2010

Governing with Clean Hands: Automated Public Toilets and Sanitary Surveillance

Irus Braverman
University at Buffalo School of Law

Article | # Governing with Clean Hands:
Automated Public Toilets and Sanitary Surveillance

Irus Braverman

University at Buffalo, State University of New York, USA. mailto:irusb@buffalo.edu

Abstract

To anyone familiar with the story of urban decay in major American cities in the 1980s – and with the subsequent abolition of toilets from city streets – the introduction of automated public toilets (APTs) to urban spaces sounds like very good news. This article explores the re-democratizing message that commonly accompanies the introduction of APTs to North American city streets as well as their on-the-ground manifestations. It focuses on two major components of APTs: privatization and automation. The process of privatization, which characterizes most APT operations in North America, carries with it various exclusionary effects that stand in stark contrast to the democratic aspirations of public space. Additionally, the APTs normally feature automated devices, and, most prominently, the auto-flush and the automated faucet and dryer. On the face of things, these devices eradicate the injustices that sometimes accompany human discretion. However, they also conceal the necessarily social and value-ridden human decision making that goes into their design. The article proposes that both the privatization and the automation of public toilets are part of a broader and increasingly expansive sanitary regime, one that imposes a morality in practice on its users. The latter are left with relatively limited options as to how to use the space of the washroom and at times join the nonhuman devices themselves in "kicking-back" at their programmers. By comparing automated toilets with attendant-based ones, the article suggests that the project of sanitary surveillance exemplifies the fluidity between traditional and new forms of surveillance.

Figure 1: NYC's first APT, located in a public right-of-way. Photo by author, July 17, 2009

Introduction

Automated public toilets, or APTs, are currently used in more than 600 cities around the world, including Athens, Singapore, and London, and across the United States in New York City (see, for example, figure 1), San Francisco, San Antonio, Atlanta, Ft. Lauderdale, and more (Marshall 2007). They are a relatively new urban phenomenon and their uptake is expanding to include many more cities. To anyone familiar with the stories of urban decay in major American cities in the 1980s, and the subsequent abolition of toilets from city streets, the reintroduction of public toilets into these streets sounds like very good news. This reintroduction promises an end to an era of inhospitable public spaces that were far from accommodating to one of the most basic human needs: the need "to go." Subsequently APTs have been proclaimed by some as a clean and safe alternative to the dirty and crime-stricken public washrooms that used to inhabit America's urban streets.

This article tracks some of the history of public toilets from their inception up to their recent manifestation as APTs, highlighting the fluctuating tensions between the public and the private that have framed this history. Supporters of APTs have portrayed them as a way of democratizing contemporary urban spaces, of making them more inclusive. This is achieved mostly by allowing various "undesirables" that live on the streets, such as homeless people, an honorable way to relieve themselves (Mitchell 2003; Duneier and Carter 1999). However, this article demonstrates that the on-the-ground manifestations of the APT's design are much less clear and perhaps even stand in contrast to the purported egalitarian agenda of APT manufacturers and city officials.

Specifically, the installation of APTs typically requires a process of privatization. This process has been criticized as contradicting the essence of the public realm (Lofland 1998). It has also been portrayed as a mechanism for instituting exclusions and, in the context of automated toilets, of concealing them behind the seemingly neutral, technical, and deterministic design of toilet machines. This machinated component of APTs makes their introduction harder to contest than other, more explicit, projects of public control. The privatization aspect of APTs is discussed in the first part of the article, which is divided into several segments: first, a brief historical account of public toilets up to the installation of the APT; then, an exploration of the APT as a fused private/public entity and its function as a vehicle for corporate advertisement; and, finally, the APT's acclaimed role of making city streets into safer spaces.

The second part of the article deals with a second major feature of APTs: automation. It explores several of the mechanical fixtures designed into the new toilets; buttons, auto-flush toilets, and sensor-activated rinsing and drying devices. This part of the article also identifies the move away from, and then back to, manually (i.e. humanly) cleaned toilets. This move is depicted as signaling a shift between a colorful world of human agency into a black-and-white realm of enforced morality in practice. At the automated toilet, the machine is positioned as the controlling agent in place of its human user, whose discretion is greatly reduced. This move flips the typical human/machine hierarchy on its head, resulting in an infantilization or degradation of the basic experience of (what used to be) a human self-sufficiency in the intimate acts that take place at the washroom. Similar to the process of privatization, the automation process also obscures the highly political judgments that are built into the design and facilitated by APTs in the name of egalitarian sanitation and hygienic efficiency. The context of APTs thus brings to light the process by which machines, rather than humans, do the dirty work – both physically, in the sense of cleaning up after humans, and normatively, in the sense of concealing, or black-boxing (Akrich 1992), the various mechanisms of human control that are built into the design of automated toiletries. In other words, the article proposes that while the washroom's automated technological devices purportedly hold the potential to eliminate the injustices involved in human policing (Joh 2007), they are not only inherently social and subjective, but also a form of creeping surveillance (Marx 1988: 2) that is inscribed into the seemingly deterministic operations of toilet fixtures (see also Graham & Wood 2003: 237).

Finally, drawing mainly on the literature of Actor Network Theory, and on Bruno Latour's work in particular, the last section of the article considers both human and nonhuman forms of resistance to APTs, suggesting several instances in which actors "kick back" (Whatmore 2002) at their initial sanitary inscriptions. Such a portrayal of surveillance from the perspective of this human/nonhuman relationship highlights its shifting nature as a product of ongoing human/nonhuman negotiations.

Throughout, the article suggests sanitation as a particular technology of surveillance. In the name of limiting the spread of germs and bacteria, a strict regime that attempts to minimize human contact with other humans, either directly or mediated by machines, is enforced. From a sanitary perspective, the public washroom – perhaps more than any other modern space – is a place of extreme danger, a place where human purity and safety are encountered, questioned, and enforced (Douglas 1966). In effect, the project of reintroducing America's public washrooms to urban streets has provided an opportunity for enhanced control mechanisms, which are more easily designed into automated toilets. At APTs, instead of placing human policemen inside each toilet stall and behind each water faucet, the potentially delinquent user is policed through standards inscribed into the body of the machines that operate in this space. Rather than trusting human users to do the right thing, this sort of governance-at-a-distance through machines eliminates the undesirable options in advance, making it almost impossible to use toilet facilities in any other way than that prescribed by their human designers.

In what context can one situate this form of sanitized surveillance? On the one hand, its high dependency on automation and privatization, as well as its effects on the user's notion of self, render sanitized surveillance more in line with "new" models of surveillance, what Gary Marx describes as the use of technical means beyond the unaided senses and through material artifacts (Marx 2002: 12). On the other hand, the type of policing exercised through such sanitized fixtures is largely devoid of what has typically been framed in surveillance literature as "dataveillance": "the collection and analysis of *information* about populations in order to govern their activities" (Haggerty & Ericson 2006; emphasis added) that functions "to extract and create personal *data*" (Marx 2002: 12; emphasis added). Indeed, unlike most forms of surveillance discussed in the recent surveillance literature – which police through a focus on collecting and managing personal information (Marx 2002; Graham & Wood 2003; Haggerty & Ericson 2000; Bogard 1996: 16) – sanitary surveillance enforces hygienic morality through the programming of machines. In this sense, this form of surveillance floats in between the "older" Foucauldian models of disciplinary and governmental technologies that center on individual and population management, on the one hand, and the more Deleuzian emphasis on assemblages and discrete flows of later surveillance literature, on the other hand (Haggerty & Ericson 2000: 608). These on-the-ground explorations of how sanitized surveillance operates offer interesting insights into the fluctuating and unstable divide between disciplinary, governmental, and new surveillance models.

Methodologically, this article is based on over a dozen semi-structured, in-depth interviews with APT manufacturers and advertisement companies, city officials and local businesses. Most of the interviews were conducted in the summer of 2009 in Toronto and New York City, which have both recently entered into a long-term contract for the design, installation, and maintenance of new public street furniture, including APTs. The article also relies on brochures and publications by toilet companies as well as city bylaws, regulations, and manuals.

Sanitation through Privatization

Public Toilets Before APTs

The twenty-first century's fascination with dirt and cleanliness is evident in the United Nations' declaration of the year 2008 as the "International Year of Sanitation" (United Nations 2008). There is now also a "World Toilet Organization" (World Toilet Organization Home Page 2008). With headquarters in Singapore, this organization spans seventeen member states and promotes an international design of

public toilets, taking into account not only cultural peculiarities but also the technological, ecological, and legal aspects of toilet construction (Wenz-Gahler 2005). In our sanitary, well-plumbed lives, the toilet – an engineering marvel – removes waste out of sight and out of mind (George 2008; Pinker 2007). Indeed, the washroom, and the water closet (herein WC) in particular, is an ingenious invention. The WC not only flushes water; it also flushes the human fear of its organic nature and, consequently, of death (Corbin 1986).

When discussing public washrooms in modern American cities one should keep in mind that not so long ago they had both a very different moral and a different functional role. Up to the nineteenth century, public washrooms were the norm and private-dwelling toilets were only built for the rich. The first evidence of actual physical facilities for public use was found in Knossos, dating back to approximately 1700 BC (Kira 1976). In fact, most of the great cities of the ancient world provided startlingly sophisticated public facilities. The epitome of this approach was Rome, which provided public facilities on a wide scale in lieu of private facilities. Roman cities were famous for their advanced sewer systems and provide the first real example of a public urinal (Greed 2003).

The decline of the Roman Empire brought with it a similar decline in public facilities, and the disappearance of the sewage system in particular. In medieval Europe, the facilities ranged from none, to designated heaps, to privies, to carriage pots for the wealthy. Within private dwellings, it was customary to empty chamber pots out of upstairs windows by throwing their contents into the street, calling out: "*gardez l'eau*" (hence the word "loo"). Public toilets were located over rivers. Under medieval statutes, anyone, including women, had the right to squat in the gutter, for example within the boundary of the ancient City of London (Greed 2003).

Industrialization was accompanied by the expansion of towns and cities, and population growth put increased pressure for better sewer systems. It was not until the 1840s that the public street urinal made its reappearance, this time in Paris (Kira 1976). By the 1860s Paris also boasted enclosed kiosks, and by the 1880s the washroom had become unisex and incorporated WCs as well. Still, most houses piled the sewage in the garden or waited for the nightsoil man to collect it. Nightsoil men were the central means for collection in Japan before World War II and in Australia around the same time. Cesspools were also common.

