



Critical GPS: Toward a New Politics of Location

Amy D. Propen¹

Department of Rhetoric, University of Minnesota, 64 Classroom Office Building,
1994 Buford Avenue, St. Paul, MN 55108, Phone: 612-624-4933

Email: prope002@umn.edu

Abstract

This paper aims to extend the purview of critical GIS to also account for what would be akin to a critical GPS by examining two cases where GPS technology is used as a similar means to two decidedly different ends. I look at Acme-Rent-a-Car's use of GPS technology to track the driving speed of their customers and then fine their customers for speeding, and the Amsterdam Real-Time Project's recent use of GPS technology to create, for aesthetic purposes, maps of the real-time movements of individual Amsterdam citizens. I examine the social implications of a consenting or nonconsenting subject who is always already locatable. I suggest that the questions raised by each of these two cases are indicative of a social dilemma in GPS, and thus advocate for a critical engagement with GPS technology.

¹ © Amy D. Propen, 2006

Adrienne Rich 14 Edgevale Road
 Baltimore, Maryland
 The United States of America
 The Continent of North America
 The Western Hemisphere
 The Earth
 The Solar System
 The Universe

--Adrienne Rich, *Blood, Bread, and Poetry*

Introduction

In this paper I aim to extend the purview of critical GIS to also account for what would be akin to a critical GPS. To do so, I first describe what is meant by GIS and critical GIS, and then describe what an examination of GPS or critical GPS would contribute to the already existing literature. It is important to note, however, that my aim in this paper is not to create a false binary between critical GIS and critical GPS; rather, I understand these endeavors as two sides of the same coin. That is, I extend the domain of critical GIS scholarship by accounting also for questions surrounding GPS use, such as individual consent and awareness around data collection and the surveillance of individuals in real-time. I highlight these issues by first describing relevant aspects of the conversation around critical GIS, and next by examining two cases where GPS-based technology is used as a similar means to two decidedly different ends. I look at Acme-Rent-a-Car's use of GPS technology to track the driving speed of their customers and then fine their customers for speeding, and the Amsterdam Real-Time Project's recent use of GPS technology to create, for aesthetic purposes, maps of the real-time movements of individual Amsterdam citizens. I describe and problematize each of these cases in order to be able to ask the following questions: What does it mean to locate? What are the social, ethical, or political implications of creating a real-time mapped space in which the knowing or unknowing user or subject wittingly or unwittingly resides? And, borrowing from Crampton, who builds upon Harley's earlier work: "Under what circumstances is a map authored?" (Crampton, 2001, 243). Before proceeding any further, though, a brief defining of terms is in order; specifically, it is necessary to describe how I understand GIS, GPS, critical GIS, and critical GPS (as an extension of the former) as functioning within the scope of this paper.

Early on, the publication of *Ground Truth* (Pickles, 1995) acknowledged the difficulty of defining GIS: "[T]he definition of GIS varies depending on who is giving it... Two of the central defining characteristics of all geographic information systems are the role of digital electronic data and the production of electronic spatial representations of those data" (Pickles, 1995, 2-3). Further, underlying any

definition of GIS should be an understanding of the technology's functioning as "part of a contemporary network of knowledge, ideology, and practice that defines, inscribes, and represents environmental and social patterns within a broader economy of signification that calls forth new ways of thinking, acting, and writing" (Pickles, 1995, 4).

The publication of *Ground Truth* was part of what Schuurman refers to as the second of three waves of GIS critiques, each of which can be "distinguished by shifts in strategies and motivation on the part of the critic" (Schuurman, 2000, 570). A common critique of GIS, especially over the course of the first two waves, was the question of GIS' competency in the mode of knowledge production, or its use as a mere *tool* of knowledge production. Also characteristic of the earlier debates were critiques of GIS as positivistic. For certain, opinions have varied as to how positivism may be defined in relation to the GIS debates. References to positivism tend to focus on critiques of the technology as value-neutral, or Taylor's suggestion that "GIS inherited an agenda from the quantitative revolution of 'retreating from knowledge to information'" (Schuurman and Pratt, 2002, 292). Later critiques focused on the notion of GIS as socially constructed (Harvey and Chrisman, 1998; Harvey, 2001)—critiques that were largely concerned with how GIS practices shape and are shaped by institutional contexts. Even more recently, much needed feminist critiques of GIS (Schuurman and Pratt, 2002; Kwan, 2002; McLafferty, 2002) have been more attentive to the subject, have dealt "more directly with GIS practices," and have set aside the "antagonistic dualisms" so characteristic of many of the previous debates (Schuurman and Pratt, 2002, 291). Most relevant to this paper, however, is the work of Crampton (1995; 2001; 2003), who, as I will soon discuss in more depth, addresses questions of privacy and ethics around the storage and dissemination of GIS data (Crampton, 1995) and later points out that it is not the technological apparatus itself that is necessarily problematic, but rather our tendency to think about the world in terms of "people and space as at-risk resources to be managed" and subsequently surveilled (Crampton, 2003a, 119). Instead, he suggests, we must think of mapping as a critical practice and ask what counts as acceptable uses of geospatial technologies.

