

# Mobile Technologies and Boundaryless Spaces: Slavish Lifestyles, Seductive Meanderings, or Creative Empowerment?

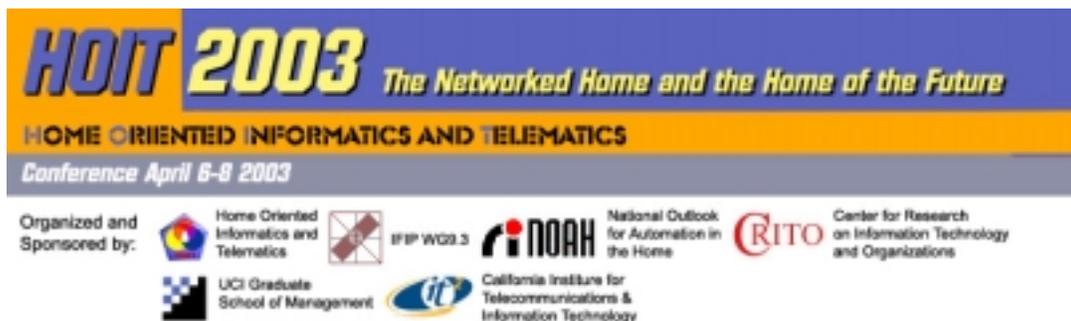
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*Acknowledgements:* The authors wish to thank reviewers of HOIT2003 for comments on earlier versions of this paper.

*Date of this draft:* January 27, 2003

Prepared for:



## Introduction

According to the instrumental theory of technology, mobile technologies – what McLuhan’s refers to as electronic prostheses – promise opportunities for greater freedom, creativity, leisure, and productivity by enhancing organic bodily functions. Correspondingly, as (Cavallaro, 2000) would argue, objects such as mobile phones, personal digital assistants (PDAs), portable physiotherapy units, laptops, and portable stereos – to name just a few – seem to impart a sense of *solidity* to consumers’ lives. Just like prostheses, they are inserted into our everyday lives, helping our “inadequate” bodies along in fulfilling practical tasks. Phenomenologically, these kinds of mobile technologies supposedly support the subject’s sense of ontological completeness and security. On the other hand the substantial theory of technology draws together less optimistic commentators. Among a host of other things, they stress the “panoptic” nature of new information and communication technologies (Clarke, 1994; Marx, 1999; Poster, 1995; Webster, 1995). The emphasis in these accounts is on the potential for surveillance and monitoring that these technologies place in the hands of the powerful. Mobile technologies according to this view is but the latest incarnation of capitalist (the Marxist view) or state (the libertarian view) power and control fantasies. Far from empowered and freed, the subject becomes captured and enslaved by these mobile communication devices. Phenomenologically, the networked worker and consumer subject is the disciplined and docile slave of the information matrix.

Both positions are well known and we can loosely refer to them as modernist views of technology. In this paper we would like to critique these views of technology and their accompanying perspectives on the constitution of consumer subjectivity, in particular the subject’s relationship to technology and space/time. We adopt R.L. Rutsky’s (1999) postmodern theory of technology to suggest that the experience of mobile communication users is neither one of complete control and freedom, nor of domination and defenselessness, but one of “fusion” and “participation”. In a second step, we extend N. Katherine Hayles (1990) concept of denaturing to develop a framework for understanding how one particular human experience, that of space and time, is being de- and reconstructed through the interaction with mobile technologies. In conclusion, we argue that a postmodern theory of technology is better suited to capture the perceptual backdrop against which users of mobile communication devices will adopt and interpret this technology in the future.

### ***Modern Technology, Modern Subjectivities***

As Heidegger (1977) argues, the Renaissance gave birth to a modern conception of technology that strives to “kill” the “spirits” that “animate” the world. The modernist view then regards technology as a tool of mastery and control over a mythical and largely unintelligible world. At this stage, an ontological dichotomy is established between the knowing subject and the knowable object world. While the human subject is alive, rational, and thinking, all objects of the world are conceived of as “dead”. This ontological shift makes the world and its objects available for human use. Technology “secures” the world for the rational subject (Heidegger, 1977). Importantly, the birth of the modern definition of technology as instrument for controlling the world altered the ontological conception of *both* the subject and the object. In other words, the relationship

between humans and technology is a *dialogic* one in which subjectivity is always reconstructed – by the very technologies it purports to manipulate. (Kendrick, 1996) In the modern understanding, this dialectic is based on the subject – object/alive - dead dichotomies.