In Britain, the nineteenth century spread of cholera made necessary a central intervention in the public's excretory conduct. The 1835 Municipal Corporations Act laid the foundation for such an intervention, aided by the material development of the modern WC.[1] The first British public toilets using a water system were at the Great Crystal Palace Exhibition of 1851, and were initially not accessible to women (Gershenson and Penner 2009; Kira 1976). The 1872 Act adopted the water-based sewer system, turning it into a government standard. This shift from cesspools to flush toilets led to the overloading of the existing sewers. Consequently, an 1875 Act was introduced to enable the creation of a set of bylaws that would control the layout of new streets and housing schemes.

The history of excrement regulation in France is not very different from that of Britain, although it starts somewhat earlier. Dominique Laporte begins his remarkable book "History of Shit" ((1978) 2000) with a quotation from a 1539 decree issued by Francois, King of France. Article 4 of the decree stated:

> "We forbid all emptying or tossing out into the streets and squares…of refuse…as well as all waters whatever their nature, and we command you to delay and retain any and all stagnant and sullied waters and urines inside the confines of your homes. We enjoin you

---

[1] In 1596 Sir John Harrington invented the first modern lavatory using water. In the nineteenth century, Sir Thomas Cropper perfected and marketed modern WCs with siphonic cisterns.

to then carry these and promptly empty them into the stream and give them chase with a bucketful of clean water to hasten their course" (Laporte 2000: 4).

Article 23 of this decree ordered every lord and owner of a house to build cesspools and earthclosets "or risk the penalty of the confiscation of their abodes" (2000: 5). Maintaining that every individual family is responsible for their personal waste, the decree established what Laporte calls a "privatization of waste," which made it possible for "the smell of shit to be bearable [only] within the family setting, home to the closest social ties" (2000: 29). This privatization enabled the state to "clean its hands" of such earthly matters, thereby becoming "the supreme guarantor of absolute power and virginal purity," an alchemist that transforms shit into gold (2000: 40-43). "Shit," Laporte further contends, has become "a political object through its constitution as the dialectical other of the 'public'" (2000: 46). While the state wants nothing to do with the *prive*, it reigns as the law of cleanliness above its sewers. "Cleanliness, order, and beauty, defined by Freud as the cornerstones of civilization, are elevated to new extremes when embodied by the state" (2000: 56; See also Ashenburg 2007; Inglis 2001).

While the privatization of excreta resulted in a decreased need for public toilets, in the previous sense of this word, they still existed nonetheless, although initially they were accessible only to certain people. In the twentieth century, North American cities saw the further decline of public toilets based on the perceived use of this public space for criminal activity (Braverman 2009). In New York City, as early as 1898, the very first pamphlet by the Citizens Union decried the city's lack of public toilets (Webber 2001). "I know that I am in distress when I walk the streets of New York. Wondering constantly where the next stop will be and if I can hold out that long," Henry Miller wrote in "Black Spring" in the 1930's ((1936) 1994). Several decades later, Toronto's Manager of Street Furniture Program, Kypros Perikleous, tells me that currently there are no public toilets in the city's public right-of-ways. By "public," he continues, he is referring to washrooms on right of ways that are accessible to the *general* public. "There aren't no public bathrooms in Buffalo," Buffalo's Chief Plumbing Inspector laments similarly in an interview.

Probably as a result of the lack of public toilets that are accessible to the general public, many laws and regulations define "public" as facilities that the public, but not necessarily the general public, can access. For example, under the title "Public Facilities," section 403.6 of New York State's Plumbing Code stipulates that "customers, patrons, and visitors shall be provided with public toilet facilities in structures."[2] As in many other state codes, public toilets here are synonymous with commercial facilities available to customers. At least until recently, then, public toilets – that is, those facilities accessible to the general public – have been a rare, if not nonexistent, phenomenon in American cities (Braverman 2009). The recent process of installing APTs in a growing number of major American cities purports to change this situation. This process has entailed an outsourcing on the part of city governments, resulting in that private, usually advertisement, companies are now in charge of designing and maintaining these facilities, mostly along with a range of other street furniture. Ironically, in order for the public to have regained general access to public toilets, they needed to undergo a process of privatization.

The APT as a Public/Private Space

"Privately owned public space is law's oxymoronic invention." (Keydan 2000: 21)

What is a public space? Its definitions – along with the underlying distinction between private and public – have been the subject of ongoing debate. Some have focused on the dividing line between the market and the state as constituting the private and the public realms, respectively. Others have identified three

---

[2] *See generally* Plumbing Code of New York State § 1100 (2007). The Building Code of New York State makes even more minute distinctions. In Chapter 11, which regulates "accessibility," the code distinguishes between public, common, restricted, service, and several other types of spatial categories. *See generally* Building Code of New York State § 1100 (2007).

separate realms – the private sphere, the civic or public sphere, and the state (Sheller & Urri 2003). Yet others, such as certain feminists (see, for example, McKinnon 1989) and Critical Legal Studies scholars (see for example Kennedy 1982), have been concerned with the power inherent in the distinction between private and public and have suggested, accordingly, to dispense with this distinction altogether. Legal scholar Jerry Frug suggests that a public space is an area that is open to anyone who decides to enter it. "They are spaces that provide people with the experience of being members of… a group that they have to learn to get along with whether they like it or not" (Frug 2006: 205). Clearly, the public/private divide is not only cultural and spatial, but also historical (Horwitz 1982; Lofland 1998).

The process of interest here is the encroachment of what is traditionally seen as the private onto the public sphere, as commonly perceived. Much writing has been devoted to the recent practices of outsourcing conducted by the state in various locations, for example at borders (Braverman 2010b). Much has also been written from this perspective about the city's public spaces (see for example Frug 2006; Keydan 2000). In her book "The Public Realm," Lyn Lofland describes what she defines as "counterlocales:" spaces in which both entry and behavior are monitored and controlled so as to reduce the possibility for discomforting, annoying, or threatening interactions. Counterlocales, she says, are purified or sanitized locales (Lofland 1998: 209). One mechanism for sanitizing public spaces, she continues, is their "shadow privatization." This article is concerned with the process of sanitation that occurs through the fusion of the private/public in public toilets and their shadow privatization.

Indeed, the distinction between private and public is yet more complicated in the space of the washroom. Architecture scholar Alexander Kira suggests in this context that the term "publicness" depends on several factors: the degree of "strangeness of other users from oneself," the extent of usage of a certain facility, and the facility's level of cleanliness (Kira 1976: 201). He further suggests that "publicness" moves along a continuum: from one's private bathroom to one's hotel room, to the washroom in the golf club or the gym, and finally to the "truly" public facilities where "goodness knows who may have used or touched something before us." The more spotless the facility, Kira contends, the less overt and tangible evidence there is to remind us that it is indeed a public facility and that we are not in our own privately protected space.

Similarly, Kira illustrates certain behavioral patterns that emerge only in the more public washroom categories, resulting from what Erving Goffman describes elsewhere as "civil inattention," namely the avoidance behavior practiced by strangers when interacting in the same physical setting (Goffman 1971). For example, a man will almost invariably use a vacant urinal that is not adjacent to the one currently in use. "A violation of this pattern," Kira argues, "is at once suspect and cause for concern, aggression, or whatever" (Kira 1976: 204; see also Rice and Overman 2006). Other physical designs are also distinctive to the public washroom setting. The partial partitions constructed between the stalls in American toilets – about twelve inches above the ground – are a good example for the distinctiveness of the public washroom in comparison with that of the private washroom (Kira 1976). While marketing brochures and architectural manuals explain this partition as resulting from the need for optimal ventilation, one need only consider their personal experience to realize the encroachment on privacy as well as the opportunities for surveillance achieved through this architectural design.

APTs are an excellent example of the fusion of public and private in urban space: what could be a public amenity infused with reasonable expectations of privacy is increasingly turning into a privately managed space. In this sense, the APTs are examples of the shadow privatization that Lofland discusses, or of pseudo-public spaces, in Mike Davis' terms (Davis 1992).

Ed Janoff, Senior Project Manager of Public Spaces at the NYC Department of Transportation (herein DOT), says that public space is a space "that is not enclosed and is meant to be traversed and enjoyed." "It could be a place as small as a sandbox," he continues, "or as large as Disneyland, which is the largest

public space in the world" (interview). Defining Disneyland as a public space already marks a clear departure from Frug's definition of this space, among many others. Indeed, Disney's environments have been analyzed and critiqued by many scholars, not only because they are tightly controlled and highly sanitized, but also because they are sufficiently entertaining and engaging so that their users either do not notice, or do not care, about the degree to which they are being controlled (Sorkin 1992; Shearing and Stenning 1997; Zukin 1991). In these various Disneylands, privatization and consumerism are tightly connected, inviting a type of surveillance that is marketed to the public as intended for its own good.

The DOT, Janoff continues, has recently moved away from seeing itself solely as a manager of traffic volume and has in addition taken on the role of "a custodian of the public realm." In this capacity, the department's job "is to create more public spaces in the city and make them well managed and vibrant and encourage people to walk, if walking is a choice, and to enjoy the public realm." Currently, Janoff argues, the street "is too crowded, there's no place to stop, there's no way to enjoy [it] because it's too busy and in many cases dangerous." When I ask why this would be of concern to city government, he replies that public space is vital. "On the one hand it's good for city dwellers in general to spend more time outside, interacting, having more social connections. It also makes the public realm safer by virtue of the fact that there are more people there."

Indeed, making "successful" public spaces is now the name of the game in NYC, which has recently come out with a new Public Space Manual (New York City Department of Transportation 2009). Revitalizing public space is also fashionable in Toronto, which has enacted a new set of bylaws entitled "Vibrant Streets" in October 2009 (Letto, interview). Under the new policy guidelines, Toronto's streets, which "often feel disorganized and cluttered and appear neglected" will turn into "well proportioned and designed outdoor rooms… places for people to gather, meet, stroll, sit in cafés and window-shop. They are the locations where connections are made between residents and visitors" (Toronto 2006).

But how does one revitalize urban public spaces? Janoff suggests that for a public space to be successful – or, in his definition, frequented by the largest number of people over a certain time frame (see also Whyte 1984) – it must be clean, safe, and, most importantly, hospitable. The user should be approached as a customer, he stresses. Public spaces should therefore be designed with attention to the highest level of detail and consumer-oriented.

This is where toilets reenter the picture. According to Janoff, "for a public space to cross the line from merely enjoyable to really successful and densely populated … you need to have a public restroom." But restrooms, according to Janoff, are high maintenance facilities. In his words,

> "Public [washroom] spaces are very finicky and they take a lot of careful onsite management. It's very difficult for government to provide that kind of…you know, government is so broad and you're looking at entire municipalities. Government is not going to be concerned with whether the restroom smells like lavender" (Janoff, 2009).

