance during the evening, so I could use her phone to call my wife.

As I went to my room, two thoughts crossed my mind: first, I was surprised by the ease with which the student handed over her cell phone and allowed me to use it. I further reflected that I had essentially given her my phone number in that it became a part of her phone's memory of calls. As someone normally very concerned with digital privacy and security, I wondered at both of our lapses. For all she knew, I could be calling a known terrorist and she would be implicated in a web of espionage. My second thought concerned the structural constraints of information technologies (IT) and how I often take them for granted. I had always had access to pay phones before, so it came as a shock that the pay phones had vanished. As new technologies enter the scene and render current infrastructure obsolete, it is easy to forget those who relied on the now obsolete infrastructure who either cannot or choose not to adopt the new technology. This article considers current models of technology adoption and explores how technology influences us as a society and individually, paying special attention to how large-scale shifts in technological change come to bear on individuals who choose not to adopt specific technologies. In doing so, I propose that theories of technology adoption must consider not only individual adoption (and resistance), but also the larger societal shifts that take place when such technologies are widely adopted.

HOW PEOPLE CHOOSE TECHNOLOGIES

Literature in information sciences has proposed several models that predict the usage of new technologies. Perhaps the foremost among them is the technology acceptance model (TAM; Davis, 1989; see also Arning & Ziefle, 2007; Davis & Venkatesh, 1996; Dishaw & Strong, 1999; Karahanna & Straub, 1999; King & He, 2006; Legris, Ingham, & Collerette, 2003; Premkumar & Bhattacherjee, 2008; Schepers & Wetzels, 2007; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003; Yang & Yoo, 2004). According to the TAM, the major determinants for technology adoption are perceived usefulness of the technology and ease of use. However, technology usage may not be reducible to these two factors. Perhaps another way to think of this is in terms of cost–benefit. In some ways, these dimensions map onto the ideas of perceived usefulness and ease of use. An individual is less likely to learn a technology that he or she considers too difficult to use or understand. In other words, the time of investment may not be worth the perceived benefits of learning the technology. To put it in more familiar terms, consider how many VCRs continued to flash 12:00 because it was not worth learning how to program the time. One could have the VCR in its utility without experiencing the full functionality of the equipment.

Perceived usefulness is a trickier concept to operationalize, especially when it comes to those who resist adopting particular technologies. In her study of a Finnish Community Resource Centre and Netcafé, Uotinen (2003) states:

> It is not (always) a question of passivity or incapacity resulting from a lack of knowledge and ability, though information society rhetoric might give such an impression. It can rather be the result of a person's conscious choice to draw a line in a situation where information technology has no place or use in their life. (p. 348)

When considering usefulness, there are practical as well as social elements. For example, one can more easily avoid e-mail as a janitor or a foundry worker than as a professor or a venture capitalist. Even in white-collar jobs where IT seems ubiquitous, there are varying levels of potential for avoidance. Paradoxically, the higher one is in the hierarchy of an organization, the easier it may be to shield oneself from the use of technologies. Administrative assistants may find themselves using e-mail, telephone, and other IT more than managers, yet managers may have a greater burden of accessibility placed on them. Thus, those in management may find themselves using other technologies, such as cell phones because those who would contact them expect to be able to reach them regardless of place or time.

Such expectations, however, may have little basis in reality. I do not consider myself indispensable, yet many people, including my family and friends, protest my lack of a cell phone. I am reminded of Aesop's fable of the fox that lost its tail in a trap. The fox, not wanting to be the only one without a tail, began to extol the virtues of being tailless and offers to cut off the tails of the other foxes. Unlike the foxes that resisted the overtures of the tailless fox, many humans seem to jump at the opportunity to become more efficient or more connected. Even so, I sense that my resistance will eventually come to an end. The costs associated with my lack of a cell phone have begun to outweigh the freedom that I experience in being able to hide. Part of this I attribute to the shrinking infrastructure of public telephone access described earlier, but also because of the perceived usefulness to my status as a scholar. As a professor of communication, expectations are placed on me by society and my discipline; resisting technology transgresses this socially constructed view of the intelligentsia. In other words, it will soon be difficult to be taken seriously if I am not well connected, both socially and electronically. My disconnection presents me with a problem of *ethos*.