Harley too saw the map as a site of critical inquiry—one which is always enmeshed in power-knowledge systems:

Power comes from the map and it traverses the way maps are made. Maps are a technology of power, and the key to this internal power is cartographic process. By this I mean the way maps are compiled and the categories of information selected; the way they are generalized, a set of rules for the abstraction of the landscape... To catalogue the world is to appropriate it, so that all these technical processes represent acts of control over its image which extend beyond the professed uses of cartography (Harley, 1992, 245).

Crampton is also concerned with the power structures inherent in the map; he sees the map as imbued with its own agency, as producing its own contexts, and he wonders about the possibilities that these contexts hold: “[M]aps and GIS are important sources for the production of geographic knowledge. What are the power-knowledge relations of mapping as they occur against the historical horizon of possibilities and how can that horizon be enlarged?” (Crampton, 2003a, 53).

Given GIS’ powerful role in the production of data about spatial relationships, it is of little surprise that, as Ranu Basu notes, GIS has often been critiqued as a tool that “perpetuates power differentials” (Basu, 2005, 88). One way in which GIS has been said to perpetuate power differentials is through its ability to enable an invasion of privacy:

[I]t is now possible to make educated guesses about any household’s political and religious views, as well as its shopping preferences. ... Indeed, what is most disturbing about this surveillance system—beyond the fact that it is largely unregulated—is that it presumes a notion of closure, a view wherein there is a population of individuals, and where it is possible to obtain measurable knowledge about each. It implies a truly closed society. (Curry, 1995, 80)

The notion of GIS as presuming closure—as creating a tidy package of information about the individual, as constructing measurable knowledge about a population of individuals and invading privacy to do so, is of great interest to this paper. While critical GIS scholars have since addressed these critiques with competence, references to these debates continue to surface in the literature today. More relevant for the purposes of this paper, though, is how the use of GPS with GIS further complicates questions regarding geospatial technologies and the invasion of privacy; in other words, the use of GPS complicates and broadens the ways in which GIS can be used to obtain particular information about a population of individuals.

At its fundamental level, GPS technology is a “satellite navigation system ... provid[ing] specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time” (Dana, 1999). Data from the receiver can then be processed to calculate and map geographical position in real time (Waag Society, 2002). GPS technology has the capacity to calculate within a small margin of error the near-exact location of a particular object or person. This data can then be integrated into a GIS. That is, a GIS acts as a “descriptive database” (CMI, 2000) that can integrate, process, and compare geographic datasets (Ball, 2003). For the purposes of this paper, though, I am most interested in the capability of a GPS system to track an individual’s movements and location in real time. It is true that GIS databases potentially allow for the storage and utilization of very personal information about an individual: “Privacy decreases as the Internet expands and personal data are combined, cross-

matched and disseminated, eliminating the ability to know who knows what about you” (Ball, 2003); however, GPS further exacerbates issues around privacy, consent, and the circulation of personal information by potentially allowing for real-time tracking and thus an always-locatable subject. First and foremost, therefore, a critical GPS would extend or build upon critical GIS by examining the problematics of an always-locatable subject in motion and in real-time.