Laport's description of the privatization of waste as a shift to an individual management within the private domain of the home is hereby extended to include the management of waste in public spaces that are under government responsibility. While even in these few public spaces the government washes its hands (pun intended) of the dirty involvement with excreta, it is nonetheless involved in setting higher standards of sanitation in comparison to its relatively "hands off" involvement with the private realm. In this sense, APTs are a fusion of private and public – their design being a product of both governmental concerns and private, consumer-driven interests. It is in this light that one should explore the standards and regulations enacted in these spaces.

Along these lines, Janoff further states that the enhanced level of attention to details in the management of

public spaces on the streets of densely populated American cities requires at least a partial privatization of public space through private/public partnerships. In fact, he adds, he is currently designing a concession agreement for the operation of revenue-raising sites in public rights-of-ways. This, he states, would enable the city to do in right-of-ways what it has been doing for years in other public spaces (such as parks) through a model of business improvement districts (BIDs) (for a critique of this model see, for example, Frug 2006; Lofland 1998).

At the end of the day then, city officials such as Janoff explain the move to private-public partnerships as necessary for the success of public city spaces. "Public spaces are not successful unless there is attention to detail and level of maintenance that the government is not capable of," Janoff summarizes. In the case of public washrooms in NYC and Toronto, there is already in place a legal model that enables their privatization: that established through the city's cooperation with advertisement companies.[3]

APTs as Commercial Boards

Figure 2: **APT with advertisement in Madison Square, NYC. Photo by author, July 16, 2009**

According to an article in the online newspaper *Slate*, Los Angeles' APTs cost $300,000 apiece and Seattle installed five APTs at a total cost of $6.6 million (Saletan 2008). In other cities, such as New York and Toronto, the APTs do not cost the city a dime, as they are installed and are managed by advertising companies. Indeed, as part of their large outsourcing bids on street furniture, some cities have required that advertising companies both install and maintain public washrooms along with their construction of other large street furniture fixtures such as bus shelters and newspaper stands.

According to Brooke McKenna, Assistant Commissioner of the Coordinated Street Furniture Franchise in NYC's DOT, the city's ability to privatize public space is highly restricted and regulated: "The only way we can license someone to do private business on our public property is through franchises." "This, basically, is when you grant a private company a right to use public land for private gain," she explains. In exchange for installing and maintaining bus shelters, newspaper stands, and toilets, Cemusa, the advertising company that recently won the bid over street furniture advertisement in NYC, is legally

---

[3] Janoff opposed an adoption of the franchise model (see explanation in main text below) for this operation because of the cumbersome procedure it requires, as detailed in Section 14 of NYC's Charter.

permitted to sell the advertising performed on these features (McKenna, interview).[4] "Bus shelters always had advertising," McKenna elaborates, "but news stands never did, so that is brand new and it was fairly controversial." As for public toilets, "there is a long history of a great desire for, and a lot of opposition to, public toilets in NYC," McKenna says. But "New York wants to be a world-class city and there are cities all over the world that have so many public toilets and people really wanted it. [So] it seemed like an amenity we should have." Yet, "easier said than done," laments McKenna.

Of the twenty APTs that NYC plans to install in the course of twenty years, two have already been constructed: Madison Square and Queens. All other locations are up for grabs. But many residents have opposed the installation of APTs in their neighborhoods, McKenna tells me. And, in contrast to bus shelters and newspaper stands, she continues,

> "We really want communities to want the APTs. This because it's such a controversial item and so many people have been so averse to it… Some, because they feel that their sidewalks are already too cluttered… Others say 'we don't need it,' which I think… many times means [that people] in this neighborhood can go home and use their toilet and we don't really want to offer this for anyone else [outside the neighborhood]. Then there is the safety [issue]: *people are afraid that it will attract a bad element*" (interview; emphasis added).

Similarly, in Toronto the placement of APTs "is a whole political game of checkers. Everyone has to be consulted, everyone has to put their requests in and then they have to be evaluated", says Kim Letto, Construction Project Manager at Astral Media (interview).[5] The high level of sensitivity around the placement of public toilets and the extended negotiations that have been taking place over each and every one of these facilities highlights the strong connections, at least those that exist in the mind of both government officials and local residents, between sanitary management and the control of unruly persons. It is precisely the fear of having a public facility that is all-inclusive that many residents seem to have a problem with. Jane Jacobs' asserted connection between safety and "eyes on the streets" (1992: 35; also see below) is thus questioned in this context, and interpreted as depending on the identity of the beholders. In line with such concerns, the city has been requiring the private manufacturers to design toilets in ways that eliminate options for deviant uses (more on this below).

Apart from the controversy over the reintroduction of toilets into NYC's streets and their appropriate placement, debates have also ensued about the use of street furniture for private advertisement. "There's always push back to advertising on public property," says McKenna. "We have a long history of putting advertising on bus shelters. So by incorporating news stands [and toilets] into the same program, it's just an extension of what we've been doing. So it really starts to make a lot more sense to people and it doesn't seem like such an unprecedented thing to sell the advertising space on newsstands [and toilets]." McKenna further explains the city's logic: the city, she says, provides the public with an amenity in exchange for advertising on a public space. The most direct way for advertising, she says, is having the advertising at the exact same location of the amenity provided (see, for example, figure 2). "Once you give someone a billboard somewhere else, which is what a lot of other cities do, you lose that direct connection that, yes, we are getting a public good in exchange for access to advertising."

This goes to demonstrate both the sensitivity and uniqueness of public spaces and the various interests that

---

[4] But 22.5 percent of the advertising must go to the city, in addition to a 2-billion dollar payment over 20 years.

[5] A similar problem has been identified in San Francisco, where APTs are considered a success. "Everyone thought the toilet is a great idea, but put it in someone else's front yard," says Jake Szeto, Project Manager of the Automatic Public Toilet and Public Kiosk Program at the San Francisco Department of Public Works. See at http://www.gothamgazette.com/iotw/bathrooms/ (last viewed July 28, 2009).

underlie the design of street furniture. Importantly, the main objective of the private companies discussed here is not so much the promotion of public sanitation but rather the existence of a physical structure as a board upon which they can advertise. More than anything, these APTs are a bitter pill that these companies must swallow if they want to win the much larger fish: a monopoly on furniture advertisement throughout the city for extended periods of time.

Recently, the City of Toronto signed a contract with Astral Media for the design, manufacturing, installation, and maintenance of some 25,600 pieces of street furniture over the course of the next 20 years. The city has limited the advertisement displayed on street furniture, says Kypros Perikleous, Manager of City Furniture for the City of Toronto, to 3700 bus shelters and 120 information pillars (interview). Consequently, the ads are restricted to one per street corner. "I think the restrictions are a little too tight," says Kim Letto, adding "I hope that within a few years we will get past that" (interview).

As part of the replacement of all street furniture on Toronto's streets, the city also decided to install 14 APTs. The first APT was installed near the waterfront and the Gardiner Expressway in May of 2010. Letto tells me that when visiting the city's APTs, users will be exposed to Astral Media's radio channels that will be playing commercials as well as instructions on how to use the washroom; all this through audio microphones. The design of this space, then, is a product of continuing negotiations between the city's interest in enhanced sanitary surveillance and the company's interests in marketing its clients' products. Perikleous qualifies that

> "We don't look at this process as privatization. We are still solely in control of all the advertising rights, which means that Astral cannot place any ad that we disagree with. We also monitor the level of up-keeping, and get the $1 charge for the use of the public washroom. Finally, once the contract ends, we get to keep all the street furniture."

The allocation of responsibility negotiated between Toronto and Astral make this a happy marriage: Astral gets much leeway in advertising, while the city controls the sanitary dimensions of this space. Both share a common interest: that the facilities continue to operate with minimal problems.

APTs for Safe Streets

In her interview, McKenna ties the reintroduction of public toilets on NYC's streets to the work of homeless advocacy groups. These groups, especially in the 1990s, have fought long legal battles for the installation of public toilets on city streets. Indeed, in 1993 – a few years after a group of homeless people brought a class-action lawsuit against NYC – the city won an exemption to the state law that outlaws pay toilets (Webber 2001). "The fact that I can't find anyplace to relieve myself in New York causes me lots of problems and pain," testified one homeless man. "I have never been able to find bathrooms in the subways. They are always locked and unavailable. The bathrooms in the parks are in terrible condition and dangerous."[6] "When you gotta go you gotta go," agrees Luis Henriques of Cemusa, the company that won the bid to install and maintain APTs in NYC, "and, unfortunately, businesses don't want you using their restroom unless you're a customer" (interview; see also Duneier et al. 1999). The APTs are viewed, then, as a move toward the democratization of the streets, in the sense of making them more accessible and thus more frequented, successful, and – perhaps most importantly – safer.

Indeed, the reintroduction of public toilets into major American urban streets has been portrayed by the relevant cities as strongly tied to Jane Jacobs' notion of "eyes on the street" (Jacobs 1992: 35). "If you're outside in the public realm and you're offering a space that's enclosed, [i.e.] not visible to police controls or to the general 'eyes on the street,' there's going to be negative uses," says Janoff in our interview. "If one is going to feel safe, it is because many eyes are watching," he adds. At the same time, "you cannot

---

[6] See http://www.gothamgazette.com/iotw/bathrooms/ (last viewed August 28, 2010).

have vibrant streets without public toilets," he stresses. Physically at least, the project of making streets more visibly accessible to public eyes – and hence more pluralistic and democratic – stands in contrast with the necessary enclosure that the APTs must provide from public eyes. This tension between public and private space, I claim here, is what has brought about the intensified management of street toilets, mainly through the privatization of their design and management and the automation of their fixtures.

On the face of things, APTs are accessible to any adult member of the public. They are also ADA-compliant and egalitarian. "You pop in a quarter, the door will open. You go in, you have fifteen minutes," explains McKenna to demonstrate how easy and all-inclusive these toilets are (interview). Despite their apparent simplicity, in some instances the APTs have been deemed a total failure for being too complicated. Additionally, a local Seattle business group says about APTs that "they are literally havens for drug deals and prostitution" (Marshall 2007). Consequently, Seattle has recently decided to eliminate them from its streets, and paid large compensation monies to the advertising group for this early termination of the contract (Maag 2008). What went wrong? Robert Caffey of Hering International, the company that manufactured and installed the toilets in Seattle, says that the main problem was their particular location (interview). Similarly, both Letto and Lacas of Astral Media suggest that Seattle's APTs were situated in "bad spots" with high levels of drugs and prostitution (interviews). Toronto's Manager of City Furniture, Kypros Perikleous, adds another possible reason for the failure of APTs in Seattle. He believes that the central problem was that the city was in charge of maintaining these washrooms, rather than a private company; the city, he says – much in line with Janoff's earlier comments – does not have the time or expertise to provide that kind of public service.