This position has led to the dominant or instrumental view of technological systems that understands them as value-neutral instruments and functions. The instrumental theory offers the more widely accepted view of technology, based on the commonsense idea that technologies are “tools standing ready to serve the purpose of their users” (Feenberg, 1991, p. 5), in effect, to enhance human capabilities, even function as organs (Box 1). By enabling the manipulation of the environment, technology results in a universal sense of empowerment and freedom (See Box 2 “Freedom at Fingertips”). Since technology is in itself considered “dead” and value-neutral, it does not actively

### **Box 1: The Prosthetic Mobile Medic**

People at high risk of cardiac problems could benefit from a tiny device the size and shape of a pack of chewing gum that reads a heart rate monitor and uses a mobile phone to automatically send a warning call to predetermined numbers if the user is in distress. It remains to be seen whether the instrument will be produced and marketed by a medical device company, a cell phone network provider, or an athletic equipment manufacturer. But the designers see a variety of uses for it and are busy working on variations on the theme. When a predetermined heart rate that signals possible cardiac distress is reached, the device automatically sends a text message alert via cell phone to any pre-programmed cell phone number, such as a physician, caregiver or the emergency services. Incorporating global positioning technology into a version of the device could enable elderly people or those suffering from Alzheimer’s disease who became lost or confused to send their whereabouts to their children or a designated caregiver’s cell phone. A pedometer version would allow athletes to send distance information to coaches or to a training database.

Source: “Cell phone warns of heart attack”, CNN.com/Technology,  
<http://www.cnn.com/2002/TECH/ptech/12/17/ibm.heartrate.reut/index.html>

intervene in the construction of identity, subjectivity, the social, or the cultural. Instrumental theorists argue that the meaning of technology depends on the cultural belief systems and social structures it is embedded in. They do not believe that technology plays a role in constituting these systems and structures in the first place.

The substantive view of technology argues that technology, in its conception, design, and application, is inherently value-laden. Powerful build-in value systems that have been discussed along these lines are patriarchy, imperialism, and capitalism see, e.g., (Cockburn, 1988; Cockburn & Ormrod, 1993; Ellul, 1964; Kirkup & Keller, 1992, MacKenzie, 1990). Evolving outside the control of human supervision and mutating to become an autonomous system, technology is capable of overwriting existing cultural values and threatening the livelihood of humans. Technological system as diverse as video surveillance, database marketing, biotechnology, television, and nuclear and chemical weapons are experienced as threatening and nefarious. Instead of a sense of

freedom, technologies in general and communication technologies in particular, mutate into a Web of data surveillance, or “dataveillance”. (Clarke, 1991) The working and consuming subject is now understood as a data hub to be monitored, controlled, and evaluated. As the case of the Mobile Medic indicates (see Box 1), the mobile monitoring device can be used as a life-saving signaling system by a heart patient or as the prosthetic

### **Box 2: Freedom at Fingertips**

The American, French, and Russian revolutions notwithstanding, in 2001, NCR (finally) unveiled the “Freedom concept” to the world. In a demonstration at the Marriott Marquis hotel in New York in July 2001, “Freedom” came in the shape of a special bank automatic teller machine (ATM) in the shape of a bright red egg. Using a mobile phone or PDA, people were now free to obtain cash from ATMs. With the Freedom concept, mobile devices would replace the magnetic-stripe cards in a consumer’s pocket. A pilot project in Denmark gave people the first taste of such “freedom at fingertips” – Danes could now use for the first time a mobile phone to withdraw cash in a live environment at regular ATMs on the street.

NCR hopes its red eggs will turn into golden eggs. The company sees a lucrative future in dispensing more than cash from the Freedom eggs, or from regular ATMs with Freedom systems – in banks, restaurants, stores, airports, and hotels. Among the uses: point-and-click retrieval of travel or entertainment tickets, even MP3 files. Such Freedom-infused ATMs could dispense physical or virtual items. For example, local area maps can be downloaded on a mobile device. The mobile communications link in the “Freedom concept” employs infrared technology. Other short distance mobile technologies such as Bluetooth could also be used in ATMs specially adapted to accept such technology.