According to Jeremy Crampton, critical GIS “is concerned with limitations in the ways that populations, locational conflict and natural resources are represented within current GISs, and the extent to which these limits can be overcome by extending the possibilities of geographic information technologies” (Crampton, 2003,1). Critical GIS might also be concerned with the ethics of geodemographics, for example, or the potential use of spatial data to “monitor, model, and control consumer behavior, [with the ultimate goal of] manipul[at]ing the market and consumer identity to enhance profitability” (Crampton, 1995, 86). In any case, the definition of critical GIS put forth by the University Consortium on GIS and conveyed here by Crampton is not incompatible with the main problematic that would fall within the purview of a critical GPS. A critical GPS, likewise, would be concerned with limitations in the representation of populations of individuals at particular locations; however, emphasis would be placed on questions of awareness, consent, and real-time tracking of individuals for particular purposes.

Problematizing Surveillance and GPS

Monmonier’s recent work, *Spying with Maps: Surveillance Technologies and the Future of Privacy* (2002), may easily be read as a position piece on critical GPS. While he does not explicitly invoke the term “critical GPS,” he problematizes the ways in which GPS devices may be used, by whom, and for whose benefit. He is not necessarily quick to demonize all GISs or GPSs and their users, though; rather, his stance is balanced and practical:

As a metaphor for intrusive surveillance, Big Brother is almost everywhere—thanks to Orwell, only systems that monitor weather or forest fires seem to sidestep the pejorative. Some of these fears strike me as silly. ... More akin to Big Brother are video cameras in public places. ... Orwellian scenarios also encompass dataveillance. Integrated analysis of our purchases, memberships, and financial data can tell a lot about who we are and what we’re thinking... (Monmonier, 2002, 170-2)

Here, Monmonier speaks of surveillance and geospatial technologies on a more general level, referring to GIS databases that store personal, geodemographic data, and video surveillance cameras. Ultimately, though, Monmonier's point is to advocate for a precautionary approach that requires an awareness and healthy skepticism of technological apparatuses such as GPS.

Using a Foucauldian framework, Crampton also considers questions of acceptable use around surveillance, and the treatment of the subject "within disciplinary spaces" (Crampton, 2003a, 117). He does so by looking at the "digital cartographic representation of criminality; of how subjects are processed in crime maps," and consequently the ways in which the information from the map acts as a catalyst for "surveillant practices and outcomes in physical spaces" (2003a, 117). In a chapter that describes the ethics of geo-surveillance relative to security and the monitoring of criminality in society, Crampton argues:

[B]y constituting people and space as at-risk resources to be managed, it is all too easy to slide into a discourse of risk and normalization (what is a normal and what is an abnormal risk), and statistics. ... Such a discourse is an extremely limited and impoverished understanding of lived human experience ... [W]e should be able to recognize the need to think critically about the role of geography as a discipline and mapping as a practice in today's efforts to improve security. In Foucault's phrase the effects of security reach 'omnes et singulatim,' or all and each one individually (2003a, 119).

Here, Crampton seems to be moving toward the question of what constitutes acceptable uses of geospatial technologies (in this case, as they relate to crime analysis). He describes several technological configurations that entail digital mapping, some of which also include the use of GPS to monitor criminal behavior: "A more advanced approach is to use GPS. It too often is based on an anklet worn by the offender which can receive GPS signals and transmit its location (through the cell phone system) to the company's monitoring center" (Crampton, 2003a, 130). While Crampton refers here to the use of crime-mapping in criminal surveillance, he indeed broaches the subject of critical GPS, problematizing the ethics of personal surveillance and its effects on the individual. As he notes, people seem willing to surrender what they perceive to be their privacy if they feel that surveillance will make them 'safer' as a result; however, he raises an excellent question—should "surveillance" and "privacy" necessarily be thought of as "terms in opposition to each other?" (Crampton, 2003a, 136). Security is often juxtaposed with privacy and civil rights; "[o]pposing surveillance by appealing to civil liberties is problematic because the latter are easily thought of in different ways" (2003a, 139). While our government understands surveillance as "*securing* civil liberties," Crampton feels that the more productive question is one of "critically understanding what rationalities these technologies produce, and how they are

deployed in policing, policy-making, and politics” (2003a, 139). Of course, putting theory into practice, or “intervention at the level of actual practices” (2003a, 139) is easier said than done, and it is one of the aims of this paper to extend the conversation about what counts as acceptable or unacceptable uses of technologies such as GPS. We will now take a look at two cases that will perhaps make salient the questions that would fall within the purview of a critical GPS. I suggest that by exploring these cases and subsequently by problematizing issues around GPS use, it becomes possible to understand the types of issues surrounding GPS use that may be of interest to critical GIS scholars.