The literature in information sciences seems fixated on the pragmatic aspects of usefulness, but the social usefulness of technologies cannot be overlooked. Status seems to be an important element of technology adoption. For some it may be a matter of possession rather than the usefulness of the technology itself; such an impulse seems to be at work in the 0-day warez scene. Dibbell (2004) notes in his discussion of mp3/warez traders, "I could see in his eyes . . . that it wasn't the songs themselves that interested him, it wasn't even how many he had. What he collected was the speed with which they'd traveled from their corporate origins to his computer" (pp. 286–287). This also seems to be an explanation for those who seek to adopt the most recent form of a particular technology, such as those who upgrade their cell phone because the new model is smaller or more aesthetically pleasing. Perhaps there may be more features, but such features may simply reproduce other devices they may already have such as

digital cameras and mp3 players. Bruner and Kumar (2005) suggest that there is a "hedonic" element to using IT. They note that "the fun of using a device was a more powerful determinant of attitudes toward usage than the perceived usefulness of the device" (p. 557) and conclude that "consumers are likely to have favorable attitudes to adopt handheld devices as much or more for the fun they can have with them as for the ability to accomplish certain functions" (p. 557). Perhaps the fun may also come from the sense of ego gratification one receives from knowing he or she is on the cutting edge of technology.

Costs and benefits may not always seem rational. New technologies may have little to offer the adopter besides novelty, yet therein may lay the allure. Early adopters can revel in the old hucksterism, "Be the first kid on your block to have one." By focusing on usefulness and ease of use, models proposed by IT scholars often neglect the element of the human desire to stand out. Perhaps this also is at work in my own resistance to some technologies; I take a small amount of pride in my asceticism that borders on a sense of moral superiority. Yet when all is said and done, there is a more practical element: I am not willing to give up what I would need to in order to adopt some technologies. In the case of cell phones, I would prefer to not give up my potential for solitude and uninterrupted face-to-face conversation with my family and friends. However, I have enthusiastically adopted other technologies precisely because they provide me with more benefit than cost. E-mail, for example, allows me to keep in contact with many people with little effort. Moreover, it allows me to maintain relationships that would be too costly in personal terms if I were to pursue them in analog space. Perhaps the natural selection of human relations would have ended these relationships long ago were it not for the intervention of technology. The benefit I derive from maintaining these relationships without the cost outweighs the sometimes-inconvenient intrusion into my mind by an e-mail from an undesirable sender.

Scholars have suggested that people use particular media to gratify some need (see Kaye & Johnson, 2004; Papacharissi & Rubin, 2000; Shah, Kwak, & Holbert, 2001; Song, Larose, Eastin, & Lin, 2004). In other words, individuals gain something desirable from using technologies. The problem seems to be when society takes on a "one-size-fits-all" approach to technology use. The ways people use technology cannot be relegated to an all-or-nothing proposal. Rubin and Rubin (1985) argue that "if that other channel is not available, or if the interaction does not effectively fulfill the need, a functional alternative would be chosen" (p. 48). But what if there are no functional alternatives available? I have a telephone in my home, but I do not wish to purchase a cell phone. When I travel to academic conferences, I enjoy calling my wife each evening. However, if the public pay phone infrastructure that allows me to do so is removed, I have few options open to me: I can purchase a cell phone, cease calling my wife while at conferences, or use someone else's equipment. Even functional alternatives such as e-mail or chat may not be publicly available to me. Writing a letter seems to be one of the few options open to me at that point, but I would be home by the time the letter arrived. When infrastructure is removed, available choices in how one uses technology are diminished.

Whether a technology is perceived as useful or as gratifying some need is moot if one cannot afford the technology, thus financial cost plays a part in technology adoption (see Bagchi, Kirs, & López, 2008). Chen, Gillenson, and Sherrell (2002) explain that "in order for online shopping to reach its desired level of popularity, virtual stores must strive to attract those late adopters and laggards. This can only be achieved when there is wide availability of the technological infrastructure, proper education of the potential user, and lower access cost" (p. 715).

However, cost is not the only determinant; research by Goldfarb and Prince (2008) suggests that access does not necessarily translate into usage; in their discussion of internet access and use, they found the following:

> While income and education positively correlate with adoption, they negatively correlate with hours spent online. Given our results, we argue that the most likely explanation for this finding is that low-income individuals spend more time online due to their lower opportunity costs of leisure time. (p. 14)

In their study of usage of specific bundled services for cell phones in Finland, Bouwman, Carlsson, Molina-Castillo, and Walden (2007) "were unable to establish stable patterns between the various service bundles," concluding that "the characteristics of specific service bundles need to be taken into account" (p. 157). Moreover, attractiveness of a new technology may have little to do with perceived usefulness or ease of use. Wu and Wang (2005) found that "perceived ease of use has no significant effect on behavioral intention to use" (p. 727) and Chen et al. (2002) found that "while virtual stores tap the needs of time-starved consumers, they seem to be less attractive to leisure consumers, who value social interaction and first hand experience with products, etc." (pp. 715–716). Online shopping is rather easy to do and ends in a purchase transaction much like a purchase at a brick and mortar store. The lack, in this case, was peripheral to the act of shopping. Thus, even within a specific technology, there are varying degrees of usefulness depending on the application. Thus, despite its usefulness and ease of use, there still remains an ungratified need.

