The Commodification of Location: Dynamics of Power in Location-Based Systems

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ABSTRACT

Location-based ubiquitous computing systems are entering mainstream society and becoming familiar parts of everyday life. However, the settings in which they are deployed are already suffused with complex social dynamics. We report on a study of parole officers and parolees whose relationships are being transformed by location-based technologies. While parolees are clearly subjects of state discipline, the parole officers also find themselves subject to new responsibilities. This study highlights the complexities of power in sociotechnical systems and what happens when location becomes a tradable, technological object.

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INTRODUCTION

In 1785, the English philosopher Jeremy Bentham designed the ideal prison, which he called the Panopticon. The architectural arrangement was simple: a watchtower encircled by a ring of cells allowed a single guard in the tower to observe any of his prisoners at any time through cell windows opening onto the inner courtyard. Prisoners could not see the guard, nor where his attention was directed, requiring them to assume that they were under constant surveillance and to act accordingly. Such a system, Bentham argued, increased the number of prisoners that could be watched by a single guard, as the arrangement would inspire greater discipline among prisoners when their every move was "perfectly individualized and constantly visible" [9, p. 200] to their minders.

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In *Discipline and Punish: The Birth of the Prison*, Michel Foucault makes much of Bentham's Panopticon as a method of inducing and enforcing discipline: it is "… a functional mechanism that must improve the exercise of power by making it lighter, more rapid, more effective, a design of subtle coercion for a society to come" [9, p. 209]. Foucault uses Bentham's design to explain the historical transformation of state justice – from brutal punishment of transgressors to their control through discipline.

Forms of state justice are constantly evolving, with advanced technologies increasingly employed to supervise prisoners. In 2006, the state of California passed "Jessica's Law," which required, for the first time, the electronic monitoring of all convicted sex offenders, including juveniles, for the rest of their lives. Sexual offenders who had been released on parole following the completion of their prison sentences were issued GPS devices on specialized anklets that, they were informed, would monitor them and provide specific location-based information directly to their parole officers. However, the device gave no indication to their wearers when parole officers accessed their location data. Parole officers, for their part, were provided with access to a system for viewing the output of the device that captured their parolee's movements and presented them on a map.

On the surface, this appears to be the perfect example of a digital Panopticon. Parolees are constantly visible and have no way of knowing precisely when their parole officers will access their movement data and what data they see; thus, they must discipline their behavior accordingly. However, extensive interviews with parole officers and parolees alike reveal a more complex story. Instead, we argue, the implementation of GPS technology reconfigures the relationship between parolees and their parole officers, not least because it overlooks the existing social arrangements that support the very power structure it was designed to reinforce. We claim that this reconfiguration results from a "commodification of location" – a dissolving of social relations into a tradable technological object, the GPS trace.

Our first paper discussed this case with a particular focus on the relationship of mobile technology to the body of the subject and on the forms of accountability engendered through location-based systems [30]. That paper was based

on an initial engagement with parolees conducted largely before laws mandating broader applications of the technology went into effect. In this paper, we draw on a related data set, which includes more recent data, and engagements with parole officers as well as parolees. We focus our analytic attention on a different issue: how the application of GPS technology disciplines both the parolee and the parole officer, and the transformation in social relations that results. Our paper, then, is not directed primarily towards opportunities for technological intervention or design alternatives. Instead, we want to examine how location-based technologies interact with the complex dynamics of the social context into which they are deployed. We begin with a description of the study, its background and our methods. Then, we discuss three aspects of parole officer work that arise from the introduction of the technology. Finally, we consider the status of location as a circulating object divorced from its context and social relations of production [20]; how such a commodification of location causes problems with respect to existing power relationships; and how accountabilities can be traced or confused within such social structures.

BACKGROUND

Ubiquitous computing research has had a long-standing interest in location-based services. Mechanisms for location sensing comprise a major area of technological examination [7, 27], while other studies have focused on the use and implications of location-based systems [4, 13]. Privacy and deception have been a particular focus of attention [14, 15, 21]. We build on this work by studying a larger-scale case and a particular institutional context: the United States Criminal Justice System.

Some earlier studies have examined the role of technology in police-work and the justice system, including the consequences of computerization in detective work [5, 12] and the use of mobile technologies in patrol work [28]. These can be placed into a broader context of ethnographic studies of the work of police officers [e.g. 19, 32, 33], litigators [e.g. 29], and offenders [e.g. 34]. Especially relevant here are studies such as that of Bittner [2], which highlight the ways that the police, like other "street-level bureaucrats" [18], find that their interests may actually coincide with those of others (e.g. the public, suspects, or criminals) to whom they might naturally seem to be opposed. Similarly, here we are interested in how parole officers and parolees must collectively adapt to the technology that mediates their interactions.