The various persons interviewed for this study have devoted much effort into designing APTs that could only be used in the "proper" manner – namely, ones that will not become havens for criminals. First, all interviewees have stated that the APTs' maintenance in general, and the elimination of any graffiti in particular, are crucial to its successful operation. Quite influenced by the Broken Windows theory (Kelling and Wilson 1982) as well as by William Whyte's urban planning approach (1988), Janoff suggests that

> "You really have to stay on top of that… Any graffiti in a public restroom is a big sign to people that there is disorder in that restroom and that maybe they should be careful and not use it again. So graffiti needs to be treated immediately. The same would go for a badly broken, badly soiled facility. That has such a negative impression on someone's experience that they might not come back to your restroom and they might not come back to your public space. Odor is another important one… Females are more attuned to threats in the public space. [So] if your percentage of female users in a public space is down below 10 percent you're probably in a dangerous public space" (interview).

Robert Caffey of Hering International also highlights the problem of vandalism in APTs, especially by graffiti, but states that his company has figured out a technological solution to this problem. He calls it "vandal-proof" design. In his words,

> "It's everywhere. People want to get in somewhere and vandalize something. [But] these [washrooms] are pretty much vandal proof. The doors are stainless steel and you really can't do much on it…. You put a chemical on it and it just comes right off" (interview).

A more complicated problem that cities have been confronting in the context of APTs is what they have reasoned as the undesirable use of this space by homeless people and other abnormal users. Janoff explains some of the complexities of this issue for the city:

> "Even if they [homeless people] might have *offensive odor* or if they themselves might be some kind of *a health risk to other people,* you can't prevent [anyone] from using public

spaces, they are entitled like everyone else. They may do something that is unseemly or even illegal like they might expose themselves in a restroom in order to clean themselves. You couldn't really do anything to prohibit them from being there until they've done that illegal activity. Once they've done it, in many cases, the deed is already done. Even then, it's hard to get enforcement. [We] could call the police, but if you call Midtown South Police and say there is a homeless person naked in our bathroom taking a crap on the floor, the police are not going to race down there with sirens to take care of it" (interview; my emphasis).

Homeless people, it is assumed here, are not just deviant but also dirty, thereby threatening the purity of public hygiene. At the same time, the city cannot explicitly deny them access to its facilities, as this would be considered discriminatory. Kim Letto of Astral Media raises similar concerns, telling me how nervous she is about the placement of Toronto's first APT. "It's sort of off the beaten path," she says, and "to be honest," she continues, "I've got many concerns because there's a lot of homeless that live [nearby]."

What, then, can the city do to exclude without overtly discriminating? In many European cities, a one-dollar entrance charge has been utilized to deter such use by "unsightly characters; you know, the kind of people you don't want to see," says Perikleous of the City of Toronto in an interview. "This is also why we decided on a 15-20 minute time constraint for the use of the APT," he adds. After that, internal sensors will detect that an unidentified body is present the washroom, prevent the door from closing, and alert the security company right away. This company works closely with the police to ensure the continuous operation of the public washroom, Perikleous further explains.

NYC's APTs also operate on a time-restricted basis, providing the user with a maximum of 15 minutes per each toilet visit. After that, the doors open and the APT becomes dysfunctional. The facility also becomes dysfunctional after the door is held open, says Cemusa's Operations Supervisor Donald Omler (interview). Because of this safety feature, as well as the emergency and service buttons, we have to send someone to handle the APT almost on a daily basis, he adds. These visits are performed in addition to the three daily routine service visits required to maintain APTs in NYC. Weight detectors have also been part of standard design of NYC's APTs. The minimum, says Luis Henriques, Chief of Operations at Cemusa, is 80 pounds: "so that a child doesn't wander in there and get locked in." The maximum is 520 pounds, because "we don't want to have a party going on inside. We don't want four or five people in there." Indeed, unlike the "old style" public toilet, APTs are designed to be used by individuals only, thus eliminating former practices of civil inattention – which were a routine part of the visit to these places – along with any possible encounter with the other's smell, noise, or image. Another design feature intended to "keep the toilets safe" is the frequent use of blue lighting in APT design. This simple technological feature prevents drug users from seeing their veins, explains Perikleous.

Hence, while in principle the doors of the APT are open to anyone from the public, they are in fact restricted *by design*. Their physical features render the intake of drugs, as well as sleeping, laundering, showering, and sexual activities, quite difficult to perform in this space, and, for that matter, so is changing a child's diaper, as there is no changing table in the facility. The inside of the APT is small and minimal, even bare. Furthermore, no signs are posted to warn users about illegal conduct in the APT. There is no need, as these toilets perform a 24-hour surveillance by the automated police that is built into their design. Whereas machines are typically perceived as unable to perform acts of human discretion and as technical and egalitarian by definition, APTs embody within their design a set of distributive justice principles that determine the precise ways in which they can be used. In other words, the technical and normative values embedded into the technological fixtures utilized in APTs prescribe specific patterns of use while restricting others. Such underlying rules of operation are non-trivial (Williams-Jones & Graham 2003).

Another aspect of APT design is its uniformity across different geographies. Basically, APTs are a transferrable box of fixed elements, with minor variations that can be adjusted according to specific city requirements.[7] Once highly varied in different places, toilet practices are therefore becoming increasingly uniform. A small number of private companies prescribe the APTs' similar design and operation around the world.

Sanitation through Automation

De-Humanizing the Toilet

Although automated features are not limited to APTs but are increasingly installed in other public washroom facilities and even in private bathrooms, the APT advances their use to a new extreme. Not only are the flushing, rinsing, and drying fixtures now automated, as is the case of many other public toilets, but so are the toilet's door operation and its cleaning devices. This section examines the prevalent use of buttons in APTs, as well as the two archetypical features of automated public washrooms: the automated flush and the sensor operated water/soap/heat dispensers. Finally, it explores some of the cultural assumptions embedded into the APT's automated operation.

Buttons

In New York City, Los Angeles, Paris or Frankfurt, one drops in a quarter and the door of the public washroom opens. McKenna of NYC's DOT provides a more detailed description of this time allocation and its consequences:

> "After twelve minutes an audio and flashing alarm gives you your three-minute warning and if you're still in there at fifteen, the door will open. So if you're done before that you hit the button, you come out. The door closes again. The occupied light is on while you're in there and then also after you come out the door closes and it goes through its self-cleaning cycle. So the occupied light is on during that time as well" (interview).

A somewhat different perspective on the toilet's automation is provided by a *New York Times* article that discusses the installation of an APT facility in Madison Square in NYC. The washroom, the article suggests, "calls to mind […] the sort of room one imagines adjoined the personal quarters of Capt. James T. Kirk on the Starship Enterprise. It is a 25-cent journey to the future" (Wilson 2008). The article then proceeds to describe one's experience upon entering this shiny facility:

> "There seem to be as many buttons as on Captain Kirk's bridge. Red buttons, blue buttons, yellow buttons, black and green buttons. The red ones near the door and toilet call the company for help in an emergency. The yellow calls for "assistance," presumably something less dire than an emergency, but nonetheless, a situation. Blue flushes. Black dispenses toilet paper. One will quickly familiarize oneself with that button, because the designers have deigned a little 16-inch strip the standard helping of paper. A word to the wise: There is a maximum of just three helpings. Another tip: Do not tarry. A grim yellow light turns on when there are just three minutes remaining, and after that, the door will open.

---

[7] "All Exeloo units are designed to fit within a container dimension so they are easy to ship and transport by road although they are over height and may need to be transported on a low truck or trailer and care should be taken with the route to ensure there are no low bridges or cables overhead… Exeloo toilet units come with the floor built in so no slab is required under the building. All that is required is a few small concrete foundations, which are poured a few days before the unit is delivered to site." See http://www.exeloo.com/Site/Frequently_Asked_Questions.ashx (last viewed July 28, 2009).

> "The sink is across the room. The big shocker here is the soap dispenser, which actually emits not a little squirt of soap, but a jet of warm water, with the soap already mixed in. Everything is motion-activated. No knobs anywhere. The warm-air hand dryer seems somewhat slow and weak, especially with that yellow light blinking by the door. Assuming one finishes before the 15 minutes are up, the big green button opens the door. The horns and sirens and chatter of the city return, jarringly."

Buttons and electronic sensors are the centerpiece of the APT (see, for example, figure 3). Once inside, they govern all operations, not only one's entry into the facility but also one's conduct within it. McKenna explains that there are four emergency buttons inside the APT. This is in addition to buttons for an extra flush, for service assistance, to open the door, and for extra servings (indeed, limited to three) of toilet paper. Sensors activate the water, the mixed soap and water, and the hand-dryer devices.

Figure 3: Buttons. APT in Madison Square, NYC. Photo by author, July 16, 2009

This new, fully automated, public washroom is the latest word in toilet design, and perhaps an early demonstration of what is soon to be the common experience in public washrooms worldwide. It depicts a future that is clean and automated, regulated and monitored. In this futuristic space, user discretion is limited to the decision whether or not to press a button. While this limited discretion by the human user is balanced out by the relatively high sophistication of the machine, both conceal the high level of human discretion that goes into the manufacturing and programming of these machines. Indeed, contrary to common perception, highly automated fixtures do not imply less human involvement but rather a very different location of this involvement: from the multiple and unknown lay users to the few and controlled expert designers. This results in what has been termed as "specialist" rather than "participant" interpretations (Knorr Cetina 1997: 8).

Heightened automation also results in the black-boxing of technologies (Akrick 1992) and, more generally, in the flattening, narrowing, and thinning out of the social, what has also been depicted as the "creolization" of the social (Knorr Cetina 1997: 6). The recent proliferation of concepts such as technological society (see, for example, Berger et al. 1974), information society (see, for example,

Lyotard 1984), and risk or experimental society (Beck 1992) attempt to embody this understanding (Knorr Cetina 1997: 7).

Yet the machine, it is important to remind ourselves, is also a heterogeneous network – a set of roles played not only by technical materials but also by such human components as operators, users, and repair-persons (Law 1992: 4). Rather than alienating, or even erasing, the human/nonhuman relationship, the machine offers a shift in the type of relationship practiced. This has also been referred to as "object-centered sociality" (Knorr Cetina 1997: 9). It is from this perspective that the next two subsections explore the properties of the automated flush and the hand washing and hand drying devices.