In addition to the question of individual adoption of technology, there also are cultural differences to consider. The Pew Hispanic Center and Pew Internet and American Life Project found that although Latinos had lower levels of Internet connectivity than Whites, "fully 59% of Hispanics consider [cell phones] a necessity, compared with fewer than half of non-Hispanic whites (46%) and non-Hispanic blacks (46%)" (Fox & Livingston, 2007, p. 14). One significant variable that factored into Hispanics' adoption of both cell phones and Internet connectivity was language spoken; those who spoke only Spanish had lower adoption of both. Another Pew Internet and American Life study found that broadband adoption by low-income Americans and African-Americans was essentially flat (Horrigan, 2008, p. 2) and that "one-third (33%) of non-internet users say they are simply not interested in the internet" (p. 12).

It is difficult to completely account for individual differences in why people choose particular technologies. It seems that the dimensions of perceived usefulness and ease of use in the Technology Acceptance Model account for only part

of the equation. The idea that individuals use media to gratify some need likewise only takes us so far. The decision to adopt a particular technology involves a combination of motivations, needs, and desires that all vary depending on the individual. To completely account for individual choices in technology adoption, it is essential to look beyond the instrumental aspects of the technology. Some elements include costs, both financial and psychological, and benefits—instrumental, psychological, and social. But these decisions are not made in a vacuum; all choices concerning adoption of technology takes place in the society in which that person lives. Social pressures also contribute to whether or not one chooses to adopt a particular technology.

HOW TECHNOLOGY INFLUENCES THE INDIVIDUAL

McLuhan (1994) notes that media systems are extensions of the self, but what kind of self is being extended (see also, McLuhan, Fiore, & Agel, 1996)? Turkle's (1984, 1995) work demonstrates that identity and the concept of the self are no longer completely rooted in one's corporeal manifestation. Negroponte (1995) argues that rather than being an individual shift, it is a societal one—we are all becoming digital: "It is here. It is now. It is almost genetic in its nature, in that each generation will become more digital than the preceding one" (p. 231). Scholars suggest that members of the rising generation, defined as Generation Y or the Net Generation, display the following attributes: the transcendence of national identity in favor of global allegiances, the ability to embody multiple personas, and the perception of cyberspace as reality (see Costello, Lenholt, & Stryker, 2004; Leung, 2003, 2004; Tapscott, 1998; Weiler, 2005). Negroponte's assertion that we are becoming digital and assessments of Net-Generation youth may be correct as far as they go. After all, there is still the issue of access to communication technologies and the requisite media literacy necessary to function in that milieu. Issues of race, gender, and socioeconomic class still heavily dictate who is qualified to become a member of this privileged class. Millar (1998) observes the following:

> While affluent western feminists may see themselves as "cyborgs" as they use digital technologies for creative and professional purposes, less advantaged women—such as those who assemble computer equipment or enter data—experience "cyborg" life in a profoundly different and exploitative way. (p. 62)

Cyberspace may indeed be a kind of reality, but not all realities are created equally and in these exultations in the digital self, the body is sometimes forgotten or ignored. Dyens (2001) notes that "to reflect upon technological culture is thus not simply to think about the impact of technologies on our world, but also to examine the emergence of new strata of reality, where living beings, phenomena, and machines become entangled" (p. 11).

Generational differences may partially account for why individuals may avoid particular technologies and adopt others. When I was in high school in the late 1980s, I had friends who were active on BBS systems. They told me that

I should log on, but I chose not to—I somehow knew that once I entered, I would never return, so I postponed the inevitable. I remember being at Comdex in the early 1990s, noticing a large area devoted to Prodigy, and thinking, "I've heard of them—I should check them out some time." I logged on to the Internet for the first time at the Oregon State University library in 1995. I stayed there for hours. I relate these accounts to illustrate my gradual immersion into the medium of the Internet. I am a member of the last generation that truly had a choice concerning whether or not they would go online. Those graduating high school today—members of Generation Y—have likely never known a world without the Internet.