Two major sets of laws deal with the management of paroled sex offenders in the United States: "Megan's Law," a federal statute, and "Jessica's Law," introduced by legislation or ballot initiative on a state-by-state level. Megan's Law directs each state to maintain a public (and, since 2003, online) record of the residence of released sexual offenders and to provide community notification systems for all registered sexual offenders. Jessica's Law further makes it illegal for paroled sexual offenders to live in proximity of schools, libraries, public parks, and playgrounds. To enforce these and other restrictions, California's version of Jessica's Law mandates lifetime monitoring of the movements of paroled sex offenders via GPS in the form of a satellite-tracked ankle bracelet: a clear response to the emerging technological opportunities afforded by pervasive location-aware technologies. Jessica's Law varies from state to state in its application to high or low risk sex offenders (i.e. those judged to be most or least likely to re-offend); in California, however, it extends pre-existing use of GPS for select sex offender monitoring to all sexual offenders, including those convicted of predatory offences against children, domestic sexual assault, statutory rape, and indecent exposure, among others.

Technologically, Jessica's Law is enforced through a body-worn GPS unit, typically attached to the ankle, which signals its location to the authorities every few minutes. Upon release from incarceration each sex offender is put on parole, at which point they meet their parole officer [PO] who explains the individual conditions of parole and attaches the GPS device to the parolee's ankle. The conditions of parole can include spatial and temporal prohibitions and limitations, such as not residing or lingering within 2000 feet of a school, park, or playground, not visiting victims' residences or places of employment, and abiding by strict curfews. Care of the unit is also included in the conditions of parole: both tampering with the strap that attaches the device to the wearer's ankle and failing to charge the device (which holds 12-18 hours of charge at a time) are now felony parole violations punishable with additional prison time.

Each offender's PO can review the GPS data stream showing patterns of parolee movement, called "tracks." They can also see whether the device recorded tampering with the strap, how much charge each device has, and when it was last charged. The system notifies POs via text messages and email when there is a recorded strap tamper, failed curfew, or exclusion zone violation – i.e., movement within an area close to a school or park. For all sex offenders on a caseload, these instances are detected, recorded, and responded to by their parole officer. Technical difficulties and false alarms are a constant problem; indeed, POs are now required to give their mobile phone numbers to parolees on their caseload, in the event of technical difficulties with the devices. Due to increases in workload as a function of the use of the GPS system, parole caseload sizes have been reduced from an average of 40 per parole officer to an ideal of 20 active cases each [47].

METHODS

In the summer of 2005, shortly before Jessica's Law was passed, the state of California launched a pilot study examining GPS monitoring as a means to supplement parolee supervision of released sex offenders. The research project described here was carried out from January 2006 until summer of 2008 in conjunction with the GPS program evaluation. To fully understand the implementation of the GPS technological supervision project, researchers conducted one-on-one interviews with POs involved with the program

and focus groups with sexual offenders in the San Diego County parole offices both before and after the passing of Jessica's Law. Note that our interviews were not conducted pre- and post-deployment; all participants were involved in GPS monitoring, but those who participated before Jessica's Law were enrolled in a technology trial.

As a result, this paper presents an analysis of four different datasets. Two are semi-structured interviews conducted with POs and others in administrative roles before (n=7) and after (n=9) the implementation of Jessica's Law. The remaining data were collected through focus group interviews with sexual offenders: two before and five after the law was passed. The total number of parolees participating in the focus groups was 47. Questions to both groups ranged from issues of supervision, privacy and identity, to changes in behavior, reactions to and narratives about the GPS monitor, to opinions on electronic monitoring devices. The transcripts from these interviews and focus group interactions were collected and reviewed by the authors, and coded under an open coding scheme grounded in the themes and issues discussed in the data. All data excerpts presented in the paper are reproduced exactly as spoken by respondents. Data are denoted by PO #number (for pre-Jessica's law interviews) or #letter (for post-Jessica's law interviews) and SO #focus group number for parole officers and sex offenders, respectively. In the next section of the paper, we will present three major themes that arose from our analysis of this rich dataset: the transformation of the parole officers' daily work practices, how parole officers negotiate the relationship between the physical and virtual tracks of parolees, and how participants in the system are disciplined according to changing power relationships as a result of the device.

TRANSFORMATION OF PAROLE WORK

The introduction of technological systems into organizations is commonly followed by substantial changes in the nature of the work that these systems are meant to support [22, 23]. As Orlikowski argues, when technology is adopted in organizations, "people's use of technology becomes structured by their experiences, knowledge, meanings, habits, power relations, norms and technological artifacts at hand," even as organizational structures and processes are changed through the use of that technology [23, p. 410]. In our interviews, POs detailed the dramatic changes to their work following the introduction of the GPS system. These changes were manifest in the reorganization of officer workdays, the adoption of new practices related to the GPS, and a drastic decline in previously-common in-person surveillance practices [31]. Moreover, our data illustrate that adoption of the GPS system also transformed how the relationship between POs and parolees is managed, executed, and performed. Even the nature of parole, previously an institution geared towards successful re-integration and rehabilitation of parolees, has changed with the application of GPS technology, now reflecting the importance of surveillance, data analysis, and interpretation in service of recidivism prevention.