The Automated Flush
A marketing brochure for washroom facilities produced by Sloan Valve Company – a manufacturer of plumbing products and systems and self-declared "world's leading manufacturer of water-efficient solutions" for washrooms[8] – states that "we've seen a nominal 35 percent increase in electronic systems in the last decades" (Fultz 2003). "A lot of people think it's 'magical mystery' electronic stuff," says Sloan's Director of Programmed Water Technology in the brochure, "but really, it's a natural metamorphosis of the electronic faucets and infrared sensors that are out there now." "It was a natural move forward," he further concludes.

One of the social constructions implied by no-touch fixtures is the avoidance of the bodily odor of others. Such a move away from olfactory senses (and toward vision) was depicted by Freud as a major characteristic of modern civilization (Freud 1961: 51-2). This might be the progression that Sloan's executive is talking about: a move toward mechanisms that enable maximum avoidance of physical contact with other bodies and their smells. Nonetheless, the use of the term "natural" in the context of a shift to electronic devices is quite intriguing: what could be natural about automated washroom fixtures? As the next section illustrates, however natural automated fixtures might seem to engineers, they are all but natural and can even seem alienating to lay users.

Alongside this so-called natural progression of no touch systems, a central computerized water usage system named "programmed technology plumbing" is becoming increasingly common in prisons, and is quickly catching on in schools as well. "The programmed system gives the prison guards the ability to manage the use of the plumbing system," says Sloan's Director of Programmed Water Technology, explaining that

> "It controls when, where, and how long prisoners get to use water and toilets. For instance, during a[n] inspection they don't want prisoners flushing contraband down the toilet; so they can shut down all the plumbing. Prison plumbing can also be set with timed lockouts where you can flush a toilet once every 5 minutes, once every half hour, once every three hours, and so forth" (Fultz 2003).

Whereas the control of toilet use sounds like a minor event in the broader and much more controlling context of prison surveillance, it nonetheless serves to highlight where APTs are heading more generally. Unlike the flushometer, which embodies a gaze that is only present in the space of the washroom itself, the central computer manages the washroom from a central location located elsewhere. Hence, the flushing device is not only programmed initially by the manufacturer but through continuous programming and reprogramming. Latour's "center of calculation" – namely, the location where the accumulation, synthesis, and analysis of observations yields greater understandings (Latour 1987: 215-257) – may serve as a helpful terminology in this context. The shift toward centralized sanitation in prisons and schools may be the first stage in a process intended toward enhanced calculation and

---

[8] See http://www.sloanvalve.com/About_Us.aspx (last viewed March 31, 2010).

observation of sites that are, or at least appear to be, far removed from the prison facility.

In "*Writing Restroom Specifications?*" Peter Jahrling, Director of Design Engineering for Sloan, considers "traffic, conservation, and hygiene" as major criteria in the design of washroom fixtures. All three criteria seem obvious and straight-forward, and make automated features more desirable, according to the company's marketing line, at least for "heavy trafficked" washroom sites (Jahrling 2004). In Jahrling's account, hygiene and efficiency are the name of the game. His assumption is that a more automated washroom is also a more hygienic one.

Apart from their acclaimed hygienic qualities, other reasons also underlie the choice of automated rather than manual devices. Jahrling explains these in the context of flushing technologies:

> "Higher-end washroom installations must accommodate (and withstand abuse by) many users, so specifying vandal-resistant, electronic flushometers is the most effective solution. For restrooms handling lighter traffic, manual [flush systems] provide the same level of performance as their electronic cousins, but require hand-activation, thereby increasing chances for abuse, non-flushing, and uncleanliness" (ibid.).

This account associates human discretion with both unsanitary behavior and abusive conduct, all now to be policed by the automated flush system. Indeed, the automated flush transforms flushing from a discretionary act, a practice of human agency, into a mandatory event prescribed by nonhuman devices (see, for example, figure 4; see also Braverman 2010a). Accordingly, in both Toronto's and NYC's APTs, users cannot prevent the automated flushing from happening. If they refrain from pressing the electronic flush button, the machine will flush automatically upon their exiting the facility (Lacas, interview).

Figure 4: Sign in Madison Square's APT. Photo by author, July 16, 2009

The Automated Faucet and Hand Dryer
Identified as the number one solution for preventing the spread of infectious disease, hand washing is an especially monitored washroom activity. As with automated flush systems, every aspect in the operation of the water faucet is programmed, controlled, and examined (see for example figure 5; see also Braverman 2010a). Delta, a large manufacturer of faucet devices, indicates on its website that "[e]lectronic faucets provide the convenience of hands-free on/off activation and help to conserve water. Electronic faucets are easy-to-use and come in a wide range of styles" (Delta Faucet Company n.d.). An automated water sensor prescribes the time and fashion of the hand-washing operation; a "fifteen second" rule is commonly enacted and enforced by the device. The Supervising Public Health Sanitarian of Erie

County's Department of Health explains that "fifteen seconds is the legal time for washing your hands well" (interview). In APTs, the user is granted a 30-second water serving, and can obtain an additional two servings. After that, the water stops running.

Figure 5: Sink. Madison Square's APT. Photo by author, July 17, 2009

While this system is intended to promote good hand-washing conduct, preserve water, and prevent an accident from happening (Sloan's Field Service Engineer, interview), it does not accommodate any exceptions or variations. Similar to the general operation of buttons, only two opposite options exist: wash or no wash. Gone are the days when the user could control the volume of water, its heat, or its running time. In this sense, the automated system may also have a counterproductive effect: it can foster resentment toward, and sometimes even avoidance of, the faucet (and its acclaimed hygienic benefits) altogether. At the very least, the automated faucet disciplines the user to fast washing. This sort of mechanical operation amounts to what Foucault calls the "micro-penality" of time, of activity, and of the body (Foucault, 1977: 177). Any lateness or interruption, inactivity or incorrect gesture, confuses the system, triggering an undesired result (here, of the water stopping to run).

Additionally, the promise by faucet manufacturers of egalitarian efficiency may be slightly exaggerated. While the faucet may make the washroom experience easier for children, disabled people, and the elderly (Braverman 2010a), its automated and unitary mode of operation also excludes a range of people, especially those who are slower or unsophisticated. In other words, while its primary rationale is the enforcement of an egalitarian and utilitarian code of conduct, the automated faucet distinguishes and creates exclusions, making the experience of the public washroom yet more alienating and challenging, at least for certain people. Moreover, as the example of the central computer system in prisons and schools demonstrates, the enforcement of this egalitarian code is applied more stringently to a populous that is conceived as potentially deviant and thus in need of extra governance. Matthew Crawford calls the process whereby increasingly sophisticated machines take over our natural tendency for self-sufficiency and handiness, "infantilization." Indeed, at the APTs, we are all children and are thus in need of extra control. In Crawford's words,

> "Consider the angry feeling that bubbles up in this person when, in a public bathroom, he finds himself waving his hands under the faucet, trying to elicit a few seconds of water from it in a futile rain dance of guessed-at mudras. This man would like to know: Why should there not be a *handle*? Instead he is asked to supplicate invisible powers. It's true, some people fail to turn off a manual faucet. With its blanket presumption of irresponsibility, the infrared faucet doesn't merely respond to this fact, it *installs* it, giving

it the status of normalcy. There is a kind of infantilization at work, and it offends the spirited personality" (Crawford 2009).

For the most part, automated features are restricted to the public washroom; they have even come to symbolize this space. Yet, more and more, these features are also creeping into the private household. According to architecture scholar and bathroom designer Alexander Kira, whereas the public washroom attempts to disguise itself as private, the opposite does not stand true: the private bathroom typically avoids any reference to the public. For example, people are reluctant to install urinals or male seats (those with a little opening in the front) in a private washroom. By producing an image of an efficient hygiene removed from bodily matters, automated washroom devices have shuffled the strict division between private and public in the washroom context. Automated toiletries are becoming increasingly fashionable in the private realm as well. In this vein, Delta, the American manufacturer of faucets mentioned earlier, promotes e-Flow™, "the first hands-free electronic faucet designed specifically for residential use." Delta's marketing information suggests that "Hands free, electronic faucets aren't just for commercial restrooms anymore! And Delta has an excellent selection of these wonderful faucets for home installation."[9]

Besides the control of water flow through automated sensors, as in the example of Delta's infrared faucets, nonhuman machines also control hand drying in public washrooms. When considering which hand-drying fixture to install in this space, both sanitary and economic concerns come into play, as exemplified by Jahrling's description of successful hand dryers:

> "Drying hands completely is essential to good hygiene, and like electronic faucets, sensor-operated hand dryers encourage use while doing away with activation buttons where bacteria can collect. Automatic hand dryers are also a good source of savings in terms of operational cost versus the cost of paper towels and labor for maintaining restrooms" (Jahrling 2004).

To fulfill the aims of both bacteria-reduced and efficient washrooms, it must be ensured that the user indeed uses the proper technology rather than resorting to the familiarity of paper towels. Accordingly, hand towels are often eliminated from this space altogether. As a result, users usually adopt the practice inscribed in the washroom's design: drying their hands with the loud and time-consuming auto-hand dryers. Others, however, may take this as a challenge, not drying their hands at all, coming out with wet hands, drying their hands on their clothes, or – probably the most extreme act of resistance in this context – using the toilet paper placed in stalls. But, I am stepping ahead of myself: the type of reactions to the washroom's auto fixtures is the central topic in the section on human/nonhuman management of APTs discussed below.

Egalitarian Enforcement
In his interview, Sloan Valve's Field Service Engineer notes that toilet practices are highly culture-dependent and that the design of automated washrooms involves "a whole educational piece" that mandates "orient[ing] the different cultures as to how to use your facilities." A similar attempt for public education also takes place in Toronto's APTs. Kim Letto of Astral – the media company that has won the bid to install and maintain Toronto's street furniture for the next 20 years – describes an audio recording device installed in each of the city's APTs; this device informs the user how the facility is to be used and describes what will come next. In a different setting, a temporary sign was installed in NYC's first APT to explain that the user cannot enter the facility immediately upon inserting the coin but must wait for the completion of the 90-second cleaning cycle. "Many users who are not familiar with the APTs' operations get very frustrated when they can't open the door," explains Luis Henriques of Cemusa, (interview).

---

[9] See http://www.plumbingsupply.com/delta_handsfree_faucets.html (last viewed December 18, 2008).

While all other signs placed in and around the APT are in English and Braille lettering, this sign is also in Spanish, deviating from the uniform sign system and implying the different cultural assumptions that underlie the use of public washrooms.