Source: “NCR hatches a Bluetooth Egg,” 10Meters News Service, July 13, 2001, [http://www.10meters.com/ncr\\_atm.html](http://www.10meters.com/ncr_atm.html); Lorraine Russell, “World First - Mobile Phone Used to Withdraw Cash from NCR ATM in Denmark Pilot Project”, [http://www.ncr.com/media\\_information/2002/apr/pr042602.htm](http://www.ncr.com/media_information/2002/apr/pr042602.htm)

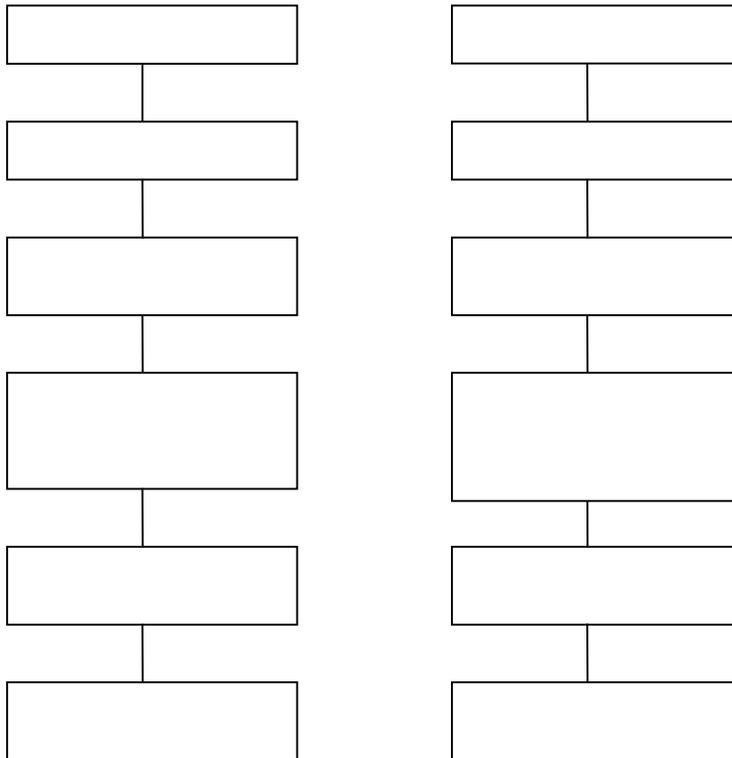
(and remote) panoptic probe by an athletic trainer. There are even cases – highly controversial – of implanting chips in children to track them remotely, to increase traceability in case of kidnapping (see Box 3 “Dataveilled Danielle”).

The instrumental and the substantial theory of technology are both modernist “technological aesthetics” (Rutsky, 1993) because they posit a Cartesian, rational subject *opposite* technology. In one scenario, we humans are the masters of it. In the other, we are at risk of losing our status as a human subject as an awesome, uncontrollable technological system enslaves us and turns us into cogs in the machine (see Figure 1).

### Box 3: Dataveilled Danielle

11-year old Danielle Duval will be implanted with a microchip to track her continuously. If kidnapped, Danielle's location would be discovered via a computer. Professor Kevin Warwick of Reading University near London has worked with human-implantable chips, including some implanted in his own body. He is developing the chip that will go in Danielle's leg, and provide security and assurance to the Duval family. Skeptics are not convinced that such Star Wars technology is ready for prime time. When Danielle's mother was quoted as saying, "If a car can be fitted with equipment to enable it to be tracked when it is stolen, why not apply the same principle to finding missing children?", a columnist wrote a rebuttal entitled "No, Mrs. Duval, you CANNOT track a mobile human by wireless like a car!" He argued that chip production economics, the need to have massive networks reaching every corner, and lack of portable power sources represented barriers that would take years to overcome.