Acme Rent-a-Car

In June, 2001 a Connecticut man sued Acme Rent-a-Car, a local rental company in New Haven, CT, “after it used GPS (Global Positioning System) technology to track him and then fined him \$450 for speeding three times.” (Lemos, 2001, 1). Cases such as this are becoming less and less surprising, and Monmonier too references the Acme-Rent-a-Car case in his recent work:

Equally adept at tracking vehicles, employees, adolescents, and convicted criminals, GPS is very much a surveillance technology, with credible threats to personal privacy. Just ask the former clients of Acme Rent-a-Car, a Connecticut firm that tracked its vehicles by satellite and fined customers for exceeding 79 MPH. (Monmonier, 2002, 13)

Understandably, the idea of GPS-enabled surveillance has caused concern in the public domain as well: “An ordinary trip turned into an Orwellian ordeal for one Connecticut driver, forced to pay multiple fines after a car rental company tracked his every move via satellite” (Stenger, 2001, 1). Similar to Crampton, I find Foucault’s understanding of disciplinary technologies helpful in framing the problematics around the uses of geospatial technologies such as GPS; in particular, references to “Orwellian ordeal,” and the tracking of “every move via satellite” are, in this case, quite reminiscent of Foucault’s description of Panopticism, which reads as follows:

[I]n order to be exercised, this power had to be given the instrument of permanent, exhaustive, omnipresent surveillance, capable of making all visible, as long as it could itself remain invisible. It had to be like a faceless gaze that transformed the whole social body into a field of perception: thousands of eyes posted everywhere, mobile attentions ever on the alert. (Foucault, 1979, 214)

In this sense, the GPS device may indeed be understood as an “instrument of ... omnipresent surveillance, capable of making all visible,” while invisible itself (1979, 214). That is, if a GPS device is installed in a rental car whose driver is unaware of its presence, then it ultimately becomes a surveillance tool that can transform a governing “social body” (in this case Acme Rent-a-Car) into a “field of perception” (1979, 214). The driver, unaware of the presence of the device, unwittingly authors that map that reveals his or her location.

Acme Rent-a-Car’s contracts purportedly state that “vehicles driven in excess of posted speed limit will be charged a \$150 fee per occurrence. All our vehicles are GPS equipped” (Delio, 2001, 1). It is not surprising that, given the fine-print in rental car contracts, few customers if any are aware of this clause, or of the presence of GPS devices in their rental car at the time they sign the rental agreement. There is essentially no evidence, discussion, contractual clause, or FAQ on the majority of car rental websites, indicating that any rental vehicles are GPS-equipped. Based both on Crampton’s discussion of Foucault and the effects of security on the individual, and on Foucault’s notion of discipline, I argue here that such abuses of power entail the implementation of technology as a disciplinary mechanism that is identified neither with an institution (such as Acme Rent-a-Car) nor an apparatus (GPS):

‘Discipline’ may be identified neither with an institution nor with an apparatus; it is a type of power, a modality for its exercise, comprising a whole set of instruments, techniques, procedures, levels of application, targets; it is a ‘physics’ or an ‘anatomy’ of power, a technology. (Foucault, 1979, 215)

Viewed through a Foucauldian lens, GPS can be viewed as a disciplinary technology—one that carries with it myriad implications for accountability, awareness, consent, and unwitting authorship. Interestingly, Crampton points out (in a discussion of the map as social construction), that for Foucault there is no unitary author—power and surveillance are not to be viewed as inherently negative; as he quotes from Foucault, “where there is power, there is resistance” (Crampton, 2001, 242). At this point, Crampton considers the notion of a “*distributed* user/agent relationship in cartography ... where users are their own cartographers” (2001, 242). Here, he seems to be envisioning the “user-as-cartographer” scenario as a strategy of resistance or empowerment, but in the rental car case, one could perhaps argue that drivers unwittingly played the role of user as cartographer, hardly with the result of empowerment. How, then, might we reconcile such strategies of resistance with such circumstances where the role played has the reverse effect? Again, context is key—understanding the ends to which the technology is put is key to how we ought to understand the notion of user-as-cartographer.