From a day-to-day point of view, the introduction of the GPS system into parole work changed the way POs organize their workdays. The incentive for introducing digital or mobile technologies is frequently used to streamline organizational processes in order to reduce workload and overhead, but the mandated deployment of GPS monitoring here has had the effect of *increasing* the workload. Throughout the interviews, POs repeatedly noted a persistent lack of time for completing parole work, due to the increased requirements for surveillance and documentation: "*We used to have more time, but now it's difficult to use the computer and track them*" (PO #D). POs who manage sexual offender cases had these caseloads reduced from a routine 40-60 to an average of 20-30 cases to help them cope with the change in workload: "*I tell people all the time, if there's anybody who feels that 20 cases is a light caseload on GPS, have them call me*" (PO #3). The same agent with a caseload of 20 claimed: "*When I had 40 HRSO's*[1]*, I never fell behind on my note taking …* [now] *I'm behind on note taking all the time*" (PO #3).

The system is connected to the officers' mobile phones, notifying them of every recorded instance of tampering with the device strap or other violations through text messaging and email. Although POs see mobile connectivity as useful, it also forces them to spend more time working. One officer explained, "[It's] *24 hours a day. This little phone is attached to my hip like an umbilical cord. After your normal workday, you're constantly getting calls"* (PO #B). As issues with technology come up, parolees now have the option of calling their parole officer to manage issues with the technology: "*Sometimes that unit can just vibrate or beep on its own … your parolee might just call because he's unsure about what he can or cannot do*" (PO #D). Increases in workload, mobile access to the GPS system, and continuously being on-call for their parolees contributed to the blurring between work and non-work for parole officers. This was expressed by nearly all of our participants: *"I'm working 24 hours a day, but I'm not getting paid 24 hours a day. I'm not getting paid for those calls. I had to get used to getting calls from parolees when I started doing GPS"* (PO #B).

The GPS system is not a simple device and its integration into parole work required substantial amounts of sense-making on the part of both POs and their parolees. Where, prior to GPS, POs selected parolees they deemed most likely to re-offend for closer scrutiny, they were now attending to the daily movements of all their charges. Through trial and error, POs learned about the limitations of the technology, such as problems with satellite reception in buildings, drift specific to GPS, or false strap tamper alarms specific to the devices manufactured for the state of California. POs quickly became aware that such limitations could make it easier for parolees to potentially find ways to evade its gaze. In order to

[1]Although the state of California extends this program to all sexual offenders, parole officers in our interviews often used the acronym HRSO (High Risk Sexual Offender) to denote the parolees on their caseloads.

compensate for this technological vulnerability, POs limited the amount of information about the system that they divulged to parolees. Thus, the only information that the parolees were given included rules about charging, i.e. that they must charge their ankle bracelet every 12 hours for an hour, and that they would be watched continuously. As one PO often explained to his parolees, *"We are going to be watching where you go and what you do, and we are going to know"* (PO #4).

POs learned to be circumspect about the failures of the devices. Always concerned about preserving their credibility with parolees, one officer said, "*I didn't want them knowing that this equipment was faulty but I'm bringing them in* [often] *and they started asking. Of course I play it off … but they know something is wrong with this and this is setting us up"* (PO #4). In their efforts to manage and maintain the device, POs became technical support for their parolees, undermining their surveillance role: "*If it* [the GPS device] *beeps a lot, I tell them to give me a call"* (PO #D). Again, the increase of technical support interactions often took the place of more traditional interactions with parolees, such as positive face-to-face communication geared towards successful re-integration, or traditional "rolling surveillance." As one officer admitted, *"The actual contact, physical contact, with the parolees, and seeing them, has diminished because of the* [GPS]*"* (PO #1).

Nevertheless, when asked about the positive effects of GPS, POs also recounted the panoptic effect of it on the parolees: *"They know that the unit works. … They know it's watching them and it reminds them of what they cannot do"* (PO #H). This sense of truth-telling was also evident in parole officer's accounts of changes in the nature of PO and parolee interactions where one officer explained, *"Because of the GPS, I get more honesty out of them. They'll tell me where they were because they know I can check"* (PO #3).

Despite the benefits, POs often talked about the GPS system as "*just a tool*" in their parole toolbox, describing it as *"not a slam dunk, and it is not the panacea that the public perceives it as"* (PO #B). Their narratives illuminate how demanding the new technological system can be; attending to notifications, system alarms, and checking each parolee's tracks required, "*more time behind a computer terminal and less time out in the community doing surveillance"* (PO #2). Even two years after the program's implementation, POs expressed how they were "*spending time going through the logs, looking at the tracks,"* and that they were involved in, *"a lot more deskwork than … straight working"* (PO #I). They expressed anxiety about the fading of active in-person parole practices as newer high-tech forms of surveillance replaced them. As one explained, "*You're physically watching this* [pointing to laptop] *instead of watching the house*" (PO #H). While laptops do allow POs to be mobile, they spent their time "*driving around looking at locations"* (PO #2) in order to interpret the GPS data for each parolee rather than conducting in-person visits or observations. The interpretive analysis of GPS location data became an essential aspect of parole work, which, on top of computer and telephone time, added to workload strain.