Resistance to technology can be described in terms of metaphysical differences of opinion. If members of Generation Y view cyberspace as an equivalent reality to that which takes place in the physical world, there is little reason to resist it—it just is. There also is the ontological consideration of "being" in cyberspace. Floridi (2007) writes:

> The ontology of the information technologies available (e.g., software, databases, communication channels and protocols, etc.) is now the same as (and hence fully compatible with) the ontology of their objects. This was one of Turing's most consequential intuitions: in the reontologized infosphere, there is no longer any substantial difference between the *processor* and the *processed*, so the digital deals effortlessly and seamlessly with the digital. (p. 60)

But in this case, the processor and the processed are the same entity—the individual. For Generation Y, it seems, being in cyberspace is simply another facet of one's existence, no more or less real than any other. In other words, the digital self also is the physical self. For members of my generation, Generation X, it seems that being in cyberspace is not a core facet of our identity—when I am online, I am merely a digital representation of my physical self. My being takes place firmly in the physical world. Media and technologies are simply tools that connect me to other carbon-based sentient life forms. But if being in cyberspace is viewed as equal to being in the physical world, perhaps there is an ontological shift between my generation and those that will come afterward; for Generation Y, one need no longer connect to a physical body—one can connect to another digital self that has no necessary connection to either party's physical state. According to Floridi (2007):

> The infosphere will not be a virtual environment supported by a genuinely "material" world behind; rather, it will be the world itself that will be increasingly interpreted and understood informationally, as part of the infosphere. At the end of this shift, the infosphere will have moved from being a way to refer to the space of information to being synonymous with Being. (p. 61)

Different generations have different ways of viewing technology. For Generation Y, new communication technologies are just another part of reality. For members of Generation X new communication technologies are appendages to reality. As

Wachtel (2005) notes, "Picasso and da Vinci, Newton and Einstein, the Bushman and the Englishman had different conceptions of time and space. So, when they faced the East at dawn, they each saw very different things" (p. 123). In a similar way, Generation X and Generation Y see very different things when they stare at a screen, whether that screen is a computer monitor, an LCD on a cell phone, or the interface of any other communication technology.

When we choose technologies, we do so with many considerations in mind. In my own case, I do not have a cell phone because I like having the ability to hide from those who may wish to contact me. When the phone rings, I answer it—not out of an obligation to the caller, but out of curiosity. I want to know who is on the other end of the line but I sometimes resent this intrusion into my environment. With my home phone, I can add a layer of distance between those I wish to speak with and those who I do not by adding another device—the answering machine. By outsourcing my response to the machine, I am able to satisfy my curiosity while still maintaining distance. With my home telephone, there is always the possibility that I am not at home so an answering machine is not viewed as an instrument of evasion. With a cell phone, although there is a similar voice message feature, others may still expect that I will have the phone with me. I do not carry a cell phone because I do not wish to carry with me a means of surveillance.

Those who avoid adopting a particular technology face diminished choices in how they will use technology. Infrastructure is shrinking for those who cannot or choose not to purchase their own infrastructure. For example, pay phones are becoming increasingly rare and it is conceivable that they may one day completely vanish. If this happens, those who do not have the means to purchase continual telephone service will no longer have access to it at all. In this way, connection may become an all or nothing proposition. One is either connected or one is not. Besides the usefulness of adopting technology, unspoken assumptions concerning the widespread adoption of technology may have unintended consequences. In the wake of the shootings at Virginia Tech, the university I worked at launched an emergency plan that would alert students to potential problems on campus. The core of this notification system is a text-messaging service that would send alerts to students' cell phones (Penn State Live, 2006). It was marketed as a notification system for weather alerts, campus closures, and so on, but the timing had an unmistakable subtext: Failing to be connected could have potentially lethal consequences. Other potential warning systems, such as e-mail or telephone notification, likewise assume connection and regular use.

With telecommunications equipment, one has the potential to be more connected to others than ever before, but with what kind of connection? More importantly, what purposes do the various connections serve and why must we be so connected anyway? We seem to lose something in the mediation of our relationships; being in the presence of another elicits a visceral response in us, a reaction of body to body. The continual expansion of mediated connection threatens to reduce these somatic experiences with each other. Fortunati (2003) argues that because of our reliance on communication technologies, "beyond the remaining old poverty, which exists even in the industrialized nations, the new

poverty that affects everybody is a *poverty of first-hand reality*" (p. 75). But this is not only a consequence of the shift in our perception of being as mediated through communication technologies; it is also a consequence of the media themselves. Speaking of the ability for television to inform us of events such as the attacks on the World Trade Center, Morgan (2001) points out that "because television only presents to us . . . sound and image, *but not the other senses*, it does us an enormous disservice. It is the senses of touch and smell that make events real to us. Without those, the true horror cannot strike home" (p. 11).