Source: Lorraine Fisher, "Microchipped", <http://www.mirror.co.uk/news/allnews/page.cfm?objectid=12164609&method=full&siteid=50143> ; Guy Keweny, "No, Mrs. Duval, you CANNOT track a mobile human by wireless like a car!", <http://www.newswireless.net/articles/020801-tracker.html>; Charles Gibson, "21<sup>st</sup> Century Lives: Kevin Warwick", ABCNews.com, Aug. 25, 2000, [http://more.abcnews.go.com/onair/worldnewstonight/wnt000825\\_21st\\_warwick\\_feature.html](http://more.abcnews.go.com/onair/worldnewstonight/wnt000825_21st_warwick_feature.html)



Importantly, also the instrumental view acknowledges the potential for a dystopian aesthetics. Of particular concern is the increasing technologization and rationalization of work- and leisure spaces, which may give birth to a machine-like subject (Habermas, 1954). Thus, as Rutsky (1993) argues, “[I]t is only to the extent that these two dystopian notions of technology can be “mediated” that a utopian technology becomes possible. Without such a mediation, the oppressive, alienating, and dehumanizing nature of technology would destroy the unity of the Cartesian subject by reducing the worker and consumer to a *mindless* body. In other words if we humans do not guard against the technological “god”, we risk losing our sense of autonomy and agency. Once dehumanized, the solution, as suggested in Fritz Lang’s monumental silent film *Metropolis* (1927), is to return to the idealized, holistic sense of the subject by destroying the machines. The mediation will look differently for the different dystopia that lurks in the technology<sup>1</sup>; however, the need for mediation in the first place is rooted in the assumption that technology and the subject are two distinct entities.

However, as we now live in the postindustrial, postmodern time of what Rutsky calls High Techne, we would argue that this conceptual and ontological separation of the human and the technological no longer offers the best model for describing our relationship *with*, and experience *of* technology. Especially with the advent and indeed rapid “insertion” of increasingly miniaturized mobile technologies into our bodies and the fabric of the everyday, the technological aesthetic of modernism is displaced by a postmodern technological aesthetic. Its key characteristics are that the conceptual and ontological separation between “the human” and technology is challenged. If we no

#### **Box 4: The Robot That Feels Your Pain**

Move over R2D2. Robot maker Nilanjan Sarkar and psychologist Craig Smith from Vanderbilt University are developing “sensitive” robots. While these robots themselves are emotionless, the goal is for the robots to understand what humans are feeling. The vision is to create a kind of Robot Friday, a personal assistant who can accurately sense the moods of its human bosses and respond appropriately. Small wearable sensors monitor people’s reactions while they play video games. The sensors capture information about heart rate to measure stress and anxiety levels. By real-time blending and analysis of the heart rate, changes in skin conductivity, and the amount of facial muscle movement, the robots can get a good idea of when someone is feeling stressed. When someone is feeling stressed, the robot responds by moving towards the subject and asking if it can help in any way. Next in line are studies that will enable the robot to sense when subjects are bored or frustrated. By measuring and analyzing physiological reactions to such emotions, the sensitive robot would enhance its behavioral repertoire.

Source: “Robot helper knows how you feel,” BBC News online, <http://news.bbc.co.uk/2/hi/technology/2590057.stm>; David F. Salisbury, “Designing a Robot that can Sense Human Emotion,” <http://www.newswise.com/articles/2002/12/ROBOT3.VAN.html>; “Metal as Anything”, Beyond Online, 17th December 2002.

<sup>1</sup> For example, progressive, “human-oriented” production formats “mediating” the hyper-rationalized technological functionality of the (service) assembly line and human reason “mediating” the chaotic frenzy of bio-technological development.

longer see technology as the ontological “other”, we can imagine new user subjectivities whose perceptual horizons of a technologically-enhanced mobile world is one of *fusion* and *arrangement* with technology.

Along the way, the question concerning mobile technology is no longer whether the infusion of our lives and bodies with mobile communication devices enslaves or empowers us because this approach reduces technology to a matter of control. In the world of a postmodern technological aesthetic, humanity’s relation to technology is one of *openness* and *participation*, “of ‘letting go’ of the sense of mastery that has defined the modern human subject” (Rutsky, 1999, p. 147). Technology then becomes a part of us, seduces us, merges with our own sense of autonomy, and is accepted as “a host of autonomous forces and agency” (Rustky, 1999, p. 146) (see also Box 4).

If we become cyborgs of the Harawayian sort (1991), we will be more than a

### **Box 5: Openness and Participation in Consumer Products**

For many years, Philips has been pioneering the concept of "Ambient Intelligence." This means integrating technology into our daily lives so that it is seamless and responds to our needs without being told.

