Refining a Conceptual Basemap: Critical GIS and Political Theory

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Abstract

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Recently, some geographers have turned their attention to some of the undertheorized concepts within critical GIS literature, resulting in the improved understanding of concepts including empowerment, participation, criticism, and the public. Nevertheless, many holes remain, with potential impacts on the future of how geographers critically examine geospatial technologies. This thesis fills one such hole, by critically analyzing the deficiencies in how geographers have conceptualized empowerment and then replacing that conceptualization with a better understanding of power itself. As a result this work provides the first detailed examination of how geographers have used the concept of power in their description of geospatial technologies and practices. In doing so this thesis refines important guiding questions for future research on emerging geospatial technologies.

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Dedication

To Bethie, for her continued love and support

To my parents and to my brother, for

instilling in me a sense of curiosity about the world

Chapter 1: Introduction

Over the past few decades both maps and the process of mapping have undergone dramatic change. Throughout the 1970s and 1980s there was a broad shift from traditional to digital cartography as geographic information systems (GIS) became increasingly popular (Sheppard 1995). While GIS changed many of the ways in which mapping was done, and offered powerful spatial analysis tools, the technology remained costly and difficult to use. These systems thus often remained in the expert hands of the cartographers and government agencies that had traditionally produced maps in the past. More recently, even this seems to have changed. Following from the technological changes of Web 2.0, which emphasized user-centered technology design and collaboration (Wikipedia 2012), many Web-based mapping applications were developed to allow untrained citizens to produce their own maps and spatial data (Crampton 2003; Elwood 2010). In many cases government agencies, and citizens more generally, now rely on untrained 'neogeographers' to provide the spatial knowledge traditionally provided by cartographers (Elwood, Goodchild, and Sui 2012; Goodchild, Fu, and Rich 2007; McMaster 2010).

Naturally geographers, and critical geographers in particular, have not allowed these changes to take place without interrogating their implications for broader social and political processes. Already in the 1980s geographers had begun questioning the ways in which maps naturalize the world in particular ways, thereby hiding and marginalizing other possible representations (e.g. Harley 1989; Harley and Woodward 1987; Wood 1992; Wood and Fells 1986). Similar criticisms were quickly leveled at GIS; in particular John Pickles's (1995) edited collection, *Ground Truth*, made an early attempt at exploring issues including the political nature of GIS, the impacts GIS is having on the discipline of geography, the effects of mass producing

maps, the challenges of community mapping work, and the ethical dimensions to community data rights, among others. In the latter half of the 1990s these issues developed into the GIS & Society research agenda, which Sheppard (2005) argues had seven primary themes: (1) the relevance of GIS to communities, (2) GIS and gender, (3) GIS and ethics, (4) GIS and political ecology, (5) GIS and global change, (6) alternate forms of GIS, and (7) the social history of GIS. In turn many of these themes developed into their own complex research agendas at the beginning of the 21st century, all under the banner of Critical GIS—for example, the first theme developed into the community-oriented Public Participation GIS (PPGIS) agenda and the second developed into Feminist and Queer GIS. Just as these research agendas began to coalesce, technology shifted toward Web-based mapping, and geographers began a new round of research under banners including the geospatial web (geoweb), volunteer geographic information (VGI), neogeography, new spatial media, crowdsourcing, and more (Goodchild 2007; Sui 2008; Elwood 2010). While the technologies, practices, and data have all changed under these new research banners, many of the questions being asked by geographers nonetheless remain the same—questions about democracy and exclusion, activism and inequality, privacy and surveillance, and more (Elwood 2008).

If this history of the past three decades of critical GIS studies appears rushed, that is in part because this history is recounted, in more detail, in the chapters that follow. However, it is also a reflection of the fast-paced nature of the research agendas themselves. In many cases geographers are working hard to keep pace with rapid technological changes, or to ensure that their reconceptualizations of these technologies have applied effects on the world. As a result this body of research has had a tendency to not deeply theorize many of the political concepts

that it has utilized (Bailey and Grossardt 2010). This thesis focuses on providing a deeper theorization of the concept of power, to help fill one of these theoretical holes.

Rationale for Research

Recently, some geographers have turned their attention to some of the undertheorized concepts within critical GIS literature, resulting in the improved understanding of concepts including empowerment (Corbett and Keller 2006; Elwood 2002; Kyem 2001; Ramasubramanian 1998), participation (Bailey and Grossardt 2010; Dunn 2007; Lin 2012; Schlossberg and Shuford 2005), criticism (Crampton and Krygier 2010), and the public (Schlossberg and Shuford 2005). Nevertheless, many holes remain, with potential impacts on the future of how geographers critically examine geospatial technologies. This thesis fills one such hole, by critically analyzing the deficiencies in how geographers have conceptualized empowerment and then replacing that conceptualization with a better understanding of power itself.

Empowerment has long been an important theme within the critical GIS research agenda and within PPGIS literature in particular. PPGIS began as part of the original GIS & Society research program, stemming from concerns that steps should be taken to increase participation in geospatial knowledge production by those that fall outside the (elite) social context that produced GIS in the first place (Aitken and Michel 1995; Rundstrom 1995). Researchers with these concerns needed a practical way to use GIS to empower marginalized voices, and to do so they often "focused normatively and ontologically on supply-driven and pragmatic approaches to engage the public in applications of GIS with the goals of improving the transparency of and influencing government policy" (Sieber 2006, 242). Unsurprisingly this institutionally- and pragmatically-focused political work gave rise to a conceptualization of empowerment that, if

defined at all, also had a policy focus. Thus, for instance, Elwood (2002) defined empowerment in terms of distributive change, procedural change, and capacity building, all of which contextualize empowerment within the relationships between local grassroots groups and government organizations. In essence empowerment was defined, within the context of PPGIS, as the ability of a map to force government agencies to grant local groups certain material objects or capabilities.

It was this notion of empowerment, and the empowering potential of PPGIS work, that led me to join Dr. Michael Gilmore in a PPGIS project with the Maijuna indigenous people (Gilmore and Young 2012). The Maijuna have traditionally inhabited a wide area of the Amazon rainforest in northeastern Peru, but more recent colonial and historical processes have confined them to much smaller areas of land titled to them by the Peruvian government. As a result much of the Maijuna's traditional land remains out of their direct control, and, worse, it is currently threatened by illegal poaching, logging, and proposed development plans (Gilmore et al. 2010; Vriesendorp and Foster 2010). The primary goal of our PPGIS project, which lasted from 2004 to 2009, was to help the Maijuna transform their knowledge of the land around them into the political power to gain control of that land. PPGIS projects have been used successfully for such purposes throughout Latin America (e.g. Gordon, Gurdian, and Hale 2003; Herlihy 2003; Herlihy and Knapp 2003; Offen 2003), and this type of project is well described by an institutionally-focused conceptualization of empowerment.

However, during the course of the project, we found that the PPGIS project had other beneficial effects for the community which fell outside of common definitions of empowerment. For example, our project led participants to feel pride in their heritage, to bond politically with one another, and even to become more educated about their own histories. In many ways these

results fit nicely within frameworks offered by feminist GIS researchers, who have argued that GIS practice can be both performative and affective (e.g. Kwan 2002; Kwan 2007; Aitken and Craine 2009). However, none of this research has connected affect to notions of community empowerment, which we believed was a necessary step to broaden and deepen our understanding of how PPGIS projects affect communities. To remedy this situation, our research asked the following questions:

1. How have GIS researchers traditionally understood the notion of empowerment?
2. What important political effects do PPGIS projects have on communities which escape this notion of empowerment? How do concepts like emotion and affect factor into these political effects?
3. What type of framework can be developed to understand these other forms of empowerment?
4. How might this framework be extended to understanding emerging geospatial practices and technologies?

If PPGIS projects do, in fact, have many important effects on communities which fall outside of our common understanding of empowerment, then it stands to reason that this understanding is flawed. Furthermore, such a flawed understanding has the potential of limiting the ways in which geographers understand the many different political effects that various combinations of technologies and practices have on the world. This is particularly dangerous now, given the ubiquity of emerging geospatial technologies as well as their wide range of uses (Elwood, Goodchild, and Sui 2012). One solution to this would be to simply widen our conceptualization of empowerment, to better encompass the many different beneficial effects of PPGIS work. However, upon further reflection, I continued to question whether simply adding another

framework would provide the necessary insights to fully understand the political implications of geospatial technologies. This approach is limiting for two reasons. First, it is limiting to develop a full model for empowerment without attempting to understand the concept of power at all. Discussions of empowerment tend to become fairly binary—by attempting to describe something as either empowering or disempowering, researchers are asking the fairly basic, and quantitative, question of whether an action increased or decreased the power of an individual or entity. They ask very little about what that power allows the individual to do, since this qualitative question has already been predefined in their conceptualization of empowerment. Second, simply adding additional models of empowerment, or even power, to pre-existing models can lead to increased confusion within the research agenda. Many models of power lie in tension with one another, and using different models all within one research agenda without understanding these tensions can potentially hinder that research agenda. Instead of improving our conceptualization of empowerment, then, what is needed is a better understanding of how the concept of power is utilized within critical GIS research. With this in mind, my research asks the following additional questions:

5. What implicit models of power did GIS & Society and Critical GIS researchers employ during their early work?
6. In what ways are these models of power compatible with one another, and in what ways are they in tension?
7. If tensions exist, can they be theorized in a manner that is productive for research?
8. What new frameworks or questions might this theorization of power provide for research on emerging geospatial technologies?

Thesis Organization

In addition to this introduction, the thesis consists of three additional chapters. The primary contributions of my research are presented in Chapters 2 and 3, each of which were designed to function as stand-alone articles that can be published independently. I should note that Chapter 2 and Chapter 3 were written sequentially, with the research for Chapter 2 preceding that of Chapter 3 by several years. Chapter 2, which has been published by Dr. Gilmore and me in the *Annals of the Association of American Geographers*, recounts my PPGIS work with the Maijuna and attempts to answer questions 1-4 from above. Chapter 3 attempts to answer question 5-8, and it is divided into three sections. The first section reviews early GIS & Society and Critical GIS literature to understand how geographers have understood the ways in which power operates in a through geospatial technology. In the second section of the paper I examine the tensions between the different models of power that I identify in the first section. Finally, in the third section I explore how useful these different models of power are for examining the political effects of the geoweb. With this section I hope to provide readers with useful questions and frameworks for designing future research.

Finally, Chapter 4 concludes the thesis by recounting some of my major arguments and exploring how these arguments might serve to form the basis for my own future research.