With the potential for continual access to communication networks, we no longer have the choice of disappearing from the radar screen that is our constant availability, with the minor exception of vacations or illness. But even during vacations, some cannot bear to be disconnected for long and call the office to check in. There is the impulse to not only be continually connected to those around us, but to be continually connected to the entire world through the consumption of information such as news reports, music, entertainment, and market information. Information comes to us though the conduits that we have demanded and carry with us—Internet, television, radio, and communication technologies—to ensure that no one need be without the latest information. But with this constant flood of information, there is, at times, scarcely the time to think about and process this information. In the foreword to *Amusing Ourselves to Death*, Postman (1986) compares Huxley's *Brave New World* to Orwell's *1984*: "Orwell feared those who would deprive us of information. Huxley feared those who would give us so much that we would be reduced to passivity and egoism" (p. vii).

But is constant connection problematic? After all, people can talk to friends and family much more often and at different times than before. On campus, I often hear (one side of) serious, heartfelt conversations from people talking on their cell phones while walking between classes. They take the opportunity to use that time to discuss issues or thoughts with others at a time in which they would otherwise just be walking. Of course there are also conversations along the lines of "Nothing—I'm just walking to class." Perhaps this is indicative of the desire to multitask, to completely fill our lives. But when one constantly exists in a cocoon of communication networks, one loses the potential of solitude. What could be regularly available has now become recreational. For example, Lynn and Brown (2003) found that "visitors specifically seek experiences relating to artifactualism, naturalness, remoteness and solitude when hiking in natural areas" (p. 86).

Solitude is not isolation; one should not have to live completely unconnected and alone in the world. Rather, I am arguing for balance. But the idea of solitude is antithetical to the continual connection that is encouraged in an information society. To some degree, this is structural; an information society is built on an inherent tension between information and privacy. Martin (1978) notes the following:

> The problem with "privacy" is its conflict with other social values, such as competent government, a free press, protection against crime, health care, provision of services,

> collection of taxes, social and medical research, and the development of community living environments. The authority providing each of these wants to decide what it should know about us and when it should be told. We, on the other hand, resent the intruding official eye. (p. 250)

Individuals lose something significant when they abandon solitude in favor of connection. Storr (1988) argues that "the capacity to be alone thus becomes linked with self-discovery and self-realization; with becoming aware of one's deepest needs, feelings, and impulses" (p. 21). Communication technologies make it difficult to detach from what Mumford (1964) calls the "Power Complex." In addition to the ways technology changes us socially, it also may be changing us physically in ways we have yet to understand. In his Alfred Korzybski Memorial Lecture, Leonard Shlain (2008) stated, "Western culture, with its unique monotheistic religions, dualistic philosophies, and distinctive perspectivist art, advanced science, and written legal codes, I propose, is the direct result of changes occurring in the brains of the users of alphabets" (p. 112). It seems clear that technology changes us as individuals; research on Generation Y suggests that ways of thinking and being are currently in a state of flux. Yet at the moment we see though the glass darkly; as we celebrate the advances of technology, it seems wise to do so with an eye toward the potential changes in humanity, both beneficial and detrimental. In the *Phaedrus*, Plato feared that writing would diminish our capacity for memory and research by scholars such as Ong (1982), Goody (1977, 2000), and Havelock (1963, 1986) suggest that Plato was at least partially correct in this prediction. As a society we seem to have gained much more than we have lost in the transition to literacy, but perhaps not all technologies will afford such a favorable ratio between costs and benefits.