These "wearable electronics" could also take other forms from tracking children’s whereabouts to enabling a DJ to step away from his booth while he spins tunes, to even incorporating a mobile phone into a businessman’s jacket that is invisible to the naked eye. Philips originated of the idea of wearable electronics in 1995, and, through a multidisciplinary team of textile designers, electronic engineers and product designers, is bringing the idea of seamlessly integrating technology with clothing to life!

Imagine a T-shirt which has a video display panel where the logo is now. Instead of static prints, you could walk around showing video clips, perhaps from a TV tuner on your belt, or you could be showing accompanying video clips while dancing to music at a night club. Smaller panels could be built into sleeves or legs. You could have a wristwatch in your shirt sleeve. Communications between the various devices could use fibers built into clothes, with their data coverage increased to as much as 35 feet using the new Bluetooth technologies. Another technique uses the body itself to transmit signals at surprisingly high data rates, megabits per second.

Beyond creating "smarter" clothing, Philips extends the concept of Ambient Intelligence to the home of the not so distant future—where upon returning from a long run, you might have a special song in your head but can’t recall the name. No worries. By simply humming the tune, your smart living room will recognize the song and play it for you—it will also brighten the lighting in the room to reflect its upbeat tempo. This is how Philips envisions making life better—by integrating technology into your surroundings so that you don’t have to work to use it; you can simply enjoy it.

Source: Phillips, Swedish website, <http://www.philips.se/InformationCenter/NO/FPRESSRelease.asp?1ArticleId=2002&1NodeId;> <http://www.philips.se/InformationCenter/NO/FArticleDetail.asp?1ArticleId=2004&1NodeId;> Ken Goldstein, The Technology Tides of Fashion, <http://www.catii.com/hightech/hightech036.html>.

“mixture” of human and technology. She theorized the cyborg as a whole new personality, endowed with its own subjectivity, at the same time non-human *and* non-machine.

Mobile technology theorized this way eradicates the subject-object/alive-dead dichotomies and opens the door for a dialogic and symbiotic relationship between the human and the technological. Humanity's relationship to technology, indeed to the technological world, "is a relationship with others, among others" (Rutsky, 1999) (see Figure 2). In many ways, this could be theorized as a shift from a modern to a postmodern conception of technology, even as Heidegger reminds us that the conception of technology as art, aesthetics, and style has always been part of the original conception of the Greek word *techne* (τεχνη). The modern view of technology has simply repressed this "softer", more holistic meaning of technology. The key point is that with the postmodern re-aestheticization of technology, a new, more humanized conception of technology has been introduced into the cultural fabric of the everyday, reinventing the notion that technologies do intervene in the construction of our sense of selves.

The aestheticization of technology is perhaps most obvious to most at the consumer product level (see Box 5). Cultural sites other than the market have also been preparing us for a future where we engage more holistically with technology. Science fiction novels and movies, video arcades, and most recently virtual environments represent an increasing readiness of consumers to immerse into a technological space, to "fuse" with cyberspace and virtual reality environments (Hillis, 1999)(see Box 6). Sci-fi movies and cyberpunk texts speak of possible futures where technological elements are no longer cordoned and separated from our minds and bodies but inextricably interwoven with both, creating a sense of self based on a cyborg identity. (Cavallaro, 2000; Haraway, 1991)

Mobile technologies, carried on the body, but also increasingly *in* the body, make this intervention very real and concrete (Boxes 1, 3, 4,5). It is these relations between the material reality of the body and the material reality of the technological systems that now very graphically constitute the subject's experiences with mobile technologies. Technology is no longer viewed as a force to be controlled or a force that controls, but as an integral part of humanity. It is conceptualized as software, rather than hardware, and as *information* processing, rather than *mechanics*. In the contemporary postmodern vortex of techno-cultural mutation, technology is no longer defined in opposition to the human. Mobile technologies bring us ever closer to a cyborg existence (in fact as in the case of the medic chip, we need technology to be mobile), where we see the technology around us and within us as a genetic part of our 'selves'.