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Chapter 2: The Spatial Politics of Affect and Emotion in Participatory GIS

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Introduction

A middle-aged man crouches down over a large hand-drawn map, his eyes sparkling with excitement as he peers down at the new creation. Fellow community-members, from young boys to elder women, crowd in on either side of him, waiting for him to speak. Slowly he begins, addressing the video camera sitting across from him. In his indigenous language, and then in Spanish, he recounts his people's proud history and the enduring connection that they have with the rainforest in which they live. He goes on to explain how they, as a community, have inscribed some of this history and knowledge into the map around which they sit. He then guides the camera through the map, highlighting important sites and praising the beautiful artistry that went into its creation. Toward the end of the narrative the camera pans out, capturing images of the other community members leaning in around the map, each smiling and admiring it. As soon as the camera is switched off, the children rush around it, begging to see images of themselves played back.

The preceding scene took place in 2008 in the Maijuna indigenous community of Nueva Vida in the northeastern Peruvian Amazon. The Maijuna are a western Tucanoan people that have traditionally inhabited this part of the Amazon Basin (Steward 1946; Bellier 1993, 1994).

Currently, there are approximately 400 Maijuna individuals living in the communities of Nueva Vida and Puerto Huamán along the Yanayacu River, San Pablo de Totoya (Totolla) along the Algodón River, and Sucusari along the Sucusari River (Figure 1). The residents of these communities carry out a variety of subsistence strategies, including hunting, fishing, swidden-fallow agriculture, and the gathering of a wide variety of forest products. The four Maijuna communities are recognized as *Comunidades Nativas* (Native Communities) by the Peruvian government and each has legal title to the land surrounding its respective community (Brack-Egg 1998). Unfortunately, the land the Maijuna have been titled represents only a small portion of their ancestral territory; hundreds of thousands of hectares remain outside of their direct control (Gilmore 2010). Additionally, Maijuna ancestral lands are currently under threat from illegal poaching and logging by outsiders. Even more troublingly, the Peruvian government is planning to construct a 130 km long road, with a 5 km development corridor to either side of it, directly through the heart of Maijuna ancestral territory (Figure 1) (Gilmore et al. 2010; Vriesendorp and Foster 2010). This plan, along with the subsequent influx of colonists that would flow into the area, would irreversibly alter the ecological fabric of Maijuna ancestral lands and negatively impact their current way of life.

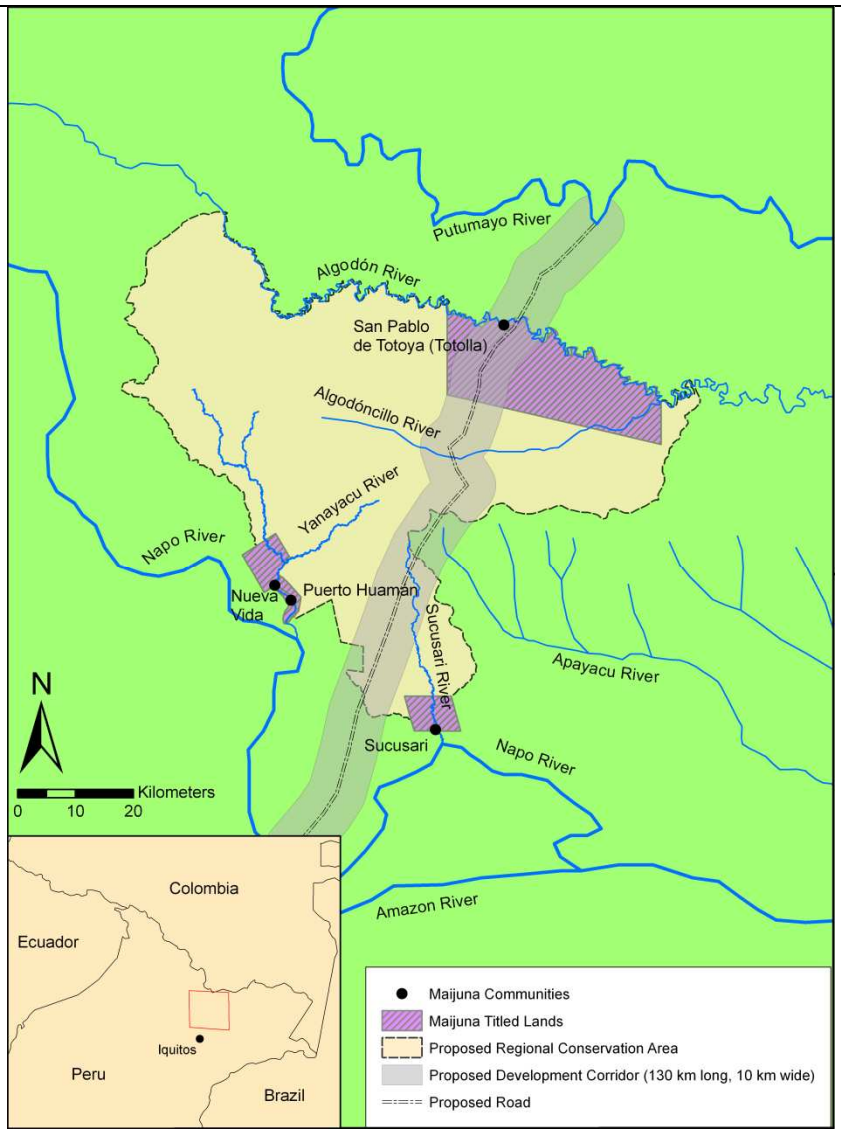

Figure 1. Map of study area illustrating the Maijuna communities, titled Maijuna lands, proposed conservation area, and proposed development corridor. The borders of the proposed conservation area were informed by the mapping work detailed in this paper and were developed in consultation with the Maijuna, regional governmental institutions, and non-governmental organizations (NGOs). It is currently being used by the Maijuna and their allies to promote their vision of a proposed conservation area.

Not surprisingly, the Maijuna adamantly oppose this development scheme and are calling on the *Gobierno Regional de Loreto* (GOREL), the regional government of the Peruvian Amazon, to create a regional conservation area that would legally protect over 336,000 hectares of their ancestral lands and associated biocultural resources (Figure 1) (Gilmore 2010; Gilmore

et al. 2010). To achieve this, the Maijuna invited the authors into their communities to help create a geographic information system (GIS) that demonstrates the historical connection that they have with their ancestral lands. In fact, the scene above describes the making of a video of Liberato, a Nueva Vida resident, describing the participatory map that his community created for this project. By connecting the narratives of Liberato and other Maijuna individuals to their ancestral lands and then populating a GIS with this representation, we hoped to engage the Peruvian government in a political dialogue that could help the Maijuna to achieve the creation of a regional conservation area. Using participatory mapping and GIS in this way, to aid indigenous peoples in getting their voices heard in a wider political sphere, is not uncommon, and the technique has been successfully used in many indigenous political movements throughout the world (e.g. Herlihy and Knapp 2003; Smith 2003; Duncan 2006; Dunn 2007; Corbett and Rambaldi 2009).

However, our beginning narrative hints at another outcome that these projects can have for communities. Instead of merely being a tool used to engage the government, the mapping process itself can have equally important, but less easily represented, effects on those involved. In our case the Maijuna demonstrated emotions like pride, bonded politically, and educated one another with different views on their shared history. Nevertheless, geographers have not scrutinized the relationship between mapping processes and these emotional and affective results to a great degree. In this article we argue that it is critical to better understand these emotional and affective by-products of participatory mapping and GIS work; after all, the final map product is far more effective when the community that created it is mobilized and excited to use it. To make this argument we will first briefly describe our work with the Maijuna within a broader history of participatory mapping and GIS. From there we will begin a three part discussion of the

affective and emotional dimensions of PGIS by problematizing current conceptualizations of empowerment within PGIS literature, developing a model for understanding emotion and affect, and applying this model to our experiences with the Maijuna. Finally, we will conclude with some parting thoughts on how our reconceptualized understanding of PGIS methodologies can strengthen future GIS endeavors.

A Methodology for Participatory Mapping and GIS

Our goal in working with the Maijuna was to create a map that would help them to push for the establishment of a regional conservation area in their ancestral lands. This mapping project took place during four different field seasons, between 2004 and 2009, and mapping was completed sequentially in the communities of Sucusari, Puerto Huamán, Nueva Vida, and then San Pablo de Totoya (Totolla) (Figure 1). We chose to begin the mapping project in Sucusari as one of the authors (M. Gilmore) has conducted community-based research there since 1999 and has built significant communal and personal relationships based on mutual respect and trust.

Notably, participatory mapping has been shown to be an effective means of transforming indigenous spatial knowledge into cartographic forms (Herlihy and Knapp 2003; Corbett and Rambaldi 2009). Geographers began performing participatory mapping after engaging in broad critiques of cartography in the 1980s and 1990s. These critiques attempted to illuminate how maps (as representations) and mapping (as a set of practices) act to legitimize very particular ways of knowing the world at the expense of others. In this way, then, maps served to inscribe specific (and often colonial) power relations by allowing cartographic experts to territorialize the world as they saw fit (Pickles 2003). Participatory mapping thus became a technique by which marginalized peoples could contest these political visions of the world with their own countermaps. While participatory mapping methodologies vary between projects, they generally

include local peoples in the planning and implementation phases, transform traditional knowledge into map, graphic, or written forms, and produce high degrees of dialogue between the participants and the researchers. The resulting maps have been used successfully to help indigenous peoples to achieve goals including the establishment of land rights claims, the production of resource management plans, and the preservation of traditional knowledge, among others (Gilmore and Young 2010).

Given the methodology's emphasis on open dialogue, upon arriving in each community we first approached community leaders to obtain their official permission to proceed. We also asked that a community meeting be held the next day to describe and discuss the project. From here we visited each Maijuna household to extend a personal invitation to the meeting to each community member, and to solicit their participation. It is important to note that after initial mapping work in Sucusari we chose to travel to the other communities with a team of Sucusari participants who had displayed leadership during their mapping process. This team aided greatly in initial introductions and during the community meetings. In fact at each initial community meeting, which we held both to explain the objectives and methods of the project in detail and also to obtain prior informed consent (PIC) from the community and each individual participant, our Sucusari team often took a leading role. The role of the authors, then, became that of technical advisors, responding to the few questions to which our Maijuna team members did not know the answers. Upon obtaining PIC from the community and all participants we began several days of participatory mapping sessions.