HOW TECHNOLOGY INFLUENCES SOCIETY

In addition to individual decisions concerning whether or not to adopt a particular technology, there are often social and institutional mandates that encourage technological adoption. Bagchi et al. (2008) argue that "institutional indicators have an impact on ICT [Information Communication Technology] diffusion, and government attitudes toward specific technologies have been shown to promote diffusion" (p. 186). One example of this can be seen in the recent decision in the United States to convert television signals to high definition. This mandate would make conventional televisions obsolete without a converter box, yet many see little benefit in moving toward this higher standard. Such top–down mandates short circuit public deliberation concerning the adoption of new technologies by those who will be most affected by them—the users. Consumers and citizens weigh the possible costs and benefits of a particular technology when coming to a decision concerning its adoption. In a discussion concerning public perceptions of genetically modified food, Frewer (2003) states:

> consumer attitudes are dependent, in part, on an analytical assessment of risk and benefit and on communication about such analysis. Other factors such as ethical and

> moral considerations, uncertainties and concerns about the potential for unintended effects as well as trust in the regulatory system are also important determinants of consumer acceptance or rejection of emerging technologies and their products. (p. 330)

Frewer makes it clear that for people to embrace new technologies there must be a sense of transparency in the adoption process.

At times it may seem that the individual has little choice but to adopt technology. The notion of technological determinism has a long history. Marx and Engels (1975) provide a succinct description of the deterministic view of technological innovation:

> In acquiring new productive forces men change their mode of production; and in changing their mode of production, in changing the way of earning their living, they change all their social relations. The hand-mill gives you society with the feudal lord; the steam-mill society with the industrial capitalist. (p. 166)

Although technology certainly influences available options for society, the outcomes are uncertain because human beings have agency and can choose to accept or reject particular technologies or create new ones. As White (1962) explains, "A new device merely opens a door; it does not compel one to enter" (p. 28).

Perhaps one reason technological determinism arguments seem so compelling is because ceding human agency to our technological creations is the easy way out. Winner (1977) argues that technology "allows us to ignore our own works. It is a license to forget" (p. 315). Elsewhere, Winner (1997) refers to the behavior of willingly ceding power to technology as "technological somnambulism," going through life refusing to critically assess technology (p. 61). How then, is one to awake from this state of technological lucid dreaming? Ellul (1992) suggests that "we must invent another mode of being: an iconoclastic democracy capable of desacralizing technique" (p. 48).

The process of desacralizing technology has long been underway. For example, computers were once solely available to scientists and technicians (Levy, 1994). Now computers are ubiquitous. Constant access to technologies diminishes their consecrated state, but familiarity does not necessarily lead to understanding. Winner (1977) notes that "the desire for access to the 'black boxes' produced by technology, therefore, does not imply a desire for access to the inner workings of the technology itself" (p. 288). Technology is at the same time familiar and alien, sacred and profane; technologies are seen but not understood. But unlike the origins of life and the chemical intricacies that manifest as love, ignorance concerning the details of technology does not provoke wonder, perhaps because the origins of technology are known—someone created them.

Even so, considerable benefits and changes are ascribed to the progress of technology. For example, Negroponte (1998) provides an unabashedly utopian ideal of the Internet as virtual public sphere, arguing that war will eventually make no sense because digital space will become more important than physical space and that "nations, as we know them today, will erode because they are

neither big enough to be global nor small enough to be local" (p. 288). Jordan (1999) likewise argues that "cyberspace undermines nation-states to the extent that nation-states can no longer exist in isolation, simply pursuing policies congenial to their national constituencies" (p. 162). But technologies do not enact change on their own; as they are implemented, they change the cultural landscape and alter our perceptions of what is possible and necessary. Technology adoption should be carefully considered, yet in today's technological landscape, there seems to be little time to contemplate potential risks and benefits of a particular technology. Moreover, technology progresses at such a pace that it seems impossible to keep up. Ellul (1992) asks, "How can people who are incompetent make important decisions with regard to technique? Here, of course, ordinary citizens are in exactly the same place as the politicians, who are also perfectly incompetent" (p. 43). Without an understanding of how technology works, citizens and government officials are ill-equipped to make rational, well-informed decisions concerning its implementation and governance.

Technologies—especially communication technologies—have become an integral part of modern life and societal assumptions concerning the sanctity and necessity of communication technology infrastructure have implications for all members of society. Such assumptions are laid bare in discussions concerning cyberterrorism. Tom Ridge, as director of the Department of Homeland Security, revealed the consequences of this dependence: "Our 21st century global economy and the 21st century technologies on which it relies are vulnerable to new threats of cyber terrorism" (H.R. 5005, 2002, p. 8) and the National Commission on Terrorism (2000) states, "Cyber attacks are often considered in the same context with CBRN [chemical, biological, radiological, or nuclear threat]" (p. 5). McLuhan et al. (1996) argue that "real total war has become information war" (p. 138), but increasing military dependence on electronic systems demonstrates that information war is still very much rooted in the physical domain of warfare (see Schleher, 1999; Vakin, Shustov, & Dunwell, 2001). All of this points to a perceived reliance on communication technologies that enable a particular way of life that is often portrayed as fragile. As attorney general, John Ashcroft described the technological dependence of the United States:

> As our economy and infrastructure become more dependent on computers, our potential vulnerability to terrorist attacks against our cyber systems grows. The United States relies increasingly upon information technologies and the Internet to conduct business, manage industrial and governmental activities, engage in personal communications, and perform scientific research. These technologies have resulted in enormous gains in efficiency, productivity, and communications and have spurred tremendous growth in the U.S. economy. They have also become essential to our society's ability to function. ("Transforming the federal government," 2002, pp. 57–58)

Scholars and pundits claim that the United States and other industrialized nations are entering into an information age and becoming information societies (see Castells, 2000, 2001; Schement & Curtis, 1997; Sussman, 1997; Toffler, 1980;

Toffler & Toffler, 1995; Webster, 1995). Technological changes have implications for the individuals that exist in these societies. A major implication for the constant connection that seems to emerge in an information society is the decrease in privacy and increase in the transparency of the citizen. Bekkers and Van Duivenboden (1995) note that although the citizen has become more "transparent" the state has not experienced a similar level of transparency (see also Howard, 2005). Such concerns are sometimes dismissed completely—in the worlds of Scott McNealy of Sun Microsystems, "You have zero privacy anyway. Get over it" (cited in Yourdon, 2002, p. 71). It seems that with increased connection comes decreased privacy. Negroponte (1995) notes that this can sometimes seem paradoxical: "The Internet provides a worldwide channel of communication that flies in the face of any censorship and thrives especially in places like Singapore, where freedom of the press is marginal and networking ubiquitous" (p. 158). More connection does not necessarily mean more freedom.

Individual experiences of technology can have implications for society in general. Stock (1993) explains that "biologically, humans have changed little since the beginning of civilization, so *theoretically* we could get along quite well on our own. But socially, people have changed so much that most of us—especially urban dwellers—could not survive in the wilds without modern devices" (p. 47). Mumford (1964) also considers this shift in consciousness, asking:

> Is it not rather the state that the mass of mankind is fast approaching in actual life, without realizing how pathological it is to be cut off from their own resources for living, and to feel no tie with the outer world unless they are connected with the Power Complex and constantly receive information, direction, stimulation, and sedation from a central external source, via radio, discs, and television, with the minimal opportunity for reciprocal face-to-face contact? (photographic plates, figure 14-15) A

Mumford strikes at the heart of the issue; it is not enough to have social connections in modern society—one must also have technological connections. The two are not completely distinct, but an increase in technological connectivity does not necessitate an increase in social connectivity nor does the inverse apply.

Floridi (2007) argues that we are moving toward a state of total connection in which we will become not cyborgs, but "inforgs"—connected informational organisms (p. 62). He clarifies his assertions, stating the following:

> I am not referring here to the sci-fi vision of a "cyborged" humanity. Walking around with something like a Bluetooth wireless headset implanted in your ear does not seem the best way forward, not least because it contradicts the social message it is also meant to be sending: Being on call 24 X 7 is a form of slavery, and anyone so busy and important should have a PA (personal assistant) instead. (p. 62)

But the kind of connection that Floridi predicts may be merely another kind of enslavement—connection for the sake of connection. The imperative to remain connected will likely become stronger as we move more completely toward an information society. Societies are shaped by the technology they employ; Ellul

(1964) argues that "technique elicits and conditions social, political, and economic change," calling technique "the prime mover of all the rest" (p. 133). An information society that privileges digital connection over face-to-face communication leaves little place for those who wish to limit mediation in their communication. As such, those who choose to not adopt communication technologies will find themselves outsiders by virtue of their disconnection, unable to fully participate in society. These individuals are faced with an ultimatum—adopt technology and participate in society or avoid the technology and thereby become unable to completely participate in society. With such a choice, the poverty of a framework that functions mainly on perceived utility and perceived ease of use or on the gratification of a particular need becomes readily apparent.