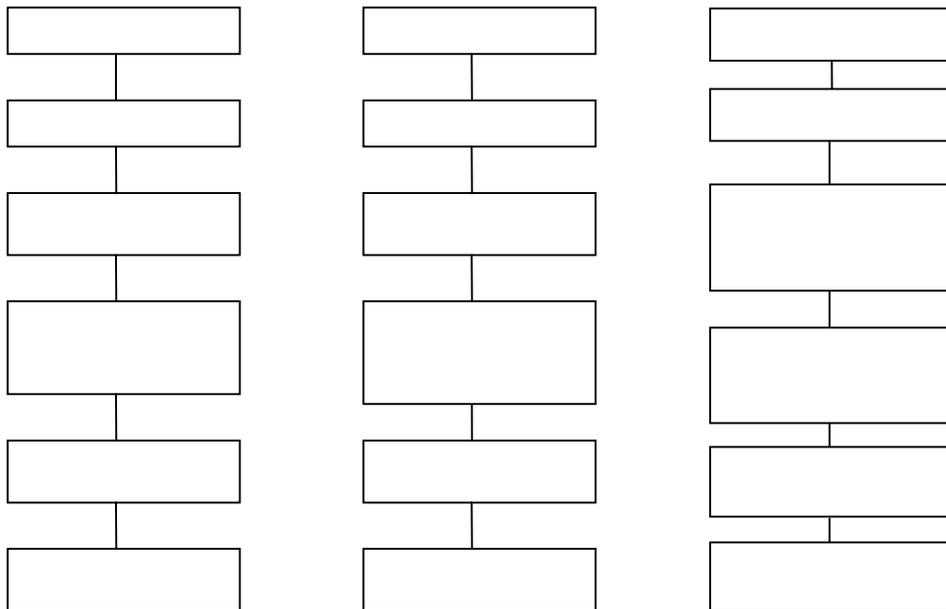
This is the conception of technology that allows for a playful, seductive, and imaginative existence (see Box 4 and Figure 3).

### Box 6: Samurai Fantasies

The popular game Samurai Romanesque, a “warlords-era adventure” set in medieval Japan, is a male fantasy – available over the popular iMode mobile network – in which the protagonists are samurai warriors. As Dwango, the game developer firm notes, “You are given a map with names of towns and provinces from the Era. You may marry and lay your hopes on your descendents, aim to become an unequaled ruler, or serve your master to try to conquer the nation together. You go through a life of your choice in the tough and hot Era of the Warlords. In this game you will age one year per day of session, and live to be about 40 years old. You will go through a myriad of different activities, including exchanging information with others in town, training yourself in sword fighting, fighting enemies, and meeting women.” The graphics and sounds in Samurai Romanesque are a throwback to old arcade videogames. There are about 1000 villages in the game universe. In each village, you might find a shop, a teacher, and a drunken belligerent looking for a fight. And of course, if you are lucky, you may find a pretty maiden that you can court, marry, and bear progeny from. Reviewer Justin Hall calls the game “a remarkable early attempt to build a game for mobile phones oriented toward continuous communal play”. Hall gave Samurai Romanesque his highest rating ever, a chart-busting 85.

Source: Dwango Press Release, <http://www.dwango.com/press/pr008.htm>, Justin Hall, “Be an iMode Mifune?”, Wireless Gaming Review, Feb. 14, 2002, <http://www.wirelessgamingreview.com/reviews/samurai021402.php>

Figure 3: Contrasting the Postmodern Theory of Technology



## ***Mobile Technologies and the Denaturing of Space***

Finally, we want to shift gears and explore how one important human perception, that of space (and in extension time), is transformed as the subject's experiences are increasingly mediated by mobile technologies. Since the 1980s, our social landscape has been transformed quite dramatically by productivity enhancing technologies. With the emergence of beepers, fax machines, cellular phones, laptop computers, modems, email, and many other devices and systems, houses are being turned into domestic work stations as "corners of our lives formerly sheltered from direct technological intervention are now being bombarded by the insistent call of incoming and outgoing messages". (Winner, 1994, p. 194) Most of North America's urban population has grown used to listening to only one part of the conversation as people chat away on their portable communication devices everywhere from movie theaters to grocery stores to restaurants to museums. According to one philosopher of technology, "[P]laces and spaces in our lives formerly devoted to sociability, intimacy, solitude, friendship, love, and family are now being redefined as susceptible to productivity, transforming social norms and boundaries". (Winner, 1994, p. 194)

Mobile communication means accessibility and, more importantly the obligation to be accessible. Expectations that increased productivity will save time have been frustrated because our availability and our available time expand as well. It also means that the logic of productivity is being transferred from place to time. Mobile technology leads to what Hayles (1990) characterizes as the denaturing of space.