One critical element of the participatory mapping sessions was their adoption of the *minga*, or communal work party, which the Maijuna regularly use to clear agricultural fields, construct houses, or build canoes, among other things (Gilmore 2005; Gilmore, Eshbaugh, and

Greenberg 2002). During a minga a host provides food and drink to participants in exchange for labor. To show our respect for communal institutions and traditions, we embraced the minga format and provided meals to project participants. During the mapping sessions we once again often took a subordinate role to our Sucusari team, who were quite effective in explaining the goals and methods of the mapping process, in starting the sessions, and in providing guidance along the way. In each case the participants began by mapping the waterways within their respective river basins, to give the map a physical skeleton that could be used as a reference system when plotting other sites. Upon completion of this reference system, our team explained that participants then needed to decide what types of socially and biologically important sites they wanted to map. When available we showed participants maps created by the other communities, but we would also stress that the participants should come up with their own sites and symbols. Participants would generally begin brainstorming symbols for each type of location that they were going to map. In the case of Puerto Huamán and San Pablo de Totoya (Totolla), participants went so far as to have competitions to see whose symbol would be chosen for the map. In contrast Nueva Vida and Sucusari residents chose their best artists and funneled ideas to them; afterwards they admired and chose the best idea. After the symbols were chosen participants would focus on mapping the different sites that they deemed significant, including hunting and fishing sites, fruit collection sites, historical areas, fields and houses, and sacred sites, among others (Figure 2).

Figure 2. Participants from San Pablo de Totoya (Totolla) adding significant sites to their participatory map.

Recently, many researchers have worked to transform the knowledge represented in participatory maps into digital maps, thereby producing a corpus of work under the titles 'participatory GIS (PGIS)' and 'public participation GIS (PPGIS)' (Sieber 2006). PGIS approaches ask participants to acquire Global Positioning System (GPS) data points for those sites that they noted during participatory mapping, which can then be used to georeference their map within a GIS. Ideally, this step can help confer more legitimacy upon the indigenous map

when viewed by government actors, simply because the map appears more scientific through its use of an 'expert' technology (Duncan 2006; Dunn 2007). Researchers interested in new geovisualization techniques have further increased the ability of PGIS projects to accurately depict the voices of participants by asking how qualitative information might be included in the quantitative space of a traditional GIS (Kwan and Knigge 2006; Caquard et al. 2009; Crampton 2009; Elwood 2009; Elwood and Cope 2009). This work allows geographers to incorporate highly interactive multimedia stories into GIS to allow indigenous peoples to tell their stories through video, photographs, and more (Caquard et al. 2009). With this in mind, our goal became to transform the participatory maps of the Maijuna into an interactive GIS database that would include multimedia that depicted their strong historical connections to the land around them.

Therefore, at the end of each of the community mapping sessions (Figure 3) we selected, with community input, a team of Maijuna individuals well-known for their expertise in traditional cultural, historical, ecological, and geographical knowledge to perform PGIS work with our Sucusari team and ourselves. Since our Sucusari team already had experience with the PGIS process, they were able to help with field logistics and provide leadership. Each team traveled throughout their respective river basin, acquiring GPS points for each site their community had previously mapped. The teams also took photographs of the areas and, when appropriate, performed video interviews about the significance of the site. Maijuna members became very dedicated to this work and most members quickly became proficient in the use of the technology involved (Figure 4). By the end of this project the teams had taken GPS points for over 900 significant sites and had completed video interviews for dozens of the most important locations.

Figure 3 (left). Participants from Nueva Vida surround their completed map.

Figure 4 (right). Participants from the Sucusari community learn to use GPS devices and cameras to record the locations of significant sites.

Upon completion of the participatory mapping and PGIS sessions, we used all of the data to create a finalized GIS map for the Maijuna. In addition to plotting the significant sites, we incorporated links to the video and audio taken during the field work into the attribute table of the map. Currently the authors are working to transform this GIS into a secure web application that can be more easily accessed by the Maijuna in the future. At this time such access to web infrastructure would be restricted to Maijuna visits to the nearest city, Iquitos, but the Maijuna nonetheless view an online database as a long term preservation mechanism for traditional knowledge.

PGIS and Empowerment

The original goal of this project was to create a map that represents the ties that the

Maijuna have to their ancestral territory, so that the Peruvian government would recognize their rights to that land. This goal is consistent with the goals of many other researchers using PGIS methodologies; these researchers design and optimize their methodology to produce a map that can accomplish certain political tasks, many of which fall under the label empowerment. While most works on PGIS do not explicitly define what empowerment means within the context of their project, a few researchers have attempted to construct an analytical framework for understanding the term (e.g. Ramasubramanian 1998; Elwood 2002; Kyem 2002; Corbett and Keller 2006). Elwood (2002), for example, argues that there are three main forms of empowerment taking place within PGIS projects: distributive change, procedural change, and capacity building. Distributive change, which involves the achievement of material change, perfectly describes PGIS projects seeking land tenure and property rights (e.g. Neitschmann 1995; Poole 1995; Herlihy and Knapp 2003; Offen 2003). In contrast, procedural change seeks to alter political processes so that the interests of new groups are given increased legitimacy in decision making (Elwood 2002). PGIS projects which seek control over land-use and resource management seek this type of change, using maps to convince the government that the indigenous community is best suited to control decisions about the land (e.g. Poole 1995; Smith 2003). Lastly, capacity building is "generally framed as an expansion in the ability of citizens or communities to take action on their own behalf" (Elwood 2002, 909). In essence, capacity building makes it easier for an individual or group to achieve distributive or procedural change in the future. Thus, for example, the PGIS infrastructure that justified land rights might become a new data-storage capacity for a community, so that they retain a repository that describes their traditions, their stories, and their ties to the land.

PGIS projects can be quite effective at achieving these types of empowerment for two

primary reasons. First, the virtual format of geographic information technology allows indigenous peoples to transmit their voices out of the forest to various hubs of government power. Even now it is difficult for people like the Maijuna to travel to the major urban centers of Peru. However, once their narratives are virtualized and visualized within a GIS, it becomes much easier for them to transmit those narratives anywhere throughout the world. Second, GIS encodes traditional knowledge within a scientific medium deemed legitimate by many political actors (Elwood 2002; Pickles 2003). Therefore, once the indigenous message reaches the public sphere it is more likely that it will lead to the political attention and discussions that it deserves. The GIS can then serve as the rational and scientific foundation for any resulting laws or decisions. This vision of PGIS and empowerment, then, assumes a deliberative model of politics in which a project will be injected into a rational debate where unbiased actors will determine political outcomes based upon their fair deliberations over accurate representations of the world (Habermas 1991). Within this framework the only truly important outcome of the research is a map that maximizes the indigenous people's chances of achieving distributive or procedural change (or capacities to achieve such changes) within the deliberative sphere. By this logic of empowerment, the driving force behind the development of PGIS methods must be the creation of a politically potent map.

Here we argue that this methodological mentality places too much emphasis on the rational and deliberative aspects of the political system. By viewing the map as simply an accurate reflection of the world that can be injected into a rational political debate, geographers continue to "cling to the notion of a democracy of free thinkers freely thinking" (Thrift 2009, 92). Fortunately, some geographers are beginning to question the implicit connection between pure rationality and GIS. Kwan in particular has argued that geospatial technologies can be a

space for both performing emotional work (2002; 2007) and representing emotions and narratives attached to place (2008a; 2008b). She goes on to argue that “geospatial practices need to be embodied and attentive to the effects of emotions” (2007, 23). However, she also recognizes that much of her previous work has generally been performed on an individual level, and that any effective “politics of resistance needs to be scaled up to the level of collectively practiced feminist politics” (Kwan 2007, 30). This article attempts to build upon Kwan’s observation at a community level. Throughout our PGIS project with the Maijuna we noticed many affective and emotional moments that went into making the map, but that were neither represented effectively by the final map product nor adequately described by current literature on empowerment. We believe that researchers need to better understand how these performative moments affect the political potential of PGIS as a research practice. First, however, it is important to gain a better understanding of just what we mean by emotion and affect.

Theorizing Emotion and Affect

Contemporary conceptions of emotion differ dramatically from many of the earliest interpretations. In fact the very term 'emotion' is a fairly recent one, with roots in concepts such as passions, affections, and sentiments. Some of the earliest understandings placed the origination of affect outside the body altogether, likening them to demons that found a temporary home within the body from time to time (Brennan 2004). Over time Classical Christian theologians developed fairly complex theories relating affect to the soul. They differentiated passions and appetites, which were “movements of the lower animal soul” responsible for hunger, thirst, and sexual desire, from affections, which were tied to the higher rational soul (Dixon 2008, 31). These affections included love, sympathy, and joy, and their presence was a sign “of the order or direction of the will” and of “relatedness to God” (Dixon 2008, 31). For St

Thomas Aquinas, in particular, the path to God was one in which the affections and one's intellect were united in an effort to overcome carnal passions and actualize one's soul or will within the world (Dixon 2008).

This description of affect was inherited by the broader philosophical community, most notably in the work of Spinoza (Massumi 2002; Brennan 2004; Thrift 2008b). Similar to theologians, Spinoza believed that affects were a “manifestation of a striving to persevere in our being, which is our essence” (James 1997, 102). However, unlike theologians, Spinoza ascribed to a neutral monism in which mind and body were composed of the same substance as both Nature and God. By this logic the strivings of Nature and individuals can easily bleed into one another. Affect became “capacities to act and be acted upon” as determined by the body's position in and relation to the world (Siegworth and Gregg 2010, 1). Through affective relations with the world “the power of acting of the body itself is increased, diminished, helped, or hindered” (Spinoza 1883, 106). We feel positive affects when our power to act in the world increases, and negative affects when this power diminishes (Massumi 2002; Brennan 2004).

Beginning with the Scottish Enlightenment many philosophers attempted to de-Christianize the mental states and provide a scientific alternative (Dixon 2008). Emotions thus became passive and non-cognitive states that were experienced by the body and could be explained by the physical sciences. This shift in discourse towards emotion provided a perfect foundation for what came to be known as the James-Lange theory, which postulated that emotions were psychobiological phenomena triggered by the autonomic nervous system or by subcortical brain processes (Dixon 2008; Greco and Stenner 2008a; Scherer 2005). More recently, experimental psychologists have mapped these brain processes to reveal emotions as bodily response systems composed of many different components. In this scenario emotions are

packages of many different bodily functions that produce a coherent response to some stimuli. However, these interpretations of emotion are highly territorialized by the psychobiological sciences, and social scientists have now begun to offer alternate understandings of emotion.

Critical to this social turn was the two factor theory, which argued that emotions are composed of a biological arousal factor and a cognition factor that interpreted the arousal (Greco and Stenner 2008a). Proponents of this theory posited that the biological factor played a "minor role of supplying undifferentiated arousal" while "the cognitive system had the more subtle job of lending specific emotional meaning to this arousal" (Greco and Stenner 2008a, 8). By dividing the cognitive from the biological, these social scientists were able to argue that emotions are a "discursive, dialogical phenomena, structured by the historical and cultural contingencies of communicational interactions" (Greco and Stenner 2008a, 9). Within geography the distinction between biological and cognitive factors remains contentious, and much of the active critical debate focuses upon delineations between the biological concept of affect and the socially oriented notion of emotion (Thien 2005; McCormack 2006; McCormack 2007; Greco and Stenner 2008b; Smith et al. 2009).