CONCLUSION

I have argued for a more nuanced understanding of technology adoption and resistance that examines technology adoption from a media ecology approach. I also have argued for a greater understanding of technology resistance in addition to technology adoption, and propose greater potential for technological selection. Schement and Forbes (2000) state that "in the Information Age, universal access to communications technology is the primary policy tool for enabling citizens to participate in the economic, political, and social activities fundamental to a democratic society" (p. 117). The key word here is access; Schement and Forbes note that even telephone access is not universal and that this is based partly on economic concerns. Technology adoption or resistance cannot be neatly classified into factors such as ease of use, perceived usefulness, or even financial concerns. There are some who will not adopt particular technologies at any cost, despite their usefulness and ease of use. A media ecology approach foregrounds the notion that when a new technology is introduced into society, the effect of that change can have profound effects on society as a whole as well as the individual. As McLuhan (1994) noted, a clock may seem like just a device to measure time, but now "time is separated from the rhythms of human experience," because the clock "helps to create the image of a numerically quantified and mechanically powered universe" (p. 146).

When society assumes that particular channels are available to all, other channels that had been previously available may close. Floridi (2007) predicts that "the digital divide will become a chasm, generating new forms of discrimination between those who can be denizens of the infosphere and those who cannot, between insiders and outsiders, between information rich and information poor" (p. 62). Such a divide will likely be influenced by the material conditions of each group; the information rich are likely to be those who are also rich in the physical world. Those with financial means to adopt technology will at least have a choice concerning whether to adopt that technology while those of lesser economic security will be more likely to be left behind when previously available infrastructure begins to vanish.

As a technology becomes increasingly adopted, those who resist these technologies become marginalized. I am not a technophobe; rather, I like to believe

that I choose the technologies that I will use. But the reality may be that the technologies that I perceive as absolutely necessary are dictated by my perceptions of societal and academic expectations of what a college professor should be. For the moment, I can safely exist without a television and a cell phone; there may come a time when I cannot, at which time I will likely slide into the cold embrace of technology rather than resist. I enjoy a measure of financial stability that allows me to make such choices. However, those who do not have the financial or technical means to adopt technologies, or simply do not have the desire to do so, are often overlooked in our quest to make technologies more user-friendly and useful. There always will be those who do not see the usefulness in some technologies.

Societal norms and assumptions work against those who refuse to conform to norms of connectivity and the assumption of constant connectivity has increased the potential for greater societal and individual disruption due to technological failure for both those who choose connection and those who resist. Changes in the technological landscape also threaten metaphysical and ontological beliefs. The Luddites recognized that the machinery of the Industrial Revolution had the potential to disrupt their way of life. In the Information Age, technology has the potential to disrupt one's conceptions of life and reality itself. The potential for "always-on" connectivity threatens to disrupt the balance between the competing human desires for social connection and distance. Sennett (1996) argues that the demise of the public sphere can be traced to the culture of intimacy in which we now live. He connects citizenship with the idea of civility, defining civility as "the activity which protects people from each other and yet allows them to enjoy each other's company. Wearing a mask is the essence of civility" (p. 264). Constant connection may diminish one's potential for solitude and uninterrupted reflection. If individuals carry with them the means of connection, there is nowhere they can go to avoid distraction. They can always turn off the cell phone, but it is always there as a reminder of their ties to the ether.

The question of whether or not to adopt a particular technology transcends such issues as usefulness and ease of use. Technology is not value-neutral; those who create technology infuse those technologies with particular values. Legal scholar Lawrence Lessig (1999) describes how technology and ideology are intertwined:

> The architecture of cyberspace is the real protector of speech there; it is the real "First Amendment in cyberspace," and this First Amendment is no local ordinance. . . . For over fifty years, the United States has been the exporter of a certain political ideology, at its core a conception of free speech. . . . We have exported to the world, through the architecture of the Internet, a First Amendment in code more extreme than our own First Amendment in law. (pp. 166–167)

When we choose to adopt a particular technology, we also choose, to some degree, to adopt the accompanying ideology. The purchase of a cellular telephone demonstrates one's acceptance of the notion that connection is important. Rejection of the ideology tends to lead to a rejection of the technology that enables

the performance of that ideology. Ellul (1964) observed that "if we make use of technique, we must accept the specificity and autonomy of its ends, and the totality of its rules. Our own desires and aspirations can change nothing" (p. 141). To resist technology is not simply a reactionary move; rather, it is an attempt to reclaim agency. But if one is to achieve balance, blind resistance is as unfruitful as blind acceptance—one must combine resistance with awareness. As Postman (1986) suggests, "No medium is excessively dangerous if its users understand what its dangers are. It is not important that those who ask the questions arrive at my answers or Marshall McLuhan's (quite different answers, by the way). This is an instance in which the asking of the questions is sufficient. To ask is to break the spell" (p. 161).

In considering the questions of technology adoption and resistance, let us also continue to question the underlying values of technologies, and consider how they will influence individual lives, our society, and the world.

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