MAKING SENSE OF LOCATION

The newly implemented GPS system provides POs with continuous information about the location of parolees and notifications of potential violations, resulting in an information overload. As one PO explained, "*There's a tremendous amount of data and we can only move data so fast"* (PO #C). Part of the reason for the overload is the fact that the time-space location data provided by the system is insufficient to make judgments about parolees' behavior. As one PO articulated, "*If you're going to have them on GPS and you're going to be looking at where they're going and what they're doing, you have to learn as the agent, to identify whether this is suspicious activity. How does somebody identify what suspicious activity is?*" (PO #3).

This statement is important as it shows how the GPS information visible to the PO is meaningful only if it is interpreted as part of a particular social and physical context. POs are not, after all, primarily concerned with *location*; they are concerned with their parolee's *activities*. The officer has to know how the GPS co-ordinates fit into the physical context of the location, of the parolee, his needs and routine patterns, and of other events (such as crimes, complaints, presence of potential victims) that may have occurred nearby in order to assess whether an indication of presence in a particular location denotes suspicious activity. Thus the social nature of the GPS trace's production – the activities, relationships and contributors that give it meaning – are absent from the trace as it circulates within the technological system. As POs attempt to retrieve, trace, or otherwise ascertain this context of production in order to determine potential for transgressions, they rely on a great deal of interpretation, conversation with parolees, and additional on-the-ground "*legwork*".

POs are acutely aware that they need to be intimately familiar with the parolee's lives to be able to interpret the location information, to detect anomalies, and to know when and how to intervene. Without exception, all POs agreed that the way to approach the data was to look for patterns: "*I am looking for deviation in pattern. If he goes to work and goes home right after, if I see a deviation in, I want to find out where he went*" (PO #2). They also explained a need to know the physical space denoted by the points on a map. Understanding the physical attributes of a given location became a concern and necessity: *"Looking at the maps … I'll zoom in … try to figure out what is there, what may be there. If I can't figure it out on the map then I print that page out and then go out and find out what is at that site"* (PO #1). Although many POs mentioned the use of mapping software in combination with hybrid and satellite information, they could not rely on these digital representations to be up to date. As one PO pointed out, "*Maps are a major issue. They are not updated on a regular basis. When you see Petco Park, well, on the map it's still under construction"* (PO #H). Thus, POs spend the majority of their workday making sense of

digital information, augmenting the inexpressive points located in time and space with rich social and physical context. As one put it: *"GPS gives us generalities, but rolling surveillance lets us look at the area with your eye, not with just a map"* (PO #J).

Defining physical places through virtual means

The use of GPS tracking devices enables parole officials to define specific geographic areas from which parolees are prohibited, usually as a condition of their parole. For example, when a court orders a sex offender to have no contact with the victim, digital boundaries are set at an appropriate distance around the victim's place of residence and employment or educational institution, referred to as *exclusionary zones*. The GPS monitoring devices trigger warning notices that are sent to the PO via email or a text message when defined exclusionary zones are broached. GPS can also send an alarm if the sex offender leaves an area in which he or she must stay at certain times of day. This parameter is called an *inclusion zone* and often includes place of residence and employment. For example, many sex offenders have curfews that define when they must return to their places of residence in the evenings and how long they must remain there (i.e. 7pm – 7am). These zones are virtual concepts, imposed on maps.

In their attempts to interpret these zones and associated GPS tracks, POs tended to impose the system's virtual spaces onto the physical world. Many of the parole officers talked about physically investigating places: "*I have zones on a couple of victim's residences,"* and, *"If I note an anomaly, I go out and physically follow the tracks*" (PO #A and PO #4, respectively). This conflating makes it difficult to talk about virtual and physical geographical identification of places. For example, discussing where he set exclusion zones, one officer said, "*I don't think I have any around any parks, but that's only because, geographically, I have my guys in downtown San Diego*" (PO #3). The use of the word "geographically" here is telling; in referring specifically to the physical world, it underscores the distinction between the digital and physical spaces. That is, there are places where one might "be" through the system, and there are places where one might "be" geographically.

Indeed, throughout the interviews agents used words like "seeing," "going," and "looking" interchangeably when they talked about actions in virtual and physical spaces – and specifically when talking about the process of weaving between the two. Understandably, parole officers assigned to HRSO caseloads are acutely aware of the distinction between location tracks in a technological system used for parole, and the actual places, paths, and forms of movement to which these tracks correspond in the everyday world. But forging a meaningful relationship between the virtual and the physical requires what POs frequently call "*legwork*."