Nigel Thrift (2008a, 2008b, 2009) is perhaps the geographer most strongly associated with affect, and he attempts to define the term using a cluster of concepts. First, affect is a biological and embodied process that can be difficult to represent socioliguistically (Thrift 2009). Here Thrift's interpretation is reminiscent of earlier psychobiological work. However, he also draws on more contemporary biological work to prove that emotions are driven by deeper bodily functions, felt pre-sociolinguistically as affect (Massumi 2002). For example, Thrift (2008b) draws inspiration from Silvan Tomkins's affect theory, which holds that a biological affect system has developed alongside the four other basic systems of human functioning (Demos

1995). This affect system presents a direct connection between an organism and the environment because it allows any stimuli in the environment to directly trigger changes in the density of neural firings in the brain of the organism. These changes in density are felt as affects (Demos 1995). Tomkins based this affect system in the face, which he saw as the portal between organisms and their environment.

Tomkins (1995) also argued that the face could transmit affect to others. This brings us to Thrift's (2009) second contention—that affect is a set of flows that moves through bodies via processes of mimesis and entrainment. Tomkins (1995), for example, argued that seeing another person smile makes it more likely that the viewer would also want to smile. Since the act of smiling itself is responsible for making an individual feel joy, the affect itself, and not just the smile, is actually transmitted from person to person (Tomkins 1995). Thrift (2008a) finds confirmation in this epidemiological model of affect from philosopher Gabriel de Tarde (1899), who argues that most human action is based on unconscious imitation. While Tomkins and de Tarde rely heavily on the role of sight in producing mimesis, Brennan (2004) argues that pheromones play a critical role in affective entrainment. While Brennan does recognize that pheromonal signals can be interpreted in different ways based on a person's history, she believes that these pheromones give spaces affective atmospheres that produce a tendency for those in the space to “converge emotionally” (Hatfield, Cacioppo, and Rapson 1994, 5).

However, Thrift (2008a, 2008b, 2009) goes a bit further than simply claiming that affect can move from body to body; by drawing on Gilles Deleuze's writings on Spinoza (Deleuze and Guattari 1987; Deleuze 1988), Thrift draws affect outside of the subject altogether. Deleuze (1988, 125) is interested in “laying out a *common plane of immanence* on which all bodies, all minds, and all individuals are situated”. For Spinoza (1883) this common plane, or Nature, was

constantly moving deterministically toward its being following God's rules. While Deleuze is willing to “take the step of dispensing with God,” (Massumi 2002, 36) he continues to describe affect in terms of the intensity of a body's attunement with the movement and self-organization of the world around it. Implicit in affect, then, is the interplay between the unactualized potential of all bodies and the functional limitations placed on this potential by the actual; in other words, the emergence of the actual from the virtual (Massumi 2002). Returning to Thrift (2009, 88), this conceptualization culminates in affect as a “set of flows moving through the bodies of human and other beings” to produce certain effects on those bodies. This points to why affect is so politically important—it is what causes us to act, to bond with others, to laugh together, and more; it is the “prepersonal intensity corresponding to the passage from one experiential state to another and implying an augmentation or diminution of the body's capacity to act” (Massumi 1987, xvii).

While Thrift associates the intensities and flows of affect with the political and social, many geographers studying emotion criticize his approach for being masculinist and dismissive of power geometries (Thien 2005; Tolia-Kelly 2006). As Thien (2006) points out, Thrift and other proponents of affect theory tend to avoid cuddly descriptions of emotion. Instead, they rely on intellectually dense philosophies that “re-draw yet again not only the demarcation between masculinist reason and feminized emotion, but also the false distinction between 'personal' and 'political' which feminist scholars have extensively critiqued” (Thien 2005, 452). Tolia-Kelly (2006) goes further to argue that Thrift's transhumanist theories ignore the ways in which different bodies have different capacities for being affected due to “their racialized, gendered, and sexualized markedness” (215). Because affects are always expressed as emotions within social situations, they are always mediated by social processes that are rife with inequalities and

uneven power geometries.

Given these criticisms of theories of affect, it isn't surprising that many geographers of emotion adopt a constructionist view in their analysis. These approaches view emotions as social products that are “constructed in and by social contexts” (Gobert 2009, 72). While emotions are embodied and biologically based, it is “impossible to separate physiological factors from the linguistic tools we use to understand these factors” (Gobert 2009, 72-73). Therefore, Tolia-Kelly (2006) argues that geographers need to unpack emotions to better understand how they are produced by and within bodies that have specific social contexts. Within many such works authors stress the relationality of experiences and identity, the power of feminist theory, and the importance of narrative to unlocking emotional perspectives (Thien 2005).

This represents a wide range of theoretical positions from which to understand affect and emotion, and each position along this range comes with its own complexities, strengths, and weaknesses. However, many others recognize that emotion and affect necessarily resist rigorous theoretical conceptualization, and these writers have embraced the blurred and provisional meanings of the terms they deploy (e.g. Lipman 2006; Greco and Stenner 2008; Smith et al. 2009). Since this article is merely attempting to initiate discussion about any less-than-representational effects of PGIS methodologies, we believe the best approach here is to take as broad of an interpretation of affect and emotion as possible, in order to serve merely as a beginning point for future work. Therefore, within this article we will take a two-factor approach of our own, but one that values the biological and the social equally. Our approach makes the following assumptions:

1. We acknowledge that affect and emotion are blurred and closely related concepts, and

will sometimes refer to them together as “affect/emotion”. This allows us to recognize the need to discuss them in a unitary fashion.

2. Affect/emotion is very complex, having biological causes and effects as well as social causes and effects. We will refer to psychobiological manifestations of affect/emotion as 'affect' and social manifestations as 'emotion.'

3. Because it is psychobiological, affect manifests itself through many different bodily functions, from subcortical brain processes to facial expressions. These bodily functions are felt, sometimes in manners that can be sociolinguistically represented as emotions and sometimes in more non-representational manners (Thrift 2008a; 2008b). Regardless, affect always changes a body's capacity to act in the world and is often felt as a sense of vitality (Massumi 1987). In this manner affect can be highly political.

4. While we recognize the potential power of transhumanist philosophies, we prefer to avoid too dense of a theoretical position. After all, many of the moments of affect/emotion that inspired this article manifested themselves through the sharing of personal narratives, and therefore took the form of socialized emotions. Affects can, and often are, expressed sociolinguistically as emotions. Therefore they should be analyzed with an eye toward the social context and positioning of the body that expressed them. In this sense emotions are every day, embodied feelings mediated by many social factors.

5. Affect/emotion is contagious, and spreads through a number of complex physiological (affective) and social (emotional) interactions. These interactions may include mimesis (Tarde 1899), entrainment (Brennan 2004), emotional discourse/emotives (Lutz 2008), and more. Affect/emotion also tends to be sticky, meaning that past affective/emotional experiences may remain with and influence a body in future situations (Ahmed 2010).

In summary, affect/emotion is sometimes felt in non-representational and biological ways and sometimes associated with and represented by socialized emotions. It can be triggered by a number of biological and social processes, tends to spread throughout groups, and can have long-lasting effects. Lastly, it is deeply political in its propensity to drive action (or inaction) and in its complicity with longstanding power geometries. With this general interpretation in mind, we now return to our PGIS work with the Maijuna.

Affective/Emotional Eruptions

In this section we argue that methodological choices made during PGIS projects can produce important affective/emotional geographies among participants. One of the earliest methodological choices that we made, particularly when traveling with our Sucusari team, was to personally visit each of the houses in the communities to spread word of the project amongst potential participants. We relied heavily upon our Sucusari team to introduce us to the community members, so that it was easier to build at least a base level of trust with them. Since our Sucusari team members were often familiar with the new participants, they often met one another with embraces, jokes, and laughter. From the perspective of Tomkins's (1995) affect theory, these introductory meetings spread positive affect through smiles and even laughter. Similarly, the Sucusari team members may have given off other signs of their excitement, from a familiar embrace to Brennan's (2004) affective pheromones. These highly affective encounters opened the new participants up to the idea of participating in the project and embracing the authors as new friends. During these first meetings the owners of each household would often take on the role of hosts, offering our team food and drink and sharing personal stories about their respective community. Our Sucusari team members would then begin to articulate some of

their feelings of excitement for beginning work in the new community. This discourse connected the idea of the mapping process, which was often quite foreign to new participants, to emotions like excitement and pride. These emotional statements can be understood as emotives, or words that "perform feelings" (Greco and Stenner 2008c, 61). By sharing in the performance of these emotives, the new participants began to feel more excitement themselves. Thus, the new participants would often echo the excitement expressed by the Sucusari team, in addition to expressing hope that they could achieve the same mapping successes that the Sucusari community had already achieved.

These methodological choices angled the new participants toward the project based upon the affects/emotions elicited during preliminary conversations (Ahmed 2010). Thus, at each communal meeting many of the Maijuna with whom we had met were eager to learn more about the project. We felt that the use of the minga as a space for the mapping sessions was important for maintaining this comfort and excitement. Since the minga is a social forum that the Maijuna regularly use to engender participation in large projects, our use of it showed that we respected Maijuna social practices and norms. It also allowed us to reciprocate the hospitality that the Maijuna had already shown us. Thus, our culturally-informed methodological choice in using the minga format provided a perfect space for the creation of an affective/emotional atmosphere that could supercharge the exchange of both affective (visual and pheromonal) signals and emotional discourse.

When asked to begin mapping their traditional lands, the participants were forced to negotiate with a number of competing discourses and social processes. While much of the discourse surrounding the project itself was couched in terms of excitement and political potential, the participants were also painfully aware of the history of colonialism that had erased

them from official Peruvian maps and obscured much of their traditional knowledge. These emotions were then compounded by contemporary processes including logging, poaching, and proposed development. In contrast, the process of mapping allowed the Maijuna to produce a new imaginary for their world, one in which ownership rights provided them the opportunity to preserve traditional knowledge and the natural resources upon which they rely.