According to N. Katherine Hayles, (1990, p. 267) "to denature something is to deprive it of its natural qualities." In her account, we have witnessed the denaturing of language and context during the first half of the 20<sup>th</sup> century. Over the last 50 years then, time was denatured as it has been *cut loose from the idea of sequence*. Time still exists in cultural postmodernism, Hayles says (p. 279), but "it no longer functions as a continuum along which human action can be meaningfully plotted." One is then left only with a world of disconnected present moments that vie for attention and jostle one another for the next time slot but never converge to a continuous or logical progression (for empirical illustration of this, watch MTV). For those living postmodernism, this is a schizophrenic, even polyphrenic existence because the end of continuous time, just like the end of the human-technology dichotomy, means the end of a unified sense of self.

In addition to these three waves of denaturing, we would argue that the intervention of mobile technologies in everyday life has ushered in a *fourth wave* of denaturing: the denaturing of place. "Physically, a place is a space which is invested with understandings of behavioral appropriateness, cultural expectations, and so forth. We are located in "space", but we act in "place" (Harrison & Dourish, 1996). Harrison and Dourish see space as somewhat of a second-order construct from which a "place" emerges through the actions of actors. For example, a theater is simply a three-dimensional space like many other three-dimensional spaces. What makes it a place we call theater (and not cathedral, mall, school, etc.) is the nature of the actions and interactions that take place among the actor within that space. The enactment of space, however, is not completely random. "The structure of the space around us moulds and guides our actions and interactions". (Harrison & Dourish, 1996) Of course, Harrison and Dourish's emphasis on practice is somewhat problematic for analytical purposes because it overlooks the

power of language to signify (e.g., a theater is a theater because we call it that and we all accept this signification as true). The notion of enacting place is nonetheless useful because it hints at the constructed nature of place (e.g., a theater is a theater if and only if

### **Box 7: From Predator Drones to Mobile Phones**

A swarm of robotic spiders crawls across the building in search of the fugitive hero, who lies submerged in a bathtub. Communicating wirelessly with each other, the robots systematically search the building until they track down their target. This is of course Science Fiction by Philip S. Dick, filmed by Steven Spielberg in his 2002 movie *Minority Report*. Reality – at least military reality – is not far behind Sci-Fi. In late 2002, an unmanned predator drone aircraft of the U.S. Central Intelligence Agency tracked down the car of an Al-Qaeda leader traveling by car on a desert road in Yemen. The drone fired a Hellfire air-to-surface missile, destroying the car and its six occupants. Funded by the U.S. Navy, research is underway at UCLA and other laboratories to develop aerial and vehicular drones that could work as a synchronized swarm, communicating via a mobile, flexible “Internet in the Sky.” Such networks are “self-configuring”, choosing their temporal “leader” on the fly or on the run, while communicating at breathtaking broadband speeds. While such technologies are being developed for military purposes, there is a wide range of commercial fourth generation (4G) mobile applications waiting to happen. By integrating different modes of wireless communications such as wireless LANs, Bluetooth, cellular signals, radio, TV broadcasting, and even satellite communications, 4G promises to equip people with mobile devices that can roam freely from across networks, serving in myriad ways.

Source: Jeff Goldman, “MinuteMan on the March”. Oct. 7, 2002. <http://www.thefeature.com/>; Craig Hoyle and Andrew Koch, “Yemen drone strike: just the start?” *Jane’s*, Nov. 8, 2002, [http://www.janes.com/defence/air\\_forces/news/jdw/jdw021108\\_1\\_n.shtml](http://www.janes.com/defence/air_forces/news/jdw/jdw021108_1_n.shtml); Rick Perera, “Researchers outline vision of 4G wireless world”. *CNN.com/Sci-Tech*, March 8, 2001, <http://www.cnn.com/2001/TECH/ptech/03/08/4G.world.idg/>

the actors in that space perform like they are in a theater).<sup>2</sup>

Mobile technologies add another layer of complexity to the process of denaturing of space because the enactment of a space, thus its transformation into a place, is increasingly done by the mobile cyborg. Portable devices expose us to incoming and outgoing information flows anytime, anywhere, making a collective and continuous experience of space and place less and less likely. Mobile technologies provide users with the phenomenological freedom to experience a space, any space, in a uniquely individual way, therefore creating their own “temporal place”. The result is total polysemy of place, without any natural or original context to draw from.