"Legwork" to capture intent

Technological systems are not only a way of surveillance, they are also a way of watching and seeing the world – places as points on a map largely devoid of their true complexity. However, it is incumbent on the PO to understand the physical context of the information the system provides and to augment the lack of complexity inherent in map traces. That is, they are expected to infer intent and behavior from knowledge of the parolee's location in time and space, but they need to understand the full complexity of places and times that they observe in order to do so. After all, knowing where someone is does not equate to knowing his or her actions. As one officer explained, *"It* [the GPS] *tells me where they are but not what they are doing there"* (PO #A). To aid interpretation, POs investigate whether particular locations may signal potential untoward behavior*: "You learn if a location has an issue"* (PO #C). They utilize available mapping technologies and engage in "*leg time*" or "*legwork*" described as physically exploring places where parolees had been seen by the GPS system. For example, one PO explained that if he got an alert on a GPS track for a location he did not know, if he was "*... not familiar with the area, I'll end up driving there to make a determination of whether or not it was a violation*" (PO #3). Here, understanding the space does not simply mean knowing what businesses and services might be there; it means understanding the style of the area, the people and activities that give it social meaning.

Officers often gain familiarity with physical spaces independently of their interactions with parolees. However, a parolee's routines cannot be learned purely through observation. POs learn their parolees' routines through interactions and asking questions. In this way, making sense of the GPS data becomes a more collaborative process, in which the information parolees provide plays a central role. One PO explained this process: "*I was reviewing tracks and it showed me this guy in an apartment building ... It showed me an address, I drove by, I saw this apartment building. I don't know what he was doing in this apartment building ... So what I do is I go to the parolee and I go, 'What were you doing here at the corner of First and Eighth?' 'A family friend lives there' ... He gives me her address and telephone number and I go check it up"* (PO #1). In the process of creating this narrative, POs use information-gathering phone calls as a way of reminding parolees that they are being watched. Another PO expressed, *"When you call and say, 'What are you doing?' and they know someone is watching"* (PO #H). The focus on location and reasons for being there structures the conversations POs have with parolees during their meetings: *"I've got guys telling me some of the places they go to before they go there. They used to never tell me that before. But now they know because I'll see them going"* (PO #5). The GPS system then, becomes a fact-checking resource. It *"gives you insight into as – are they telling you the truth about where they're going, what they're doing"* (PO #D). The concern with being in the right or wrong places – virtual and physical – comes to dominate the interactions between POs and parolees.

While one can argue that GPS provides ongoing technological surveillance, agents feel that this kind of surveillance is insufficient. For them, active "rolling"

surveillance by a human observer is different because of the face-to-face communication and thick content it delivers. With the current GPS system, POs may feel they are always a little bit behind. Ironically, the GPS system is designed such that they literally are several minutes "behind" when actively tracking someone who is trying to abscond. As a parole supervisor explained, "*This system was always designed as a near real time. Now agents are past that, they want real time. I have agents out in El Centro tracking a guy, and they don't want to be 5, 10 minutes behind the guy, whatever the system allows. They want to be right on top of the guy.*" This tension between "near real time" and "real time" points to POs understanding of GPS as merely one more tool in their parole tool kit. Several POs reminded us that, at the end of the day, *"It's still all about the human interface between me and my parolee. Looking that parolee in the eye, knowing what kinds of habits he's keeping. It's* [GPS] *an investigative tool, but it's still about agents supervising people"* (PO #C). The quote underscores the tension between active surveillance, and its effectiveness in maintaining public safety; automatic monitoring; attempts to broaden the surveillance net; and changes in the initial rehabilitative nature of parole. These issues become conflated by the constant mediation of active monitoring, by reducing location context to GPS information, and by replacing time spent interacting with parolees with time spent interacting with computers.

THE SYSTEM OF DISCIPLINE

Past studies of this system indicate that sexual offenders shift their experiences and behaviors to accommodate the device when they first receive it [30]. For example, they must keep the device charged and protected under the conditions of their parole. Furthermore, the very presence of the anklet serves as an inert reminder of their constant surveillance. As one sex offender explained "*These are a constant reminder to tell me that I have molested a boy 20 years ago and now I am branded by that"* (SO #5). Sex offenders described attention to their movements in space and time to comply with parole restrictions, remaining "*conscious where I should be and where I should not be"* (SO #1). Expecting to be constantly visible to their POs, they adopted routines and limited patterns of motion in an attempt to make their GPS traces legible and somewhat predictable to discourage accusations of parole violation. Reflecting on the importance of routine, one sex offender suggested: "*They* [POs] *know your patterns as they track you, and they know when you're out of your pattern. When you get out of your pattern they ask what he's doing. It puts suspicion into them"* (SO #2).

We might well understand this kind of behavior as the result of *disciplining* the sex offenders. By "disciplining" we do not mean corporal punishment or even imprisonment for the offense, but rather the process through which the state justice system exerts its influence on sex offenders upon their release on parole. Here we apply the Foucauldian concept of discipline as a diffuse and corporeal process, one in which the expectation of constant surveillance produces the same kinds of effects as if the offender were actually being continually observed. Prisoners must be docile and dutiful at all times because they cannot control or predict when they will actually be under scrutiny. This is, doubtless, exactly the kind of discipline and behavioral scrutiny that Jessica's Law legislators claimed they intended [24] and that POs often expressed in the interviews. One explained, *"It gives the impression to the parolees that they're being watched 24/7. That may not be the case, but it gives them the impression. There are some immediate gains just putting something on their ankle. It kind of tightens the reins almost immediately in their minds based on what they've heard about it"* (PO #4).