Participation in this re-territorialization of the world became a point of pride for many of the participants. For example, they often took pride in the amount that they knew about their people's history, and their participation was rewarded as other participants treated them and their knowledge with respect. For many of the participants the process also became more than the act of simply recording a history—it also became a performance of ownership, community, and heritage; a statement that the Maijuna lived in the forest; and a demand to be recognized by the Peruvian government. The traditional names for rivers or historical sites became proof that the Maijuna had a right to the land. In other rare instances participants no longer knew the historical name of a site due to the erosion of traditional knowledge. However, a strong connection to that site often remained, either because a Maijuna family farmed or hunted near it or because of other recent experiences in the area, and the participants would rename the site (in both Spanish and Maijuna) based upon that connection. Thus, the participants were able to use these opportunities to reassert their ties to the land within the lexicon of the map. This performance of naming-as-power rewarded participants by officially tying their spatial activities to the land.

Here, we should note that active participation in the mapping sessions did vary along gender and generational lines, and that these divisions undoubtedly had an impact on the ways in which the project affected different participants. After all, if certain individuals felt less able to participate in the naming of traditional sites, then they likely felt the affective/emotional effects

of that process differently. When inviting participants to the mapping sessions we were careful to welcome all members of each household to participate, and we found that entire families often did attend the sessions. However, men did tend to actively participate in the project the most. Naturally, this was not always the case; women with higher status in the communities would participate as much or more than some of the men in their respective community. We were cognizant of these gendered dimensions to participation throughout the project, as well as the difficulty of balancing respect for Maijuna traditions (including traditional gender roles) with our desire to empower all participants equally. In the end, given this balancing act and our own position as two male researchers, we chose to simply do our best to create a safe space in which all individuals, regardless of gender or age, felt that they could participate equally.

Nevertheless, it is likely that the adult male participants felt the effects of the produced affective/emotional geographies in different ways than other participants. For example, when not actively participating in the creation of the maps, adult female participants often used the sessions to sit with their children, helping them to understand the mapping process and to appreciate the traditional knowledge being discussed. These roles, as both teacher and mother, have their own affective/emotional dimensions and deserve far greater attention (Watkins 2010). Therefore, we do not believe that the gendered and generational dimensions of our study undermine our broader argument that PGIS practitioners should pay closer attention to the connection between methodology and affective/emotional geographies. Instead, we believe this project points to the need for future research that further analyzes the affective/emotional micro-geographies that produce different effects in different participants (Thien 2005). This will allow geographers to better understand the ways in which PGIS projects empower (or disempower) different participants to different degrees based upon their own methodological choices.

In addition to the performance of mapping, our methodology also allowed space for participation into more artistic realms. When participants were asked to choose symbols to represent different significant sites on the map, they took it upon themselves to brainstorm and create the best symbols. Individuals and teams were encouraged to compete against one another to see who could come up with the best idea, and they were rewarded for both their creativity and their artistic ability. This same level of creativity was also applied throughout PGIS activities; the Maijuna began taking great pride in setting up photographic and video opportunities. Without any prompting from either of the authors, the field team would often set out to find the perfect spot from which to take a photograph of a site, and they would even cut down branches or trim high grass to optimize the scene. For example, when Nueva Vida participants arrived at an old cemetery site, they trimmed grass and removed branches from around the graves to show respect for the deceased. They also began scripting the video interviews by writing out small speeches and choosing good spots to take the video. They became very proud of how their videos represented their people's history with the land.

While this pride in oneself and one's history is important in itself, it is also highly political. As Goffman (2008) explains, social encounters allow individuals to receive confirmation from others that they are acting in socially appropriate ways. Individuals feel rewarded when they receive this confirmation (Hochschild 2008). In the case of the Maijuna participants, our methodological choices facilitated the performance of different modes of ownership, pride, and identity. They then received confirmation, from both the authors and other Maijuna participants, that this was an appropriate way to perform. In fact, by encoding their performance in an authoritative technology which could be shared with government actors, it was symbolically proclaimed that their performances were valuable to actors far outside of the

mapping process itself. This valuation flies in the face of hundreds of years of governmental practices that deemed any performance of indigeneity as inappropriate (Yashar 2005). In this case the authoritative and communicative nature of the technology, the presence of the authors as experts, and the power of group recognition all served to transform the map into a political affirmation of a Maijuna right to re-territorialize land based upon historical ties and traditional knowledge. Therefore, the newly created map became far more than a representation of knowledge; it was also a "cluster of promises" that the Maijuna should and could act politically (Berlant 2010).

Importantly, these promises can have enduring effects. To prove this we turn to Collins (2008), who has examined the relationship of emotions to long term social cohesion. He argues that conversations act as rituals that determine who gets to be a member of a social group. According to Collins (2008, 135) it is "not important whether what is said is true or not, but that it can be said and accepted as a common reality for that moment, that makes it an emblem of group membership." In the context of PGIS work, this means that whether or not the project produces an accurate representation of the world, it can still produce social cohesion if all the participants feel the same way about that representation. The two key factors for producing social cohesion are common conversational resources and a common emotional tone (Collins 2008). Thus far we have looked primarily at how the PGIS process produces common emotional tones among participants. However, it also produces new (or reproduces old) conversational resources that the emotional tone can continue to feed off of into the future.

Many of the participants initially became interested in the project because they were curious about what they had heard about the mapping process or field work. Others were interested in learning more about the history of their own ancestral lands since, in many cases,

traditional knowledge about different places was declining and degrading over time. Many of the children and teenagers of the communities would crowd around their parents as they worked on the participatory map, and they would listen with great interest as the adults discussed the histories of different sites. Even the adults would learn from one another during the project, and particularly from elders of the community. At times none of the participants knew or could remember the history of a particular location, but their desire to learn led them to go out into the community and seek others with the necessary knowledge. This knowledge exchange was not restricted to a single community, either; many times Maijuna individuals from other communities would come to listen to the mapping sessions taking place in other communities. This process allowed a transfer of knowledge between communities of different river basins, ultimately providing individuals with a more complete and comprehensive picture of Maijuna traditional knowledge. Additionally, this learning process extended past the mapping sessions and into the field for PGIS data collection. As the teams travelled to different historical sites, team members would recount detailed histories of the land through which we were travelling. Many of these narrative moments were recorded on video, and then shared again when the team returned to the community. PGIS team members also often learned to use cameras and GPS units, so that they could take more ownership of the PGIS process. They often became fiercely proud when they returned to the community, were able to share the pictures that they had taken, and then tell stories about both the site and our visit to it. In the long run we hope that the maps, and eventually some form of GIS database that includes these multimedia data, will preserve these conversational topics for generations to come. In this way they may continue to contribute to some sense of Maijuna community, and to elicit some of the affective/emotional responses to the PGIS project.

Much of this discussion has been grounded in theories of emotion, but affective elements should not be discounted; the mapping process often also produced an affective atmosphere that escaped emotional representation. Returning to Massumi (2002) we would argue that the mapping process in general produced a sense of vitality within the participants, opened them up to potential in the world, and augmented their capacity to act on this potential. Many times during the mapping and PGIS process the Maijuna would lapse into discussions of uses for the map, including its use as a claim to their land, as a teaching vehicle for their children, as a tool to control logging in the area, or even as a tool to spur sustainable job opportunities like ecotourism. These were important bonding moments for the Maijuna and also moments that stressed the importance of the project. At times notions of political responsibility would also help participants overcome disappointments. For example, at one point during one of the community mapping sessions, participation was low and those present commented that it was disappointing that more members were not present. Another participants responded, “Such is life, we must remember this is for our children, our grandchildren.” They then continued on to ask us about the future functionality of the final GIS and what its implications might mean for their children. At another point a rumor circulated that the regional government had already accepted the proposal to establish a regional conservation area in Maijuna ancestral lands. Although this acceptance might have made the original political purposes for the maps moot, the participants did not find the project any less relevant. When we asked one participant whether or not the map was still important, he replied,

> “Yes. Nothing is certain yet. We don’t know what the company [that wants to build a road through our land] is going to do, and we don’t know what the people want to do with the map.”

He believed the map was the key to finding out how the Maijuna people want to manage the land if a regional conservation area is established. This showed how participants in the project were able to see past the original goals of the project, took ownership of the process, and could imagine that process leading to outcomes other than those prescribed by us.

Conclusion

With this article we attempted to show how the Maijuna PGIS project produced many important results that remained outside of the representational space of the final map product. Regardless of whether one classifies these results to be emotional or affective, they are results that directly benefitted those involved in the project. They are also a result of some of the methodological choices that we, as researchers, made and the ways in which we positioned the project within the communities. Had we stressed audio instead of video, downplayed creativity or artistry during the mapping process, not utilized the minga as a forum for the mapping, or not taught the Maijuna to use GPS and cameras, then the project may not have achieved these same results, even if it did still produce an effective map. Therefore, we would argue that these affective/emotional results are something researchers need to think more about when designing their PGIS methodologies. Maps are powerful, not only because of what they represent, but also because the process of mapping forces communities to come together and think about how they share the spaces in which they live. These results are not only intrinsically important, but they also make the community more likely to be excited about using their mapped product, adding political value to the map itself.

While we primarily made methodological choices in order to produce positive political outcomes for the Maijuna, researchers can also make them to prevent or mitigate negative results for the research and participants. After all, emotions including anger, jealousy, and resentment

can devastate communities and political movements. When dealing with data and methodologies that can so powerfully affect a community's wellbeing, researchers must tread carefully to avoid negative consequences; the recent controversy over the first Bowman Expedition clearly demonstrates these dangers (Steinberg 2010). During this Expedition, in which Herlihy (2010) used participatory mapping to study Mexican land policy, a local indigenous activist accused the researcher of hiding their military funding source (Agnew 2010; Bryan 2010; Cruz 2010; Steinberg 2010). Regardless of whether Herlihy actually violated human subject ethics, there is no doubt that meta-level research decisions—funding sources, prior informed consent, and data accessibility and dissemination—have produced a great deal of alarm and confusion for the communities involved (Herlihy 2010). Thus, even if the researchers did fulfill ethical requirements at the beginning of the project, they still could have made certain methodological choices (lengthier discussions about funding and data dissemination rights, etc.) to further benefit the affective and emotional wellbeing of the communities. While it can be difficult for researchers to predict how participants will react to, (re-)interpret, or politicize different aspects of a research project, a better understanding of the emotional and affective dimensions of participatory research can only help researchers to be more prepared for these unforeseen consequences. It may also help to reinforce the importance of treating ethics as an important, difficult, and dynamic process that researchers must constantly negotiate with participants.

Naturally, we do not want to detract from the power of the actual map produced by the Maijuna, nor reinforce a boundary between representational and non-representational thinking (Del Casino and Hanna 2006; Sparke 2011). We hope that the map that the Maijuna created will bring them powerful political results, as a representation of their longstanding connection to the land around them. However, that is only half of the picture. In fact, we hope the map itself can

produce certain affective/emotional geographies beyond the stage of production, particularly with the inclusion of qualitative data like videos and photographs. Ideally, the video narratives included in the map will affect policy makers on a visceral level and not simply intellectually (Aitken and Craine 2009). That is, of course, one of the main reasons for going to the trouble of including video in the GIS; text would, after all, impart the same information to the user. But, in the end, it would leave out a great deal of the qualitative and emotional experience.