On February 20, 2002, in what was referred to as a “landmark case for consumer privacy and for consumer rights,” the Department of Consumer Protection in Hartford, CT issued a press release ordering Acme Rent-a-Car to cease and desist from its practice of tracking customers and fining them for speeding (Dept. of Consumer Protection, 2001, 1). The Department of Consumer Protection’s cease and desist order helps illustrate the atmosphere around questions of acceptable use of GPS technology. I argue that cases such as this illustrate the need to critically consider what counts as acceptable versus unacceptable uses of technologies such as GPS. What constitutes crossing the line with acceptable use of GPS? Must the public experience financial reverberations from technologies such as these in order to perceive them as alarming? Had drivers’ speeds been monitored in the name of ‘highway safety,’ but no fines been imposed, would that have then been deemed acceptable? And finally, when must the user be made aware of their dual role as cartographer? These are questions of awareness, consent, authorship, and control; I suggest that the questions raised by cases such as this may extend the domain of critical GIS by accounting also for issues surrounding acceptable use of GPS technology.

The Amsterdam RealTime Project

Next, we will look at a project in which GPS is used in essentially the same manner as in the car rental scenarios, but its use is put to remarkably different ends. The Amsterdam RealTime project was originally planned as part of the exhibit, “Maps of Amsterdam: 1866-2000,” for the Amsterdam City Archive. Subsequently, the Waag Society, with Esther Polak, designed the online version of the Amsterdam RealTime Project. The mission of the Waag Society follows:

Waag Society is a knowledge institute operating on the cutting edge of culture and technology in relation to society, education, government and industry. With its knowledge Waag Society wishes to make a contribution to the design of the information society. In this it doesn’t let itself be led by technology but instead looks at the possibilities of people, their creativity and culture. The interplay of technology and culture is the driving force of all Waag Society’s activities (Waag Society, 2005, 1).

In their mission statement is not only an implicit dismissal of technological determinism (“it doesn’t let itself be led by technology”), but also an explicit interest in the intersections of technology, social life, and the individual, lived experience. The Amsterdam RealTime Project exemplifies these values particularly well.

The project is based on the premise that “[e]very inhabitant of Amsterdam has an invisible map of the city in his head. The way he moves about the city and the choices made in this process are determined by this mental map” (Amsterdam RealTime, 2002, 1). The project “attempts to visualize these mental maps through examining the mobile behavior of the city’s users,” in order to show users just how “individual the map of Amsterdam can be” (2002,1).

The Amsterdam RealTime project took place between 3 October and 1 December, 2002. During this time, volunteers who wished to participate in the project were equipped with a “tracer unit” comprised of a Personal Digital Assistant (PDA) with integrated GPS. Data from the tracers were “sent in realtime to a central point. By visualizing this data against a black background traces, lines, appear. From these lines a (partial) map of Amsterdam constructs itself” (2002, 1). The maps do not register streets or blocks, but “consist of the sheer movements of real people” (2002, 1). As users move about the city, they construct their own representations of it; that is, they make use of the GPS device in order to create representations of the city (Figure 1).



Figure 1: Map of “Irene (nice-weather-cyclist)”
Image © by Esther Polak & Waag Society.

In a sense, then, participants in this project become “their own cartographer” (Crampton, 2001, 242). While Crampton does not invoke the term “critical GPS,” per se, I extend his discussion (2001, 242) by asking: what are the implications, then, for a critical GPS that

must account for the notion of the user as cartographer, or user as author?

Obviously, immense differences exist between the notion of user as cartographer in the Amsterdam RealTime project and the Acme-rent-a-car case; in fact, the comparison is an admittedly heavy-handed one. The distinction I wish to emphasize is that the Amsterdam RealTime project *invited* public participation; that is, all participants essentially *consented* to surveillance, illustrating Crampton’s point that power and surveillance needn’t necessarily be viewed in pejorative terms. In this case, participants were enabled by GPS technology to act as their

own cartographer—to better understand their own mental map of the city. While the user's representation of the city may certainly be viewed as a social construction that is the product of a technological apparatus functioning in social life, the map in this case is also illustrative of a technological apparatus functioning within the context of consent, awareness, and an interest in the individual's better understanding of their own lived experience. The map is the product, the outcome, of the configuration of the technological apparatus, such that it allows for user consent and embrace's the user's interest in participating in a project whose goal is to provide a more nuanced understanding of the lived environment.