However, it may be more appropriate to look at these processes of discipline at the level of the system rather than individual participants. After all, the adoption of the GPS system as part of the parole for sexual offenders requires new forms of conformity in the lives and work of the POs too. Thus, it is not only the parolees who are disciplined: it is the POs as well. As we have noted, making sense of the offender's GPS tracks required both constant vigilance and comprehensive legwork that tie virtual to physical spaces and a coherent narrative about the spaces of the parolee's encounters. Along with such stories come those about the imperative of this constant vigilance, often preceded with statements like "you have to…" For example, one PO emphatically expressed this sentiment as follows: *"The only way to know is by actually going in there* [the GPS system] *and looking at the information … and then you're going to have to do … some follow-up. You're going to have to do some legwork, you're going to have to do some investigation"* (PO #3). Another echoed: "*You have to make time to go."* Aware of the intensive work required to make sense of the GPS data, POs regularly produce voluminous notes: "*Most of the time it's difficult to go back out in the field because of all the paperwork and phone calls"* (PO #C). This kind of work is required of the PO in order to perform their job appropriately: "*At the end of the night I've got to go back and fill in where I've been and what I've done. You want to make sure you're documenting this"* (PO #3). POs applied this rigorous imperative to their peers as well. Reflecting on the enormous amount of work he did to keep track of offenders, one officer stated, "*I hope my colleagues are doing the same thing*" (PO #3).

On the one hand, such statements indicate the new kinds of labor involved in working with digital devices. The devices require particular kinds of work of their keepers that perhaps involves disciplining themselves as well. This discipline involves new practices of making GPS traces legible in context. It also increases the importance of techniques like note-taking to make one's work legible to others: "*If you're not documenting what you're doing then people are not going to be able to review and look at what it's entailing* [to do this job]. *So the note taking, if you want to be able to show people well this is all the legwork I did on this particular case. Then you have to write that on your record of the provision"* (PO #3). This officer described how, unlike pre-GPS days, he was always behind on his notes. Similarly, one PO aptly expressed: "*I have to respond to somebody and I tell them*

[parolees]. *'You have to respond to me and I have to respond to somebody else'"* (PO #D). A useful comparison here might be the formation of the "scientific self." Producing scientific results that can be considered objective by the community requires not only the right instruments, objects and analysis, but also the right kind of discipline and moral character in the scientist, made legible through documentation of the process [6, 26]. Just as scientists must behave in a particular way to conduct science faithfully, POs are similarly disciplined through the expectations and demands of the GPS device alongside the civic responsibility of sex offender tracking.

On the other hand, the GPS system requires particular performances in order to operate effectively, which may be at odds with the roles that individuals in the system already perform. Both "legwork" and co-construction of location in co-operation with the sex offender are required in order to "do one's job" effectively under Jessica's Law. Other studies of interactions with bureaucratic technologies demonstrate similar problems. For example, Gilliom demonstrates how single mothers navigating the welfare system must accept losses of privacy that would not otherwise be tolerated [11], while Bowker and Star describe the "torque" experienced by mixed-race South Africans during the apartheid regime, when the entirety of the state social system relied upon clear delineation of racial heritage and phenotype [3]. Such technological systems require their participants to change or discipline themselves to fit the demands of the system. In this case, too, because the POs' activities are directly attuned to their parolees' actions, HRSOs exert a degree of disciplining power over their own parole officers as well.

DISCUSSION

We are not here attempting to evaluate Jessica's Law or advocating freedom from monitoring for sex offenders. Our goal is not to provide a design critique or a technological intervention. Rather, in observing the kinds of activities that the technology of GPS location-based tracking requires of sex offenders and POs alike, we can explore several issues critical to the implementation of ubiquitous computing systems: how location is commodified to become an isolated, tradeable artifact within a technical system; how this commodification turns location awareness into a disruptive element of the power structure, and how the enactment of power relationships produces networks of accountability. But first, let us briefly clarify our position with respect to privacy and institutional structures.

The question of privacy is never far from the discussion of any monitoring system such as this. But we believe that the notion of "privacy" often hides as much as it reveals, linked as it is to particular notions of exchange and cost/benefit analysis [8, 30]. This particular case is a useful site at which to examine these concerns precisely because in the eyes of the law, "privacy" *per se* is not a relevant consideration to this parole population. But a series of complex social processes concerning the framing, disclosure, and use of location information are unquestionably present. In this case, they are at work within a social structure where hierarchical relationships and power dynamics are overtly maintained and demonstrated. We argue that these processes and power negotiations are present in all cases of technologically-mediated sharing of location information, but that the overly-broad and inadequately-specified term "privacy" frequently obscures them. In this case we have an opportunity to examine what people are "doing" when they "do" privacy in the context of pre-defined power-relationships by looking at a case where "privacy" is not available to us analytically.