By way of conclusion we would like to leave the reader with a few final thoughts about how affective/emotional geographies could engage productively with two current strands of critical GIS thought: neogeography and qualitative GIS. By neogeography we are referring to a trend in which citizens, or neogeographers, with little background in cartography or geospatial technologies are taking advantage of Web 2.0 technologies to produce their own maps or mash-ups (Sparke 2011). These neogeographers each work with their own computer or mobile device to contribute partial truths that are made more accurate by a larger crowd. We believe that a closer look at many of these neogeographic projects from an affective/emotional perspective may problematize this discourse of crowdsourcing. Individuals, just like communities, can be affected by a whole range of choices made in the construction of neogeographic products. As the division between map producer and consumer continues to become blurrier, we imagine that the emotional geographies produced by maps will become ever messier and more powerful (Del Casino and Hanna 2006). Geographers must remain aware of these effects as they engage in their own activist research.

Finally, the qualitative GIS movement is attempting to capitalize on many of the multimedia experiences we described above, and many qualitative geographers have begun to ask what a qualitative GIS might look like (e.g. Elwood 2009). With this article we argue that

this is the perfect opportunity to stress the qualitative experiences that go into creating a map, and not just the qualitative data inside the map. It is time to start investigating how a qualitative GIS might not be solely about the map produced and displayed on the computer screen. Perhaps it is also the many qualitative experiences and affective geographies that go into, and come from, producing that map.

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Chapter 3: An Archaeological Excavation of Power: Toward a Framework for the GeoWeb

Beginning in the late 1980s and early 1990s a number of threads of critical thought, drawing primarily from feminist and poststructural theory, converged to destabilize the map as an expert and objective representation of the world (e.g. Harley 1989; Pickles 2003; Harley and Woodward 1987; Wood 1992; Wood and Fells 1986; Sparke 1995). Around the same time geographic information systems (GIS) were being increasingly used within the discipline, which caused critical cartographers and geographers "more than a few discomforts and anxieties" (Sheppard 1995, 5). In successive waves of criticism these geographers extended many of the earlier representational critiques of maps into the realm of GIS, and also added increasingly nuanced levels of technological critique to the mix (Crampton 2009; Elwood 2009a; Leszczynski 2009a, 2009b; O'Sulllivan 2006; Pickles 1995; Schuurman 2000; Sheppard 1995, 2005). Like the earlier critiques of cartography, this emerging critical GIS research was primarily driven by a desire to expose the ways in which GIS practices are both an effect of and complicit in power relations, rather than purely objective forms of scientific knowledge production.

This concern over power naturally extended to several areas of study, including critiques of epistemology, imperialism, surveillance, and scientific objectivity, among others (Schuurman 2006). Additionally, as the research agenda matured many geographers turned their sights from performing pure negative critique of GIS to posing constructive methods for including new voices and ways of knowing within the map. Thus, in addition to exposing the harms of GIS, critical GIS research also worked to harness this 'expert' technology to empower marginalized communities and, more generally, marginalized discourses and epistemologies. As a research agenda this work included pursuit of a wide range of objectives, including an examination of the

relationship between mapping and identity production or performance (e.g. Aitken and Craine 2009; Brown and Knopp 2008; Crampton 2009b; Kwan 2002, 2007), education and the preservation of local knowledge systems (Corbett and Rambaldi 2009; Pearce and Louis 2008; Tripathi and Bhattarya 2004), knowledge production as a form of power-in-and-of-itself (e.g. Elwood and Cope 2009; Knigge and Cope 2006), community empowerment within existing political structures (e.g. Corbett and Keller 2006; Dunn 2007; Elwood 2002; Gilmore and Young 2012; Rambaldi et al. 2006; Tate and Hogrebe 2011), and wider critiques of society (e.g. Crampton 2010; Rundstrom 1995; Wainwright 2008). As a whole these critical engagements with GIS have broadly centered "around similar questions of inclusion, exclusion, and knowledge claims" (Elwood 2010, 351). Thus, despite all of the variation in this literature, the question of the politics of participation in spatial knowledge production, and thus the question of how power operates through and within the map, remains central to critical GIS literature (Elwood 2008, 2010; Elwood, Goodchild, and Sui 2012).

It is surprising, then, that critical GIS literature contains little to no systematic theorization of how researchers have understood power, or even normative political theory (Bailey and Grossardt 2010). More recently researchers have attempted to solidify some of the theoretical underpinnings of the research program by scrutinizing concepts such as criticism (Crampton and Krygier 2010), participation (Bailey and Grossardt 2010; Dunn 2007; Lin 2012; Schlossberg and Shuford 2005), empowerment (Corbett and Keller 2006; Elwood 2002; Kyem 2001; Ramasubramanian 1998; Young and Gilmore 2012), and the public (Schlossberg and Shuford 2005). The concept of power, however, remains conspicuous in its continued undertheorization. As Low (2005) points out, this might reflect a wider inability of geographers to conceptualize power in a deep sense; he believes that the ubiquity of the term within the

discipline has allowed many researchers to deploy theories of power without rigorously questioning the assumptions that affect this usage.

Ultimately Low (2005) concludes that "it is perfectly possible to coherently and productively talk about politics […] without necessarily being very precise about what power is." (87) Against his conclusion this paper argues that it is important for critical GIS researchers to better theorize their understandings of power, particularly because power underlies many of the questions critical GIS projects continue to pose. For example, if inclusion within a map lends a certain type of power to particular spatial discourses, then it is critical for geographers to understand how this power impacts the negotiation of wider geographical imaginations. More importantly, without this understanding it becomes more difficult to understand how this form of power interacts with other forms of power, such as the power generated by technologies of surveillance. Thus, for instance, models of power can help geographers to negotiate the ways in which critical GIS work both empowers communities, by including their discourses within maps, and disempowers them, by encouraging them to volunteer information which can be used to surveil them.

Furthermore, fundamental shifts in geospatial knowledge production currently provide persuasive reasons as to why we must begin this theorization now. These shifts, growing out of the technological possibilities of Web 2.0, are increasingly allowing people with little cartographic expertise to both contribute and use maps and spatial data during their everyday lives (Crampton 2003; Elwood 2010). With increasing ubiquity these users are able to check reviews of nearby restaurants on their mobile devices, to share georeferenced photos with their friends and relatives, and even to contribute to international aid efforts by helping to construct global maps (Elwood, Goodchild, and Sui 2012). Along with these changes in geospatial

technology has come increased governmental interest in the utilization of citizen-produced geospatial data (Elwood, Goodchild, and Sui 2012; Goodchild, Fu, and Rich 2007; McMaster 2010) and increased design of geospatial technologies for the participation of citizens in self-governance and democratic mobilization (Elwood, Goodchild, and Sui 2012; Elwood and Leszczynski 2012).

The effects of this phenomenon, which go by names including the geospatial web (geoweb), volunteered geographic information (VGI), crowdsourcing, and neogeography, have fundamental implications for the politics of participation behind geospatial knowledge production, and thus for the power of maps in general. The widespread influx of neogeographers into the geoweb represents a fundamental shift in who is actively participating in the negotiation of geospatial knowledge, data, and representations. For some this represents a radical democratization of cartography, while for others this signals the production of new inequalities and tyrannies (Elwood, Goodchild, and Sui 2012). Either way, though, this means changes in who has control over and access to geospatial knowledge and representations, and thus changes in the power that they wield. Additionally, because both government agencies and private corporations are paying increasing attention to citizen-produced data, and because emerging technologies have dramatically lowered the barriers to the mass dissemination and retention of information, the geoweb is creating an unprecedented opportunity for local geographic imaginations and knowledges to produce widespread changes in the broader world. Combined these implications represent a dramatic shift in how geospatial knowledge and representation is implicated within and productive of power relations. As a result the need has never been greater for a stronger conceptual understanding of how power operates on and through geospatial knowledge, data, and representations.

This paper attempts to theorize a framework for understanding power that is appropriate for and productive of analysis of the geoweb. As Elwood (2008) argues, past work in critical GIS can be important in shedding light on the newer developments within the geoweb. An understanding of how power has functioned throughout past critical GIS work is thus important for conceptualizing how we might think about power within the geoweb. In the first section of the paper, then, I review early critical GIS literature to understand how geographers have understood the ways in which power operates in and through maps. While few, if any, of these geographers have rigorously defined power as a concept, they nevertheless draw on many assumptions about power. In particular critical GIS researchers tend to employ ideas drawn from Foucauldian, feminist, Latourian, Habermasian, and liberal models of power. The second section argues that these models of power lie in tension with one another in fundamental ways, from how they define what counts as power to which forms of resistance they consider to be effective. For example, Foucauldian thinkers tend to be highly critical of the state- and norm-based forms of resistance advocated by Habermasian and liberal thinkers. Geographers must be cognizant of tensions like this as they unite different theoretical traditions in their exploration of the geoweb. In the third section, then, I move forward to explore how these tensions are already manifesting themselves within geoweb research, and how a more rigorous understanding of power might help researchers to negotiate these tensions. I thus propose new questions and frameworks for use in exploring the political implications of emerging geospatial technologies and practices. Finally, I conclude the paper by highlighting a few other models of power which have remained underutilized or unexamined throughout geography's critical engagement with geospatial technologies. The ultimate purpose here, then, is neither to produce the perfect model of power for understanding the geoweb, nor to completely resolve the tensions that inevitably structure all

political examinations. Instead, I simply want to highlight the ways in which assumptions made through critical examinations of GIS continue to shape the ways in which we explore the geoweb, in ways that are both productive and prohibitive. In doing so I hope that my engagement with our political heritage will hint toward new ways to continue theorizing the ever-changing politics of geospatial knowledge production.

GIS and Power

This section reviews critical GIS literature to build a more rigorous conceptualization of the ways in which geographers have deployed notions of power. The history[1]of the critical GIS research agenda is long and varied, and within its umbrella it includes a number of other research programs, including early GIS and Society research, feminist GIS, queer GIS, qualitative GIS, and public participation GIS (PPGIS[2]), among others. Nevertheless, geographers working within these different programs tend to work within one of only a few models of power—Foucauldian, feminist, Latourian, Habermasian, or liberal systems theory. Thus, this section is organized into parts which identify groupings of critical GIS literature that correspond to one of these models of power. Each part also describes the identified model more fully.