Indeed, some social groups are more comfortable than others with the automated features of the new public toilets. Sloan Valve's Field Service Engineer mentions that "for some reason, women are not that fond of the automated flush system." Another cultural anecdote relayed by the Field Service Engineer is with respect to Asian people, who "unlike us Westerners, like to squat on the toilet seat."[10] "We knew there was an issue when we started to find broken toilet seats hanging in our washroom facilities," he says, asking "how to cope with such cultural discrepancies?" The designers of the new APTs have found a creative solution: the abolition of toilet seats altogether. In their place, one may sit on top of the toilet bowl, in which case a sanitary paper towel is available to be placed on the wet (but clean) seat.

The history of APTs in New York is full of claims of social group discriminations. New York State outlawed pay toilets in 1975 in response to the charge that such facilities discriminated against women. Women always need a stall, while men could make do without, opponents argued. As mentioned earlier, the city won an exemption to the state law in 1993, a few years after a group of homeless people brought a class-action lawsuit. NYC then proceeded with plans for automatic toilets, starting with a pilot program of six. The toilets were well received in some quarters. But again, they were held up amid accusations of discrimination; this time, the victims were said to be the disabled. The plan to install a few handicap-accessible toilets among others that were not accessible violated the Americans with Disabilities Act, said the APT's opponents. Toilet manufacturers responded by shrinking the size of toilet bowls and eliminating other fixtures from the space of the public washrooms, thus making them handicap-accessible without introducing additional costs.

However, as mentioned earlier, opposition to APTs has not been limited to particular social groups; they have also been common among local communities. In Holliswood, Queens, for example, a group of residents successfully resisted the construction of a two-toilet comfort station in a local playground. They feared it would fall into disrepair and would attract child molesters, vagrants, and other undesirables. In May of 2000, another community board voted against a $350,000 "comfort station" for the Utopia playground in Fresh Meadows.

As shown, APTs have been at the center of extensive criticisms by various social groups and local communities. These focus either on the exclusionary nature of the APT's architectural design and on their particular locations or, rather, on the inclusive nature of their design. This paper presents a slightly different focus: it examines the automated fixtures of APTs and suggests that those enable a much less overt method of discrimination and exclusion.

---

[10] He then goes on to describe the "toilet clashes" during the Olympic events in China, explaining that: "they installed 500 public toilets, with instructions on the wall for non-Westerners about how to use them." The Olympics also led to a silent yet costly "toilet revolution" in Beijing. Providing education on proper use of toilets is an important task, says Ma Kangding, an official with the Beijing Municipal Utilities Administration Commission that oversees this "toilet revolution." According to Ma, Beijing dispatched 8,000 toilet maintenance staff, each responsible for a specific restroom to ensure frequent and thorough cleaning. "They also received training in hygiene standards and techniques, Olympic knowledge and practical English expressions," says Ma Kangding. The results of the selective inspections of these staff are conducted weekly, posted on an official municipal website, and directly affects their salary. See http://en.ce.cn/National/Local/200806/21/t20080621_15910533.shtml (last viewed December 18, 2008).

Human vs. Nonhuman Management of Public Toilets

Humans "Kicking Back"

> "Auto-flush toilets, I despise you. I hate the way you begin flushing as soon as I stand up… Most of all, I hate the way you flush so violently that you spray little droplets of water of dubious cleanliness all over the stall, forcing me to press myself against the farthest corner, pants still around my ankles...

> "Motion-activated sinks, I loathe you. I don't like having to bend over and hold my hands in front of you like I'm making an offering at a Buddhist temple and want to make sure that everyone sees me lighting my incense. I hate how half of you are malfunctioning most of the time. I hate how it takes 30 seconds to get the water warm enough to really get your hands clean. I hate your stupid accompanying automated soap dispenser.

> "…I hate all parts of you, bathroom. I hate you so much" (I Hate You, Fully Automated Bathroom 2008).

How can one explain the heated emotions[11] triggered by automated washrooms? Underlying these strong emotional reactions, I would suggest, lies the anger of being controlled and monitored, especially in the relatively intimate setting of the public washroom. Quoting from the ancient philosopher Anaxagoras and from early Heidegger, Matthew Crawford more broadly suggests that humans take pride in handiness and self-reliance. In his words,

> "The problem of technology is… that we have come to live in a world that precisely does not elicit our instrumentality, the embodied kind that is original to us. We have too few occasions to do anything, because of a certain predetermination of things from afar" (Crawford 2009: 69).

By being disciplined toward passive consumption, Crawford continues, the modern personality is deprived of self-reliance. More concretely, and similar to Latour's anger at not having control over the moral choice of complying or breaking the mandatory seatbelt rule (Latour 1990:151-52), there is, in this case, the anger at being deprived of the moral choice of whether or not to be clean – specifically, of deciding whether to flush after every use, how to wash and dry one's hands, and how long to stay in the facility.

This also brings up questions of function and efficiency: are people more likely to wash their hands at automated sinks in comparison to manual ones? Do they forgo washing their hands if they see there are no paper towels? And what do they do at this point: do they leave with wet hands, use their jeans, or use some other form of resistance? In other words, are people so intent on behaving a certain way that they develop strategies to outwit the auto-sensors? Fairly common examples of such "work-arounds" would be people who use the sink for two cycles rather than just one or leave the sink before their time is up.

But other than these rare examples, are people more or less happy with automated washroom fixtures? After all, the pollution taboo produces a great deal of anxiety about physically encountering the dirt of the other, especially in the dirty context of the washroom. The design of the APT promises to avoid contact with any object that someone else has touched; thus, users on the whole may see automated fixtures as generally beneficial and preferable to existing washroom alternatives.

---

[11] Or amusement. See for example the reaction of an Australian visitor to an Exeloo APT facility at Surfers Paradise, Australia (The Exeloo automated public toilet experience at Surfers Paradise 2008).

In an interview, Jerome Barth, Director of Operations in NYC's Bryant Park Corporation (BPC) provides a partial answer to some of these questions. "What I say is only relevant to our limited experience," he warns in advance, before proceeding to discuss the problematic operation of the two automated public toilets that the BPC installed in NYC's Herald and Greeley Parks in 2001 (the first APTs in NYC). After seven years of cooperation, the BPC and the advertising company that supplied these particular APTs "had an amicable parting of ways," Barth says. At Bryant Park, on the other hand, the BPC operates manual public toilets: three stalls in the women's room and two stalls and three urinals in the men's.

According to Barth's statistics, the public washroom in Bryant Park serves between 600 and 700 thousand users per year (precisely 735,374 users in the year up to January 2008). Compare this to 500-600 users per week or 182,500 users a year for the APT in Madison Square (Olmer, interview). At the same time, the number of toilet users at Herald and Greeley Parks amounted to an average of 20,000 per year (in 2007 the total number of users was 13,944). According to Barth, the difference in the number of toilets (altogether seven seats/urinals in Bryant Park and only two of the automated kind) and in their location (Bryant Park accommodates many more visitors per year) cannot explain the stark difference in the number of users between these facilities. What, then, is the reason for this difference? "The biggest issue," says Barth, "is that the public just didn't enjoy the APTs and much preferred attendant toilets [i.e. the kind where a human janitor is on duty], such as that in Bryant Park." He lists several reasons for this dislike. First, he says,

> "People are just not accustomed to the automated toilets. Europeans may be more familiar with these fixtures. But many people here were puzzled. They just don't get it. They don't understand how to make the water work. They go in and they immediately go out. Why? I'm not sure, but I saw this behavior with my own eyes. I think they just hit the wrong button and find themselves having to exit the washroom and then pay again to reenter, which gets them all worked up" (interview).

Secondly, Barth continues, people prefer washrooms with attendants. "Beyond making sure that the place is clean throughout the day," he says, "the attendants send a strong message that someone is in control, that this place is safe. It allows you to let your guard down." Finally, Barth suggests that "the automated toilets are designed as *functional machines*, not to create an environment for *real people* to use. The only reason they are constructed in the first place is for advertising companies to win large bids for outside furniture." "We had tried them and it's very hard to keep them up, keep them clean, and we weren't finding the right level of maintenance," adds Lindsey Boylan, BPC's Operation Manager, in an interview. "We would have to do a great deal more and staff it even though it was supposed to be an automated public toilet," she adds. She says about the attendant toilets that "We really wanted something that would be an attraction for people and would bring them here. I mean, when they walk into the bathrooms they should say: 'is this a public toilet? It feels as though you're in a private space'" (see figure 6).

Sharon Edwards, Supervising Attendant at Bryant Park's public washroom, further explains the differences between automated and attendant managed washrooms. In her words, "an automated system isn't going to be able to respond to things that happen, especially in a very busy area" (interview). A public washroom cleaned by humans is much more likely to stay clean than an automated one, she adds, explaining that when she leaves the place, even for 15 minutes, "everything goes chaotic. Like you come in there is toilet paper on the floors, pads on the floor, stuff." "So," she concludes, "you gotta be there at all times." According to Edwards, human surveillance is both more comprehensive and more efficient than nonhuman surveillance; furthermore, it offers a more sanitary solution than its nonhuman alternative.

Figure 6: Public washroom in Bryant Park, NYC. Photos by author, July 17, 2009

Ed Janoff of the DOT had previously worked for the BPC, and in that capacity he oversaw the design of the attendant-managed public washrooms at Bryant Park. Janoff strongly believes that the BPC's unsuccessful experience with APTs at Herald and Greeley Parks is a direct result of the inability to prevent homeless people from using it:

> "As I understand it, it wasn't being used because people, homeless people, someone who clearly was in the restroom for other reasons, would stay there or we wouldn't be able to keep it at the level of maintenance that it needed to be unless we were actually just manning it… continuously" (interview).

Apparently, homeless and other "undesirable" users found ways around the technical features of the APTs' automated fixtures. The attendants have more control over such disorderly behavior, Janoff says, very much in line with Edwards' observations. He adds, "Sometimes some attendants would be familiar with certain homeless people that would come and bathe in the sinks. They could turn off the power to the sinks because they are sensor operated."

Edwards, who at the time of the interview has been working as attendant at the Bryant Park public washroom facilities for over three years, describes the rules and regulations that pertain to this space:

> "No shower, no smoking, no bathing, no laundering. Don't come with your [extra] clothes. Because they do. They do come to take a shower. When we can't do it anymore, we call security. If they can't take care of it, they call the police" (interview).

She continues to say on the issue of unruly behavior:

> "[A while ago,] this lady came in, took off all her clothes in the bathroom and started taking a shower. Nobody can get her out, even the police can't get her out because she is naked and she is big. She is like 400 or 500 pounds and she got everything out… We had to let her take a shower. Stop everybody, let her take her shower. When she finished taking her shower, then we let her go…
>
> "We have some homeless that stink so bad, the [police] don't want to touch them. They

> don't want nothing to do with them. They don't even want to take them away. I don't
> believe there is a human being that could smell like that but they exist. They got
> something on their foot and worms are crawling out [of] them so when they come in
> there, the smell that they leave behind you can't allow anybody to go in for a while. You
> gotta close it down, bleach it out, and then [you can] open it back."