In attempting to better account for the individual's lived experience, and in its real-time tracking of participants as they go about their daily routines, we might also see some overlap between the aims of the Amsterdam RealTime Project and Hagerstrand's concept of Time-Geography. Hagerstrand's time-geography was concerned with the "time-space 'choreography' of the individual's existence at daily, yearly, or lifetime (biographical) scales of observation" (Pred, 1977, 208). Similar to the Amsterdam project, Hagerstrand was interested in describing an individual's "trajectory, a 'daily-' or 'life-path' of movement—a weaving dance through time-space," in order to shift the focus away from what he felt was human geography's tendency to over-emphasize the "'spatial cross-sectional view' of human phenomenon," and focus more so on "people as physically existing individuals" (Pred, 1977, 208-209). The fact that GPS technology can at once be understood as rooted in the concepts and goals of time-geography, and critiqued as panoptic, poses an interesting problematic for critical GIS scholars, and only serves to highlight once again the need for further discussion around the question of what counts as acceptable uses of GPS technology.

Final Thoughts

In the case of the Amsterdam RealTime project, GPS may still be regarded as an instrument of power, as a disciplinary mechanism, but perhaps that is not the question. Rather, the question lies in the anatomy of the mechanism, or in the level of its application. And it is precisely the level of its application that is called into question here. We may rightfully refer to the map as a social construction, as a "contingent and contested representation" (Crampton, 2001, 242). In the case of GPS, though, it becomes even more necessary to consider both the apparatus and the representation it produces in light of the following questions: What does it mean to locate? What are the cultural, ethical, or political implications of creating a mapped space in which the knowing or unknowing user or subject wittingly or unwittingly resides? And, borrowing from Crampton, "Under what circumstances is a map authored?" (Crampton, 2001, 243). That is, the Acme Rent-a-Car case presents a social dilemma at the level of the individual, lived experience; the panoptic use of GPS by Acme Rent-a-Car turns GPS into a disciplinary technology

that wields its power at the individual level, through subversive action. The apparatus itself takes the user as its unwitting cartographer; the fact that corporations can use GPS apparatuses to track the practices of consumers without their knowledge or consent also signals the need for an 'acceptable use' policy relative to these technologies. The Amsterdam RealTime project, on the other hand, uses the GPS apparatus as a means to an aesthetic ends in which the representation produced is a gesture toward the better understanding of lived worlds. In this case, to be tracked and located in the mapped representation is the desired goal—authorship of the map is part of the game. Nonetheless, the Amsterdam project makes for a subject still always locatable in the mapped space, and as such GPS still assumes the role of disciplinary technology. Again, it is not the apparatus itself that necessarily needs to be called into question, but rather the possibilities for levels of application therein. Perhaps, as Crampton suggests, in considering the question of what it means to locate, we should consider various modes of surveillance as indicative of our various understandings of lived human experience (Crampton, 2003a, 119). In this conception, we might understand Acme Rent-a-Car as viewing their customers as “at-risk resources to be managed” through surveillance and GPS tracking (Crampton, 2003a, 119); conversely, for example, we might understand the Amsterdam Real Time Project as conveying a more nuanced understanding of lived human experience—one that uses GPS to illuminate the multiple lived worlds in which the subject resides. While it is not the place of this paper to answer these questions in full, what I hope this analysis has done is shed light on the sorts of questions we might ask about geospatial technologies such as GPS, and open the door for additional analyses that can further expand the domain of critical GIS scholarship.

Acknowledgments

I would like to thank the peer reviewers and the editors for their invaluable comments and feedback, as well as Karen Dias, for her support and insight during the revision process.

References

- Amsterdam RealTime. *Irene: Nice-weather Cyclist*. Image (C) by Esther Polak & Waag Society. 18 Dec. 2002. Sept. 2005. <<http://www.waag.org/realtime/>>.
- Ball, Matt. Concerning ourselves with privacy. Feb. 2003. Nov. 2005. *GEO World*. <<http://www.geoplance.com/gw/2003/0302/0302ed.asp>>.