The second, related issue is the analysis of the broader institutional realities within which particular information technologies (and actors) are enmeshed. Studies of technology use tend to be framed in terms of users and usability. Here, though, our interest is not directed towards either parolees or POs as "users" of GPS location tracking. Instead, we are interested in the role that this technology plays in shaping the institutional relationships between them, the dynamics of power and control to which they are both subject, the forms of accountability to which they are each subject, and the transformation and performance of these with and through digital mediation.

The Commodification of Location

Foundational studies of location place great emphasis on the social processes through which place is articulated. Some, such as Laurier [16] or Schegloff [25], explored the way location is formulated in conversation, making manifest particular social arrangements such as membership in social and professional groups. Being able to formulate a location appropriately for some particular occasion is one way that membership in social arrangements is "done." Even working with maps requires sense-making work and interactions to establish place and purpose [4]. We too are concerned with the social processes that surround notions of location, but raise different concerns. The central issue is not so much the interactional formulation of location, but rather the implications of extracting "location" from its interactional context to produce a technological artifact that circulates within a different system, acquiring different meaning. Following Marx [20] one might call this a process of commodification.

As Marx elaborates in Volume 1 of *Capital* [20], the commodity plays a key role in mediating social relations as it derives value not from its context of production, but from its context of exchange. Human beings have always taken raw materials and fashioned them into objects that they need; what Marx calls the "use value" of commodities is not a source of mystery. However, when objects are created for the purpose of exchange, and when that exchange is embedded in a capitalist system of trade and accumulation, a transformation occurs. The commodity is no longer valued for the social relationship it expresses between the laborer who produces it and one who uses it; rather, the commodity itself seems to have value. This is the idea of "commodity fetishism," where Marx uses the term "fetish" not in the sense of an undue or obsessive interest, but rather in the anthropological sense of a displacement of agency and power

to an inanimate object (such as the way that certain religions believe that objects can be imbued with supernatural power). The mystery of the commodity, then, is the way that an object in the world comes to substitute for and obscure the social relationships that give it meaning, deriving value from a different system of circulation.

A similar process of commodification attends the development of location-based systems. In these systems, location – reified as a particular kind of representation, a GPS trace – becomes a tradable entity. It can be handed to system services, reported to others, and exchanged for data; in other words, it becomes something that, transformed into a digital object, can move about in the (electronic) world separately from the mobile person that it purports to describe. It also has value within the justice system *sui generis* as it stands in for constant surveillance of HRSO's in the interest of public safety. In these systems, as with commodities in Marx's analysis, it begins to seem to have power and meaning in itself rather than as a moment of social engagement between people. In the technologically-mediated circumstances of parole management, our study suggests, this commodified version of location both substitutes for and displaces the social relations and actions around which activity was previously organized. That is, the traffic in digital representations of location potentially obscures the social relationships that make those representations meaningful, at the same time as it changes the very practices and purposes of building and maintaining those social relationships, such as PO interactions with community members and their concern with parolee re-integration. Thus commodification and its consequences presents significant implications for the management of power and accountability.

Location Awareness and Power

POs are meant to monitor parolees, to assist them with rehabilitation and re-integration into society and to ensure they do not re-offend; they have recourse to a number of different techniques in order to do so. But as the social relationship between POs and sexual offenders is profoundly defined by hierarchy and power, it is impossible to talk about the adoption of the GPS system and its role in the relationship between POs and parolees without considering the exertion and effects of power. In speaking to the concept of power here, we do not consider power as a discrete unit that can be balanced, allocated or shared. Instead, our investigation refers to Foucault's definition of power: as something "that circulates, or rather as something which only functions in the form of a chain. It is never localized here or there, never in anybody's hands … individuals are vehicles of power, not its points of application" [10, p. 98]. The Panopticon is so effective not because it takes power away from inmates and puts it in the hands of the state, but rather because it produces subjects who internalize the state's demands of them and thus become "vehicles" of state power. As Foucault puts it, it "induce[s] in the inmate a state of conscious and permanent visibility that assures the automatic functioning of power" [9, p. 201]. Such power is less visible than public corporeal punishment, but as it is expressed through disciplining its subjects into compliance it is both effective and efficient.

Location awareness serves an important function in the automatic functioning of power in this case, as it is the parolee's belief that their POs know where they are at any given moment – like that of the prisoner in the Panopticon – that enforces compliant behavior. The emphasis on seeing and knowing is important here: after all, knowing where the parolee is by seeing their location trace gives the PO power to elicit truthfulness from parolees about their activities. Knowledge is power, Foucault claims, and in this case, the relationship between knowing location and exerting power over one's judicial charge could not be more direct. Yet the GPS devices also restructure this power relationship in problematic ways. On the one hand, due to the commodification of location, visibility here is not seamless. POs are therefore themselves subject to discipline, as they must engage in more and different work to gain full knowledge of the parolees' locations and exert control. On the other hand, because the devices are subject to false alarms, the "tracks" are not self-evident and increases in workload reduce the amount of time POs can do in-person surveillance, POs must increasingly rely on the parolee's narratives of where they were and what they were doing. Thus when the GPS anklet is secured, the power relationship and disciplinary structure is strongly asserted. But as the system comes into use, and both POs and sex offenders realize that the tracks' legibility relies upon co-constructed meaning and increased workload for the PO, the power relationship and its application of discipline are compromised. This is no doubt in stark contrast to the kinds of effects that lawmakers hoped Jessica's Law would have.