In the age of mobile communication, we have thus moved from *spatialized time*, where the nature of the activities was predominantly governed by the structuring logic of the place (one reads in a library, one studies in a classroom, one eats in a restaurant, etc.) to *temporalized space*, where the nature of the activities of its inhabitants define the place

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<sup>2</sup> There are other problems with Harrison and Dourish’s definition of place as enacted space. E.g., what happens if everyone or some people in a theater start a bar brawl? According to Harrison and Dourish, at the moment of the brawl the theater would cease to exist and the space would become redefined as a bar. The problems with such an ontological fluidity are obvious.

(a restaurant becomes a playground, a coffee house becomes an electronic mall, a train becomes a work station, etc.). Mobile technologies change the hierarchy of time and space as organizing principles of human experience. In spatialized time, the subject perceives *place* as a primary mode of identification against “others” such as the environment, people, or work processes. In temporal space, the predominant mode of identification is through the *experience of time fragments*, temporarily demoting place to a physical backdrop. In this sense, mobile technology denatures space by deconstructing “natural” perceptions of space and reconstructing it not as physical three dimensions, but as temporal flow of information (see Box 7, “From Predator Drones to Mobile Phones”).<sup>3</sup> .

Emerging new generations of mobile applications are already focusing on seamless multimedia experiences that would be available to people on the go – anytime, anywhere. Time and space converge in such applications, creating spatialized time in which vicious or virtuous enactments can occur with the aid of mobile communications. Some applications will even hint at the complete obsolescence of physical space by constructing virtual spaces that allow for temporal enactment of subjectivities (see Box 6). As with many technologies of the past, it is cutting-edge military applications that are likely to be the proving grounds for mobile technologies that would later seep into domestic, work, and shopping spaces (see Box 7).

## **Conclusions**

Mobile technologies affect how consumers interact with technology and how they relate to it. They also affect the experience of ‘self’ in space and time by altering the “nature” of both. We have suggested that modern theories of technology, commonly referred to as the instrumental and the substantial theory, can no longer adequately capture the range of experiences and interactions that users form with technology. In particular we argue that the dichotomies like human and technology, subject and object, and alive and dead are dissolving in the age of a postmodern aesthetics of technology. Instead, the proliferation and adoption of mobile technologies will lead to an unparalleled openness to and participation in technology. We thus theorized a user of mobile technologies against views that see him or her either as a master of technology or as its slave. By rejecting the construction of “technology as the other” we suggested a user that engages and fuses with technology and perceives it as an autonomous force that users accept as playing a part in the reformulation of their own humanity.

In addition to new trends in human-technology relationships, we discussed changes in the perception of space and time prompted by the incorporation, literally, of newer, smaller, and more powerful mobile devices. Our main thesis was that the dominance of space (or place as enacted space) as the organizing principle of our subjective experience is being overturned by mobile communication technology. Space becomes a temporal

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<sup>3</sup> Interestingly, signal processing research that deals with mobile communications has moved strongly into the area of “space-time processing” or STP. In STP, signal processing is “performed on a system consisting of several antenna elements, whose signals are processed adaptively in order to exploit both the spatial (space) and temporal (time) dimensions of the radio channel” (VanRooyen 2002). Devices based on STP technologies provide “solutions to wireless environment problems such as ever increasing interference, limited bandwidth and limited range” (VanRooyen 2002).

construction of converging information flows. As we move from *spatialized time* to *temporalized space*, our sense of what constitutes spaces for work, consumption, or recreation is no longer clear. Three dimensional space becomes denatured by the atomizing force of communication flows as *time fragments*. In the last instance, it is this mechanism that gradually erases traditional spatial boundaries, ushering in *new spaces* of technological seduction, play, and creativity.

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