- Basu, Ranu. 2005. Geosurveillance through the mapping of test results: An ethical dilemma or public policy solution? *ACME: An International E-Journal for Critical Geographies* 3, 87-111.
- Corvallis Microtechnology, Inc. 2000. What is GPS? Nov. 2005. *Introduction to the Global Positioning System for GIS and TRAVERSE*. <<http://www.cmtinc.com/gpsbook/>>.
- Crampton, Jeremy W. How can critical GIS be defined? Apr. 2003. Sept. 2005. *GEO World*. <<http://geoplance.com/gw/2003/0304/0304cgis.asp>>.
- Crampton, Jeremy W. 2003a. *The Political Mapping of Cyberspace*. Chicago: University of Chicago Press.
- Crampton, Jeremy W. 2001. Maps as social constructions: Power, communication and visualization. *Progress in Human Geography* 25, 235-252.
- Crampton, Jeremy W. 1995. The ethics of GIS. *Cartography and Geographic Information Systems* 22, 84-89.
- Curry, Michael R. 1995. GIS and the inevitability of ethical inconsistency. In, John Pickles (ed.), *Ground Truth: The Social Implications of Geographic Information Systems*. New York: The Guildford Press, pp. 68-87.
- Dana, Peter H. 1999. Global positioning system overview. *The Geographer's Craft Project*. Department of Geography, The University of Colorado at Boulder. 1 May 2000. 2 Sep. 2005. <<http://www.colorado.edu/geography/gcraft/notes/gps/gps.html#DODSystem>>.
- Delio, Michelle. Rent-a-Car motto: Speed bills. 12 Jul. 2001. 18 Apr. 2005. *Wired News*. <<http://wired-vig.wired.com/news/print/0,1294,45163,00.html>>.
- Department of Consumer Protection, Hartford, CT. Consumer Protection orders ACME Rental to stop charging consumers for speeding and to return fees to customers. 20 Feb. 2002 11 Dec. 2002. <<http://www.state.ct.us/dcp/Press%20Releases/ACME2.htm>>.
- Foucault, Michel. 1979. *Discipline and Punish*. NY: Vintage.
- Harley, J.B. 1992. Deconstructing the map. In, Trevor J. Barnes and James S. Duncan (eds.), *Writing Worlds: Discourse, Text, and Metaphor in the Representation of Landscape*. New York: Routledge, pp. 231-47.
- Harvey, Francis and Nick Chrisman. 1998. Boundary objects and the social construction of GIS technology. *Environment and Planning A* 30, 1683-1694.

- Harvey, Francis. 2001. Constructing GIS: Actor networks of Collaboration. *URISA Journal* 13, 29-38.
- Kwan, Mei-Po. 2002. Is GIS for women? Reflections on the critical discourse in the 1990s. *Gender, Place and Culture* 9, 271-279.
- Lemos, Robert. 19 Jun. 2001. Car spy pushes privacy limit. *ZDNet News*. 18 Apr. 2005. <http://news.zdnet.com/2100-9595_22-530115.html?legacy=zdn>.
- McLafferty, Sara L. 2002. Mapping women's worlds: Knowledge, power and the bounds of GIS. *Gender, Place and Culture* 9, 263-269.
- Monmonier, Mark. 2002. *Spying with Maps: Surveillance Technologies and the Future of Privacy*. Chicago: University of Chicago Press.
- Pickles, John. 1995. Representations in an electronic age: Geography, GIS, and democracy. In, John Pickles (ed.), *Ground Truth: The Social Implications of Geographic Information Systems*. New York: The Guildford Press, pp. 1-30.
- Pred, Allan. 1977. The choreography of existence: Comments on Hagerstrand's time-geography and its usefulness. *Economic Geography* 53, 207-221.
- Rich, Adrienne. 1986. *Blood, Bread, and Poetry: Selected Prose 1979-1985*. New York: W.W. Norton & Company.
- Schuurman, Nadine. 2000. Trouble in the heartland: GIS and its critics in the 1990s. *Progress in Human Geography* 24, 569-590.
- Schuurman, Nadine. 2002. Reconciling social constructivism and realism in GIS. *ACME: An International E-Journal for Critical Geographies* 1, 73-90.
- Schuurman, Nadine and Geraldine Pratt. 2002. Care of the subject: Feminism and critiques of GIS. *Gender, Place and Culture* 9, 291-299.
- Stenger, Richard. 22 June 2001. Rental driver finds big brother over shoulder. 18 Apr. 2005. <<http://archives.cnn.com/2001/TECH/ptech/06/22/gps.airiq/>>.
- Waag Society. 8 Dec. 2002. Mission Statement. *Waag Society*. Sept. 2005. <<http://www.waag.org/>>.