We emphasize that such effects are not unique to our study. Rather, we must see the application of power at the core of debates about "privacy" in location-aware systems across the board. Which information is visible, to whom, and when is an expression of underlying relationships of power and knowledge. Further, technologies do not enter into power-neutral spaces. Even a simple GPS system installed in the dashboard of a family car enters into a social space where power and disciplinary structures are evident and where particular roles related to navigation are played by the married couple, the parent and child, or the friends in the front seat [17, 35]. When building location-sharing systems and other ubiquitous computing systems, designers must consider existing power relationships at play alongside technical requirements to achieve the seamless integration of the social and technical in new and ubiquitous spaces.

Accountabilities and Responsibilities

We have previously suggested that the problems of privacy in location-based systems might be more fruitfully framed in terms of the accountabilities to which people may find themselves held in their relations to others [30]. While the parolees have no expectations of privacy with respect to their movements, they are nonetheless accountable to others – specific people in their lives, their POs, the police, the public

at large, etc. – in different ways for their presence (or absence) at different moments. POs and others similarly face a range of accountabilities to others – their superiors, the state corrections system, the public at large, etc. The shift from a discourse of privacy to a discourse of accountability gives us some purchase, perhaps, on those cases where privacy seems to "disappear" [e.g., 1]. In cases of location-based technologies in which it seems that "people don't worry about privacy" (e.g. in sharing location information amongst friends), we find it useful to think of how, instead, the disclosure of location information reflects accountability amongst peers. Far from being able to choose not to disclose this information, a system might create a context in which one becomes accountable to others for the timely report of location. Accountability focuses our attention on what is achieved through location reports.

The question of accountabilities is raised here also by the experience of the POs. As we have noted, they recognize that the GPS system was introduced to help them maintain their responsibility for public safety, one that they discharge through their regular monitoring and management of parolees. However, the technology imperils this responsibility in three ways: first, in its failure to provide real-time monitoring as initially expected by POs; second, in transforming the work so that they actually spend less time, rather than more time, engaged with the community and the parolees themselves; and third in creating an information overload where the interpretation of location falls far short of being able to instantly alert to transgressions as imagined by the public and by the authorities. For many of the same reasons, the technology imperils a second responsibility towards the parolees themselves, both through the reduction of face-time and through the multiplication of potential infractions and violations to which the parolee might become subject. Instead, these responsibilities are diminished in favor of the responsibility for following organizational procedures and endlessly documenting activity as a hedge against future action. While this is a less motivating responsibility than that of rehabilitation, the technologically-mediated environment facilitates and requires its achievement.

CONCLUSIONS

Considering the iconic nature of his writings on prisons and discipline, it is perhaps unsurprising that we (and others) turn to Foucault's writings in thinking about this case. Yet while we opened this paper with the image of Bentham's Panopticon, which figures prominently in Foucault's writings, our appeal to Foucault's work lies in more than simply his discussion of surveillance. The Panopticon, after all, is a metaphor for Foucault; his concern is with the forms of docility inspired by the threat of potential monitoring, which he develops more broadly as a notion of "governmentality," that is, the mentalities and rationalities adopted by those who are governed and which render them subjects of governmental power.

For Foucault, given this connection between governance and mental attitude, power is linked to knowledge, and his term power/knowledge highlights their mutuality [10]. It is not simply that with knowledge comes power; rather, that the struggles through which particular ways of knowing gain authority and authenticity in societies are struggles through which power is expressed, wielded, negotiated and maintained. Power reproduces knowledge and ways of knowing. When Foucault talks about the "insurrection of subjugated knowledges," he is talking of the struggle to define what is known, what can be known, who can know it, and how: struggles of power and authority. In the case of the GPS tracking of parolees, then, we see power/knowledge at work in the very definition of location and understanding of location. This is the question of whether the system can know, through the mediation of GPS tracking, of people's movements in the same way that POs can know. This is also the question of the authority and responsibilities of the POs and their roles within the institutional structures in which they operate, the meaning of technological representations of location, and so forth. Such authority and responsibility is reassigned under a system in which location has been stripped of its social context of production and meaning and circulates instead within a system that enforces different relationships, power structures, disciplinary activities, and accountabilities.

Our appeal to Foucault's analysis highlights the fact that power is always at work in the generation of knowledge and the substitutions and competitions between forms of representation – such as those of location. The production of location as a technological object, what we have called the commodification of location, displaces or at least rearranges the social relationships that surround interactions over, around, and through reports of presence, absence, situation, and movement. Such power dynamics are easy to see at work in the context of criminal justice, but our goal here has been to underscore their inherent significance to all sociotechnical ubiquitous computing systems.

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