GIS and Foucault

The critical GIS research program has its roots in Brian Harley's (1989) critiques of maps and cartography. Harley examined how cartography, as a scientific discipline governed by technical rules, cloaked the operation of power within maps with notions of objectivity. Utilizing a Foucauldian analysis of discourse Harley revealed how cartography's technical rules are closely related to cultural rules and biases. For instance, Harley describes how world

[1] For a detailed account of this history, see O'Sullivan (2006), Schuurman (2000), and Sheppard (1995, 2005).
[2] PPGIS itself has developed into its own broad umbrella of research programs, which include community-integrated GIS and participatory GIS (PGIS). For more on this history, see Sieber (2006) and Elwood (2011). For simplicity, throughout this paper I simply use the term PPGIS to refer to this entire umbrella.

cartographers have traditionally adhered to a cultural 'rule of ethnocentricity' by choosing orientations and projections of the world that make certain countries appear more central and larger than other countries. However, this is covered up by a discourse of scientific objectivity. "Thus, the scientific Renaissance in Europe gave modern cartography coordinate systems, Euclid, scale maps, and accurate measurement, but it also helped to confirm a new myth of Europe's ideological centrality through projections such as those of Mercator." (Harley 1989, 430) Pickles (2003) later looked at these rules in even more detail, focusing on the technical rules that govern the management of error within maps. Rules governing everything from scale to symbology produce the perception that maps are agents of scientific, objective truth, and thus foreclose the existence of alternate forms of knowledge and epistemology. In the early 1990s critical geographers began to level these same epistemological critiques at GIS (O'Sullivan 2006; Schuurman 2000; Sheppard 1995, 2000). As Schuurman (2000) points out, many of these early critiques were both antagonistic and laden with dense social theory, continuing Harley's earlier examination of positivism within mapping.

Over time these critical geographers have begun to engage technologists more productively and have also developed more subtle and nuanced critiques. Nevertheless, a Foucauldian concern with power/knowledge complexes continues. Thus, before turning to these critiques of technology, a turn to Foucault's work is instructive. Foucault began his career in the 1950s with a break from phenomenology, which described an autonomous, rational agent capable of writing her own history. Foucault believed that history is a powerful force that produces the very reasons that subjects can utilize to understand themselves (Kelly 1994a). As a result of this belief Foucault (1994a, 1994b) chose as his object of analysis the triangular relationship between truth, power, and right, thereby asking "what rules of right are implemented

by relations of power in the production of discourses of truth" (Foucault 1994a, 31). By applying a genealogical methodology to the study of historical institutions, from the prison to the asylum, Foucault (1965, 1995) was able to answer this question through the illustration of a historical shift in the way power has been operationalized. In particular he identified a shift from the sovereign-subject relationship of power, as exemplified by the Machiavellian sovereign, to a disciplinarian mode of power. For Foucault (1991) disciplinary power represents something new because it is productive. Where past models of power enforced prohibitions through their ability to 'make die', power now productively guides populations toward collective goals through its ability to 'make live'. This power is thus exercised through disciplinary technologies and practices, such as the publication of health and safety guidelines or sexual norms, rather than through laws. Thus, Foucault highlights the rise of state bureaucracies (and other nodes of expert power) which regulate behavior through the production of expert modes of knowledge and guidance designed to keep subjects happy and healthy. This points to the importance of defining expertise within each discipline, as well as the role of the expert in producing regimes of power/knowledge that shape the technical manipulation of populations and the horizons within which those populations are capable of thinking.

Like Foucault (1994b), early critical GIS researchers described how social and technical rules govern the limits of spatial knowledge in ways that determine how we understand ourselves and the world around us. For instance Sheppard (1995) argues that the configuration of GIS as a digital technology means that any analysis conducted within GIS "is based on Boolean or mathematical logic," (9) and is thus both deductive and instrumental. This, in turn, shapes the types of questions that geographers can ask with GIS, the types of data that can be analyzed within the GIS, and thus the types of answers that the software can provide us about the world.

For example a tourist using an online map to explore Egypt is much more likely to ask the underlying database how it can get them from one destination to another, rather than asking about how the map's spatial representations of Egypt produce particular spatial representations of the Orient in their own mind (Minca 2001). Similarly, county government analysts may be led to ask about the most efficient way to provide services to residents, rather than asking what types of pre-existing inequalities already structure the ways in which efficiency is understood (Gilbert 2010). These disciplinary effects of the technology itself only serve to reinforce the normalizing effects of maps already identified by Harley (1989). Additionally, not only does this normalization impact how GIS practitioners understand the world, but it also affects geographers' own practices within the discipline and even in the classroom (Pavlovskaya 2009; St. Martin and Wing 2007). In this light St. Martin and Wing (2007) point out that "as a singular, universal, and expanding entity or mode of doing science, GIS is easily cast as the modern face and future of the discipline of geography." (244)

This epistemological critique is not the only evidence of Foucauldian notions of power within the critical GIS research program. Schuurman (2006) also identifies two very closely related critiques, one concerned with imperialism and the other with surveillance. As Rose (1999) points out, the rise in disciplinary power has not necessarily translated into the elimination of the sovereign or the state. Therefore, many critical GIS researchers extend previous concerns over the connection between mapping and imperialism to the governmentalized realm of GIS (Smith 1992; Sparke 1995; Crampton 2010). Early within the research program Lake (1992) argued that the positivistic assumptions of GIS, including its abstract instrumentality, produced a shallow ethics that allowed for unchecked imperial aggression. By defining the world around certain positive goals, geospatial discourses and

propaganda are capable of mobilizing entire populations to war (Pickles 2011). Just as the tourist forgets to question the ways in which maps shape their interaction with place, so the population focuses on instrumental goals rather than engaging in wider philosophical debates about militarism and imperialism. Gregory (2006), for example, contextualizes this relationship between cartographic representations and war within the case of Israel and Palestine. He argues that the simulacral nature of cartography allowed Israeli agents to territorialize Palestine within maps in order to justify military interventions on the ground. In other words, and in more Foucauldian terms, the power to define a spatial truth allowed Israel to define military action as 'right'.

Other researchers have been more interested in the ways in which geospatial technologies affect citizens' conduct of their own conduct. In particular this literature is framed around the relationship between GIS and surveillance. Geographers thus describe how the history of GIS is a history of increasing population surveillance, and how this surveillance affects individual behavior. For example between 1972, when Landsat became the first operational civil remote sensing system, and 1999, when IKONOS was launched, the ground resolution of satellite imagery increased dramatically from 79 meters to 1 meter (Armstrong 2002; Armstrong and Ruggles 2005). Even more recently the US Department of Commerce has released sensors capable of capturing imagery with a resolution of less than a meter. Imagery of this resolution can easily be used to view automobiles from space, or even count individuals, which has "considerable implications for strategic and individual-level surveillance." (Armstrong 2002, 21) This imagery becomes even more problematic when combined with the large sets of geodemographic data sets currently collected by government agencies and private companies (Curry 1997). These data sets, which include information from demographics to market survey

results, can easily be matched to particular addresses, thus giving GIS users intimate knowledge of households.

Authors studying these effects often situate their work within the Foucauldian tradition, with special emphasis on Foucault's (1995) description of panoptical surveillance. In his analysis of the prison, Foucault (1995) described Jeremy Bentham's Panopticon, a prison design meant to lead prisoners to think that they are under constant surveillance. For Foucault this became the perfect metaphor for the normalizing effects of disciplinary power—as subjects came under the constant gaze of disciplinary sciences, they were increasingly driven to regulate their own practices according to the truths of that science. Once again, geographers feared that geospatial technologies were increasingly becoming technologies of power in their ability to translate a spatial truth (i.e., accurate and detailed imagery) into normalizing behavior (i.e., 'proper conduct at all times during which they may be captured by remote sensing or geodemographic data sets). On the ground, for instance, Armstrong (2002) fears that police abuse of GIS technology may force citizens to increasingly change their everyday behaviors, while Curry (1997) fears that the increasing availability of this data may even lead neighbors to judge one another based on it. In each case increased surveillance, and the dissemination of the resulting data through geospatial technology, has the potential to directly impact individual behavior.

GIS and Feminism

Naturally, not all of the work within critical GIS is wholly connected to Foucauldian notions of power. While still borrowing several key concepts from Foucault, many geographers also employ feminist work on science and technology to examine the ways in which discourses about GIS, and particularly discourses of scientific objectivity, reinforce power relations. These concerns have developed into many different movements internal to critical GIS, including

feminist, queer, and qualitative GIS. McLafferty (2005), for example, grounds her own feminist GIS research in Haraway's (1991) work on hybridity and the cyborg, which results in a number of key theoretical lines of questioning. First, like the Foucauldian researchers above, McLafferty (2005) argues that objective science does not exist—epistemologies are always biased. As Pavlovskaya (2006) points out, feminist critiques of science have "shown that the development of modern scientific practice […] had not been a result of their self-actualizing innate rationality but a product of the specific historical and cultural context" in which they were produced (2006). Second, and due to the importance of historical and cultural contexts, McLafferty (2005) argues that the positionality of subjects and knowledges within these contexts is critical. Given these positionalities, it is also important to recognize that "power is situated and gendered." (40) Within the context of GIS these feminist theories imply that:

> Technologies like GIS affect positionality and reflexivity by altering the positions and power of people and groups. The technologies privilege and convey certain types of knowledge and communicate particular types of images and messages. (McLafferty 2005, 38)

It is critical, then, that GIS users understand which forms of epistemology and knowledge GIS privileges, and which forms the technology marginalizes or erases.

Furthermore, McLafferty (2005) argues that the epistemology historically privileged by scientific objectivity is a masculinist one. For example she argues that the Cartesian abstraction of GIS allows users to become detached observers, thus making their geospatial analysis seem objective and hiding the positionality of knowledge. This problem is exacerbated by widespread reliance on secondary sources of data, instead of the collection of primary sources. Given the general inability of current metadata standards for capturing and preserving qualitative information about how the data was collected, this results in data that is highly abstracted and

decontextualized. Finally, McLafferty (2005) argues that the discipline does not emphasize reflexivity enough for GIS practitioners. The result of these factors is a practice that emphasizes masculine abstraction and objectivity at the price of positionality, context, and epistemological diversity.

As mentioned above, despite the emphasis upon a binary set of masculinist/feminist epistemologies, in many ways these feminist concerns with GIS closely parallel Foucauldian critiques of the technology. In each case the researchers are interested in the ways in which the regimes of knowledge emphasized by GIS practice work to normalize the behavior of those interacting with GIS. However, where Foucauldian research often ends in this negative critique, feminist GIS research often continues on to suggest positive enhancements to current practices. A closer look at Haraway's (1991) conceptualization of power, in contrast to Foucault's, may help to explain this difference. As Pritsch (2004) points out, "Haraway's story of technoscience can be read as a postmodern continuation of Foucault's history of the modern episteme." (128) Thus, like Foucault, Haraway recognizes that power is multiple and productive in its ability to produce particular practices and subjectivities. Her technobiopower thereby describes the ways in which cyborg subjectivities are produced by a postmodern, instrumental logic "that seeks to combine heterogeneous living and nonliving elements" (Pritsch 2004, 128-9).