This quote again highlights the central role of odor in the project of sanitary surveillance (Freud 1961; Laporte 2000). Here, it is not only the actual body that stinks and that is associated with unsanitary animals such as worms (and thus with death), but everything that this body has touched is similarly infected and thus must be "bleached out." Whereas in this exceptional case even the human attendant could not keep this particular invasive body away from the purity of her washroom, she is nonetheless positioned as someone who both managed this invasion and also ensured that, after the polluting event, everything returned to its properly sanitized place. The human based toilet model is thus portrayed as more flexible and as better apt in dealing with human deviance.

Automated Fixtures "Kicking-Back"

Alongside the various forms of human unease with and resistance to automated washroom facilities, there is also the issue of the washroom fixtures themselves "kicking-back" (Whatmore 2002). As probably anyone who has conducted herself even in the world of partially automated washrooms has observed, automated fixtures do not always perform the roles that engineers and other human actors have inscribed to them. Some electronic eyes do not "notice" our desperate hands reaching out for water, for example, or suddenly "decide" to constantly flush, rinse, or dry, with no way of stopping their operation.

Such uninscribed behavior by nonhumans has been depicted and characterized in the Actor Network Theory literature in many ways. Some have referred to this process as a "betrayal," namely, a situation where actors do not abide by the agreements arising from the enrollment of their representatives (Callon 1986; Aykac et al. 2009). Others have noted how scripts (and thus the particular technology) may be translated by other actors in ambiguous, uncertain ways not intended by the designers (Singleton & Michael 1993), resulting in a process of "de-scripting" (Akrich 1992) or "anti-programming" (Latour 1991). Yet others have indulged the term "drift" (Ciborra 2000), implying a situation in which a technology is used differently than intended by its designer. Common to all these accounts is the understanding that whereas the purpose of a given technology, from a design perspective, is embedded in an initial script, the script may not succeed, the technology may be used in unanticipated ways, or its implementation may give rise to a competing script that makes the technology a failure from a design standpoint (Williams-Jones & Graham 2003: 276).

As with similar human behavior, the question is whether nonhuman things behave this way on purpose, so to speak. Have they declared some sort of clandestine war on our washroom fetishes? Such recalcitrant behavior does not necessarily require agency on the part of nonhuman things. Rather, it is a component of their mechanized making, a property of their physical nature (Pollan 2001). Latour refers to this ability of nonhuman things to act, albeit without agency, as "actancy" (Latour 1992). While programmed by humans to act in certain ways, and in this instance to police other humans, things also take off in their own direction. Consequently, the human programming of nonhuman things so as to control other humans is not always successful and can trigger a series of unplanned, even counterproductive, effects. Whereas the assumption behind the operation of automated public washroom fixtures is that they are efficient and less likely to malfunction than the manual ones, various incidents point to the contrary. Numerous complaints about APTs focus on their malfunctions: automated doors that will not open or close, flushing devices that refuse to flush or to stop flushing, faucets that spit out water that is too hot, or sinks that overflow.

Anything that touches water, Sloan's Field Engineer explains in an interview, is susceptible to being clogged or eroded, depending on the water quality in the place, which is particularly questionable when

"they take water from the street, as in the case of most public facilities and old constructions." Finally, there are also numerous maintenance issues. "The infrared lens of the sensors is designed to be cleaned with soap and water only, not with heavy chemicals," Sloan's engineer says. These various failures, he summarizes, can cause "run on" toilets (toilets that constantly flush); "short flushing" toilets (toilets that do not provide sufficient amounts of water per flush); or toilets that do not run at all.

But rather than demonstrating the weakness of electronic control, the malfunctions of automated washroom fixtures actually make one acutely aware of their omnipotent power. Put differently, tactics of problematization – un-black-boxing, dis-enrolling, marginalization, extrication, ambivalence, and multiplication – also contribute in a fundamental way to the network's strength and longevity (Singleton & Michael 1993: 228). First and foremost, this power is a reflection of the human agency that has manufactured the technical object to store knowledge and that has programmed things to act in a certain way. Since such power is embodied within the materiality of the thing itself, it is easily taken for granted and rendered invisible. The materiality of things becomes painfully visible when they are suddenly unavailable or when they break down (Knorr Cetina 1997: 10; quoting from Heidegger). This is also the power of things to "run wild." In this sense, it is the nonhuman that takes control over and that governs the everyday conduct of humans. In the course of performing one of their most basic needs – the need "to go" – humans are made aware of, and required to constantly negotiate their relations with, nonhuman things.

Conclusion

The APT offers an excellent opportunity for the reintroduction of washroom control into the public space of the city and for the enforcement of sanitary morals in these semi-private spaces. But instead of placing a *human* policeman to make sure that the user comes in one at a time, does not misuse the facility, flushes after every use, and then rinses and dries her hands properly – which might constitute an illegal, immoral, and also impractical act in the context of the public washroom – a nonhuman thing is designed to do the dirty work. Automated flushing, rinsing, soaping, and drying devices – and recently also automated doors and automated self-washing – have become increasingly familiar components in the lay user's mundane experience of the public washroom. The APT takes these functions to an extreme.

This article has argued that spatially mandated public hygiene constitutes a morality in practice. Yet whereas this morality poses itself as egalitarian and inclusive and thus as a democratization of urban public spaces, it is in fact embedded with a series of value judgments that are strongly influenced by the underlying interests of city government and of the private companies that manage the APTs' operations. The decision of where to install the APTs, their anti-graffiti design, their restricted weight features and limited time allocation, and the particular division of space in this washroom – all intend to attract the desired user, while excluding undesired others.

Although blessed with the promise of heightened hygiene, the operations of nonhuman fixtures are often seen as an aggressive intrusion into mundane bodily practices, enacted in the most intimate of spaces, and, as such, they do not always resonate well with the general public. Some humans seem to resist such restrictions to their prior self-sufficiency and discretions in this space. Forms of resistance vary, including adaptations that most would consider benign and even necessary, such as those conducted by people with bowel problems and by parents with kids, on the one hand, along with other adaptations that would be more controversial, such as homeless people using the stalls to change clothes or bathe and drug users using them to set themselves up, on the other hand. Automated features create more problems for these "abnormal" users. Indeed, in their assumption of the "normal," programmed automatic fixtures undermine human inventiveness, adaptation, and otherness in general. This perspective brings to light some of the complexities and problems behind the utilitarian and egalitarian purposes in the name of which automated washroom technologies are marketed. Since the programming of nonhuman things is meant to accommodate the "normal" user, it is bound to exclude. This form of exclusion, while seemingly an error

in nonhuman programming, is in fact an essential and inevitable aspect of the APT's design, a way of programming humans to behave "normally" and in the public's best sanitary interests, even as they conduct themselves in the mundane space of the public washroom.

Mirroring the increasingly uniform spatial design of public washrooms, human conduct in this space has also, for the most part, become automated and uniform. Automated washroom fixtures thereby "induce a state of conscious and permanent visibility that assures the automatic functioning of power" (Foucault, 1977: 201). But rather than governance through a constant human gaze, here it is the increased self-consciousness by the human subject, who is being controlled and infantilized by the machine, that institutes the desired control.

Perhaps unsurprisingly, then, various forms of human resistance to these impositions have mushroomed here and there; acts of vandalism directed at automated fixtures or their routine avoidance, for example by holding the door open or by not cleaning or blow-drying one's hands after handling the toilet. Interestingly, nonhuman washroom fixtures sometimes align themselves with such human recalcitrance, perhaps also expressing their resentment toward the unartful repetition they have been programmed to perform. Both human and nonhuman resistances, the article has suggested, merely serve to reinforce the power of such automated technologies (see also Giddens 1984: 183-4; Bogard 1996: 17).

The article has also explored NYC's experiences with both automated and human managed public toilets. This context has offered a unique opportunity for a close study of the differences between human and nonhuman forms of sanitary surveillance. Apparently, human forms of sanitary surveillance are by far more familiar, and thus feel safer to users and are also more accepted and even abided with than their nonhuman counterparts. They provide for a more "hands on" and efficient form of sanitary surveillance. Despite this preference, the trend in North American cities is undoubtedly toward automation, an illustration of the immense power of privatization and automation and of the relatively limited voice of human users in this scheme.

To summarize, while the current installation of APTs in many North American cities is being carried out in the name of democratizing public space, they in fact promote a double form of sanitation: first through their privatization, which indirectly excludes some users, then through their heightened automation, which is yet again designed to exclude. Conveniently, in the automated public toilets it is machines that do the dirty work.

Acknowledgements

Interviews
Barth, Jerome, Director of Operations, Bryant Park Corporation, telephone interview, December 23, 2008.
Boylan, Lindsey, Operations Manager, Bryant Park Corporation, interview, New York City, July 16, 2009.
Caffey, Robert, Area Sales Manager, Hering International, interview, Toronto, June 13, 2009.
Chief Plumbing Inspector, Buffalo, New York, interview, Buffalo, April 11, 2008.
Field Service Engineer, Sloan Valve, interview, July 24, 2008.
Henriques, Luis, Chief of Operations, Cemusa NY LLC, interview, New York City, July 16, 2009.
Janoff, Ed, Senior Project Manager of Public Spaces, NYC Department of Transportation, interview, New York City, July 17, 2009.
Lacas, Robert, Senior Director, Operations, Astral Media Outdoor L.P., interview, Toronto, June 15, 2009.
Letto, Kim, Construction Project Manager, Astral Media Outdoor L.P., interview, Toronto, June 15, 2009.
McKenna, Brooke, Assistant Commissioner of the Coordinated Street Furniture Franchise for NYC Department of Transportation, interview, New York City, July16, 2009.
Olmer, Donald, Operations Supervisor, Cemusa NY LLC, interview, New York City, July 16, 2009.
Perikleous, Kypros, Manager of City Furniture, Toronto, telephone interview, July 24, 2009.
Sharon Edwards, Supervising Attendant at Bryant Park's public washroom, interview, New York City, July 18, 2009.

Supervising Public Health Sanitarian, Erie County Department of Health (anonymous), interview, Buffalo, April 16, 2008.

References

Akrich, Madeline. 1992. The de-scription of technical objects. In, *Shaping Technology/Building Society: Studies in Sociotechnical Change*, ed. Wiebe Bijker and John Law, 205–224. Cambridge: MIT Press.

Ashenburg, Katherine. 2007. *The Dirt on Clean: An Unsanitized History* (1st ed.). New York: North Point Press.

Aykac, D. Selcen, Ronan DeKervenoael,Nihat Kasap et al., An Actor-Network Theory (ANT) Approach: Analysis of Turkish E-Government Gateway Initiative (12 March 2009). International Conference on eGovernment & eGovernance (Ice-Gov), Ankara, Turkey, 12-13 March 2009. Available at SSRN: http://ssrn.com/abstract=1362598 [accessed 7 April 2010]

Beck, Ulrich. 1992. *Risk Society: Towards a New Modernity*. London: Sage.

Berger, Peter L., Berger, Brigitte, and Hensfried Kellner. 1974. *The Homeless Mind: Modernization and Consciousness*. New York: Vintage Books.

Bogard, William. 1996. *The Simulation of Surveillance: Hypercontrol in Telematic Societies*. Cambridge: Cambridge Cultural Social Studies.

Braverman, Irus. Forthcoming 2010a. "Potty Training: Nonhuman Inspection in the Public Washroom, In Toilet: Public Restrooms and the Politics of Sharing." eds. Harvey Molotch and Lauren Noren. New York: New York University Press.

Braverman, Irus. Forthcoming 2010b. Civilized Borders: A Study of Israel's New Crossing Administration. *Antipode*.

Braverman, Irus. 2009. Loo Law: Washrooms as a Hyper-Regulated Space. *Hastings Women's Law Journal*, 20(1), 45-72.

Callon, Michel. 1986. Some elements of a sociology of translation: domestication of the scallops and the fishermen of St. Brieuc Bay. In *Power, Action and Belief: A New Sociology of Knowledge?* Vol. 32: Sociological Review Monographs, ed. John Law, 196–233. London: Routledge & Keagan Paul.

Ciborra, Claudio et al. 2000. *From Control to Drift: The Dynamics of Corporate Information Infrastructures*. Oxford: Oxford University Press.

Corbin, Alain. 1988. *The Foul and the Fragrant: Odor and the French Social Imagination*, trans. Aubier Montaigne. Cambridge: Harvard University Press.

Crawford, Matthew. 2009. *Shop Class as SoulCraft: An Inquiry into the Value of Work*. London: Penguin Press.

Davis, Mike. 1992. *City of Quartz: Excavating the Future in Los Angeles.* New York: Vintage.

Delta Faucet Company. (n.d.). *Electronic Faucets*. http://www.deltafaucet.com/wps/portal/deltacom/BathFeatures/ElectronicFaucets. [accessed 22 July 2008]

Duneier, Mitchell. 1999. *Sidewalk.* New York: Farrar, Straus, and Giroux.

Exeloo Public Toilet in Bunbury. 30 June 2008. http://www.youtube.com/watch?v=jaeBRzojShQ&NR=1 [accessed 28 July 2009]

Foucault, Michel. 1977. *Discipline and Punish: The Birth of the Prison* (1st American Edition ed.). New York: Pantheon Books.

Freud, Sigmund. 1961. *Civilization and its Discontents.* New York: Norton.

Frug, Gerald. 2006. The Legal Technology of Exclusion in North America. In *The New Suburban History*, Kevin. M. Sugrue and Thomas. J. Kruse, 205-220. Chicago: University of Chicago Pess.

Fultz, John. "Get with the Program". *Reeves Journal*. 28 June 2003

George, Rose. "Send in the Latrines". *New York Times*. 19 May 2008 edition.

Gershenson, Olga, and Barbara Penner. 2009. *Ladies and Gents: Public Toilets and Gender.* Philadephia: Temple University Press.

Giddens, Anthony. 1984. *The Constitution of Society: Outline of the Theory of Structuration.* Cambridge: Polity.

Goffman, Erving. 1971. *Relations in Public: Microstudies of the Public Order.* New York: Basic Books.

Greed, Clara. 2003. *Inclusive Urban Design: Public Toilets.* Oxford: Architectural Press.

Horwitz, Morton J. 1982. The History of the Public/Private Distinction. *University of Pennsylvania Law Review*, 130(6), 1423-1428.

I Hate You, Fully Automated Bathroom. July 2008. http://www.craigslist.org/about/best/sea/199973342.html [accessed 29 July 2009]

Inglis, David. 2001. *A Sociological History of Excretory Experience: Defecatory Manners and Toiletry Technologies, Mellen Studies in Sociology, vol. 30.*. Lewiston, NY: Edwin Mellen Press.

Jacobs, Jane. 1992. *The Death and Life of Great American Cities.* New York: Vintage.

Jahrling, Peter. March 2004. Writing Restroom Specifications? Consider Traffic, Conservation, and Hygiene. *The Construction Specifier,* 57(3).

Joh, Elizabeth. 2007. Discretionless Policing: Technology and the Fourth Amendment. *California Law Review* 95(1), 199-234.

Katz v. United States, 389 U.S. 347 (1967).

Kelling, George, and James Q. Wilson. March 1982. Broken Windows. *The Atlantic Monthly*.

Kennedy, Duncan. 1982. The Stages of the Decline of the Public/Private Distinction. *University of Pennsylvania Law Review,* 30(6): 1349-1357.

Kayden, Jerold. 2000. *Privately Owned Public Space: The New York City Experience.* Oxford: Wiley.

Kira, Alexander. 1976. *The Bathroom.* New York: Viking Press.

Knorr Cetina, Karin. 1997. Sociality with Objects. Social Relations in Postsocial Knowledge Societies. *Theory, Culture & Society,* 14(4): 1–30.

Laporte, Dominique. 1978, 2000. *History of Shit*, trans. Nadia Benabid and Rodolphe el-Khoury. Cambridge: MIT Press.

Latour, Bruno. 1991. Technology Is Society Made Durable, in A Sociology of Monsters: Essays on Power, Technology and

Domination, ed. John Law. New York: Routledge & Kegan Paul.

Latour, Bruno. 1987. *Science in Action*: *How to Follow Scientists and Engineers through Society.* Cambridge: Harvard University Press.

Latour, Bruno. 1992. Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts. In *Shaping Technology/Building Society: Studies in Sociotechnical Change*, eds. Wiebe Bijker and John Law. Cambridge: MIT Press.

Lofland, L. 1998. *The Public Realm: Exploring the City's Quintessential Social Territory.* New York: Aldine De Gruyter.

Lyotard, Jean-François. 1984. *The Postmodern Condition*, trans. G. Bennington & B. Massumi. Manchester: Manchester University Press.

Maag, Christopher. "Seattle to Remove Automated Toilets". *New York Times*. 17 July 2008 edition.

MacKinnon, Catharine. 1989. *Toward a Feminist Theory of the State.* Cambridge: Harvard University Press.

Marshall, Lynn. "Many Say Toilets Have Got to Go". *Los Angeles Times* 9 September 2007 edition. http://articles.latimes.com/2007/sep/09/nation/na-toilets9 [accessed 18 December 2008]

Marx, Gary 2000. What's New About the "New Surveillance"? Classifying for Change and Continuity, *Surveillance and Society* 1(1), 9-29.

Marx, Gary 1989. *Undercover: Police Surveillance in America.* Berkeley: University of California Press.

Miller, Henry. 1936, 1994. *Black Spring.* New York: Grove Press.

Mitchell, Don. 2003. *The Right to the City: Social Justice and the Fight for Public Space.* New York: Guilford.

New York City Department of Transportation. 2009. *Street Design Manual.* www.nyc.gov/streetdesignmanual [accessed 23 July 2009]

Page, W. T. 2008. http://www.worldtoilet.org/ [accessed 24 September 2008].

Pinker, Steven. 2007. *The Stuff of Thought: Language As a Window Into Human Nature.* New York: Viking.

Pollan, Michael. 2001. *The Botany of Desire: A Plant's Eye View of the World,* (1st ed.). New York: Random House.

Rice, Phil. 13 September 2006. *Male Restroom Etiquette*. http://www.youtube.com/watch?v=IzO1mCAVyMw (alternatively at http://z-studios.com/films/mre/) [accessed 22 September 2008]

Saletan, William. 9 July 2008. *Crap and Trade: Why Public Toilets Should Pay You.* http://www.slate.com/id/2195071/ [accessed 6 April 2010]

Shearing, Clifford D. and Philip Stenning. 1997. From the Panopticon to Disneyworld: the Development of Discipline. In *Perspectives in Criminal Law: Essays in Honour of John LL.J. Edwards*, eds. Anthony Doob and Edward Greenspan. Aurora, ON: Canada Law Book, Inc.

Sheller, Mimi and John Urry. 2003. Mobile Transformations of public and private life. *Theory, Culture, and Society*, 20(3): 107-125.

Singleton, Vicky & Mike Michael. 1993. "Actor-Networks and Ambivalence: General Practitioners in the UK Cervical Screening Programme." *Social Studies of Science*, 23(2): 227-264.

Sorkin, Michael. 1992. See You in Disneyland. In *Variations on a Theme Park: The New American City and the End of Public Space*, ed. Michael Sorkin, 205-233. New York: Hill and Wang

The Exeloo automated public toilet experience at Surfers Paradise. 21 October 2008. http://www.youtube.com/watch?v=aq_ctdl7MIw [accessed 28 July 2009]

Toronto. September 2006. *"Vibrant Streets: Toronto's Coordinated Street Furniture Program and Policy Guidelines.* http://www.toronto.ca/involved/projects/streetfurniture/index.htm [accessed 28 July 2009]

United Nations. 2008. *International Year of Sanitation*. http://esa.un.org/iys/index.shtml [accessed 24 September 2008]

Webber, Rebecca. "Public Toilets", *Gotham Gazette* 15 July 2001 edition. http://www.gothamgazette.com/iotw/bathrooms [accessed 27 July 2009]

Wenz-Gahler, Ingrid. 2005. *Flush! Modern Toilet Design.* Base, Switzerland: Birkhäuser Basel.

Whatmore, Sarah. 2002. *Hybrid Geographies: Natures, Cultures, Spaces.* London: SAGE.

Whyte, William H. 1998. City: Rediscovering the Center. New York: Doubleday.

Williams-Jones, Bryn and Janice E. Graham. 2003. Actor-Network Theory: A Tool To Support Ethical Analysis of Commercial Genetic Testing. *New Genetics and Society* 22(33): 271-296.

Wilson, Michael. "Greetings, Earthlings. Your New Restroom is Ready". *New York Times*. 11 January 2008 edition.

Zukin, Sharon. 1991. *Landscapes of Power: From Detroit to Disney World.* Berkeley: University of California Press.