Where Foucault advocated continual transgression of this instrumental logic, though, Haraway sought only its reorganization along feminist and socialist lines. As Pritsch (2004) explains, Haraway "also defines power according to *which* metaphors link worlds together. Therefore, she claims a subversion of technoscientific salvation stories by inventing her own feminist stories and figures designed to counter technoscientific interpellation." (130) In other words the hybridity of the feminist cyborg can be reconfigured to produce a collective and

positive subject capable of ethical forms of agency. Pritsch (2004) describes this ability to reconstitute oneself as a form of 'constructive power'. Thus, where Foucault is only capable of a negative aesthetics, Haraway achieves a positive aesthetics of the subject. In the process, though, she is forced to adopt certain normative principles that Foucault might describe as disciplinary mechanisms. For example, Haraway views plurality as a normative goal in itself, and she also adopts a "utilitarian ethic that determines a good life" via particular norms (Pritsch 2004, 134).

Many of the alternative forms of GIS offered by feminist geographers conform to Haraway's (1991) notion of constructive power. They do so by offering particular normative visions for GIS which seek to empower particular marginalized positions. In this spirit McLafferty (2005) is quick to stress that GIS is not inherently masculinist or even scientifically objective, and that it can be improved by focusing on particular areas of research. Similarly, Elwood (2009a) emphasizes that "[v]iewing GIS as technology, methodology, and social practice highlights the fact that it is multiply constituted and therefore open for critical reconstruction through a wide range of interventions" (4). For McLafferty (2005) these interventions fall within three main areas—the examination of ways in which GIS affects subjectivity and identity formation, the examination of the ways in which GIS intersects with and improves everyday tasks and lives, and the examination of the ways in which GIS can be utilized by feminist activists. The first area, in particular, echoes Haraway's description of the ways in which cyborgs can reconfigure the narratives that determine their subjectivity. Already, geographers have expanded on this view in a number of ways. For example, Brown and Knopp (2008) examine the ways in which decisions surrounding the representational strategies of a queer advocacy group have important affective and performative effects on participant subjectivities. Similarly, others argue that GIS can be an important site for both performing and

representing emotional and affective geographies (e.g. Aitken and Craine 2009; Crampton 2009b; Kwan 2002, 2007, 2008a, 2008b). The second two areas, of course, are no less important, and perhaps best reflect Haraway's (1991) own concern with pragmatic and utilitarian methods to improve everyday lives. In each case these interventions into GIS practice reflect an occupation with power in that they assume that geospatial technologies and information productively affect individuals' understandings of themselves and their everyday practices. In particular, and following Haraway's (1991) notion of constructive power, these interventions attempt to reconfigure the metaphors attached to geospatial practice in order to make room for epistemologies and subjectivities other than those that are technoscientific and objective in nature.

In a similar vein of thought, qualitative GIS research attempts to dissolve the exclusive link between GIS and quantitative methods (Pavlovskaya 2006) in order to open space for qualitative or mixed methods (Cope and Elwood 2009; Elwood 2009b; Knigge and Cope 2006; Pavlovskaya 2002). While many of these researchers describe mixed methods approaches which can be deployed utilizing commercially-available forms of GIS, others are more technical in their attempt to unite GIS and qualitative methods. Jung and Elwood (2010), for example, explore fairly simple methods for combining GIS with Computer Aided Qualitative Data Analysis Software (CAQDAS), while Kwan (2008b) and Matthews et al. (2005) develop their own analytical extensions to GIS using more sophisticated programming techniques. Shifting focus slightly, other geographers enhance metadata to better preserve the context of data, such as research assumptions or bias, within GIS (Gahegan and Pike 2006) or design culturally sensitive GIS interfaces in order to better empower the situated knowledge of marginalized activists (Reyes and Martinez 2005; Sieber 2004). Regardless of the approach, though, each researcher is

concerned with the ways in which geospatial technologies and practices exert disciplining power over what types of discourses can be represented within GIS. Additionally, and more closely united with the hybridity lauded by Haraway, these researchers believe that an appropriate response to current power structures within GIScience should be guided by the normative goals of plurality and empowerment. In this way the technology can be opened up to additional forms of data and, subsequently, new groups and epistemologies.

GIS and Latour

The criticisms of GIS examined thus far have been driven primarily by social theory and have focused on many of the epistemological biases of current GIS structure and practice. In contrast some researchers focus more closely on the materialities of the technology itself (e.g. Chrisman 2005; Halford and Savage 2010; Hinchcliffe 1996; Leszczynski 2009a; Schuurman 1999a, 1999b). Many of these researchers look at GIS through a science and technology (STS) perspective. STS began as the sociology of science in the 1970s, as sociologists began to question the privileged role that scientists held within society (Fuller 2005). Upon leveling their sociological tools against the sciences, researchers found that science is not a clearly defined activity. Instead, it is composed of "many different activities that are typically connected more to their social contexts than to one another." (Fuller 2005, 2) As a result, sociologists argued that "science could have gone in many directions," and only took the paths it did because of "ambient political, economic, and cultural factors." (Fuller 2005, 2)

In many ways this insight, that the social and the scientific are intertwined, is very similar to the claims made by Foucault and Haraway. In fact as Fuller (2005) points out, many continental philosophers see in the sociology of science mere "'applications' or 'extensions' of ideas that are already present in Martin Heidegger, Michel Foucault, Michel Serres, Gilles

Deleuze, and others." (7) However STS, and particularly Bruno Latour's work within STS, differentiated itself from these forms of social theory through its unique focus on non-human actors. As STS developed out of the sociology of science, the role of the technical and of technology gained increased prominence—STS scholars argued that technology and the technical also played a role in shaping the development of science and of the social. This led STS scholars like Latour (2005, 2004, 1991, 1986) to argue that technologies and other non-humans are themselves actors. Society can therefore be effectively understood as a material network of human and non-human actors linked together by a series of chains. It is through these relational chains that human actors influence technologies, and vice-versa. Following the earlier insights of the sociology of science, it is also important to recognize that these networks are contingent, meaning that the chains that connect the actors must be continually re-performed. Latour's (2005, 22) concern, then, is that "when sociologists of the social pronounce the words 'society', 'power', 'structure', and 'context', they often jump straight ahead to connect vast arrays of life and history […] to reveal behind the scenes some dark powers pulling the strings." Latour believes that jumping to these terms causes researchers to ignore alternative interpretations of networks, and thus works against attempts to highlight the network's contingency. Instead of looking at preconceived entities like 'groups' or 'the social', Latour (2005) looks for the traces that actors leave behind as they constantly group and re-group themselves. Latour is particularly interested, then, in (1) exposing the techniques used to artificially stabilize groups over the long term and (2) instead allowing actors to "propose their own *theories of action* to explain how agencies are carried over." (57)

For some, Latour's stance that non-human actors should be allowed to speak for themselves demonstrates the bankruptcy of STS—by limiting themselves to exposing the many

different viewpoints and interpretations of the world that are possible, STS scholars abandon any strong, ethically-rooted stance of action. For others, though, this represents a more pragmatic approach to engaging technologists and producing alternative technological practices, precisely because it allows critical geographers to engage technologists through discussions of technologies rather than theory. Geographers utilizing STS critiques have taken this possibility seriously, and many have attempted to evaluate technological assemblages on their own merits in order to make space for alternate configurations of technology. For instance Schuurman (1999a) calls for an "internal method of critique" for GIS, and she offers her own such critique through an examination of theories of generalizability. Some technologists have taken up Schuurman's call themselves. Chrisman (2005), for instance, argues that epistemological critiques forget to look at the ways in which technologies affect society. For him STS allows for a potentially more liberating view of technology:

> Not merely an instrument or toolbox, each particular GIS presents a unique collection of artefacts that enable multiple social groups, with divergent or even contradictory values, to mediate these differences and construct more technological artefacts that multiple groups can share. Data produced for one purpose can be mobilized by another group for a different goal. […] At best, the social construction of technological objects is stable only for a specific moment and is subject to constant renegotiation. (Chrisman 2005, 29)

Many others have also worked to produce novel forms of GIS for the mobilization of groups like these (e.g. Ahlqvist 2004; Brodaric 2007; Gahegan and Pike 2006; Hopfer and McEachren 2007).

All of this research works to expose the ways in which social, scientific, and technological actors are stabilized to produce particular networks of GIS practice, and then to offer up other possible alliances. Based on this work it is tempting to define power, in a

Latourian fashion, as the strategies used to assemble and stabilize networks of actors in particular ways. However, reaching for such a definition risks doing a disservice to Latour's philosophy. First, the term 'power' rarely occurs in Latour's work, and where it does occur it is usually in reference to the work of others. For example at one point Latour (1986) argues that STS studies can help to produce strategies for resisting bio-power, thereby accepting some of Foucault's own conceptualizations of power. Latour's own focus remains firmly trained on how associations and the social are formed. Second, and as a result of this focus, Latour (2005, 63-4) views power as an effect of processes of assemblage:

> [I]t's so important to maintain that power, like society, is the final result of a process and not a reservoir, a stock, or a capital that will automatically provide an explanation. Power and domination have to be produced, made up, composed.

Therefore, Latour (2005) does not offer a theory to explain power, he only offers a framework which can be used to listen to actors as they describe their experiences of power. By seeking a theory of power, Latour (2005) fears that researchers become too tempted to "*use* power instead of explaining it" (85). Ultimately, then, Latour's (1986) work suggests "that the notion of power should be abandoned" in favor of a more intricate "study of the stuff of which society is made" (278).

Given this ambivalent attitude toward the concept of 'power', I find that a full engagement with STS falls outside the scope of this paper. As such, I will not include references to STS in future chapters. However, I include this thorough discussion, and subsequent disqualification, of STS literature here because it represents an important and growing position within current studies of information technologies (e.g. Schuurman 1999a; Hinchcliffe 1996; Halford and Savage 2010). Given this importance, future work should evaluate the comparative usefulness of studies of power and studies of assemblages for understanding the geoweb.

GIS and Habermas

The critical GIS research discussed thus far has emphasized criticisms of the normalizing and disempowering aspects of GIS technology and practice. Against the dominant configurations of power related to GIS, this research promotes the needs of marginalized voices and epistemologies. The literature highlighted therefore places a strong emphasis on transforming GIS to accommodate all voices in varying levels of dissensus. While negative critique can be a very effective tool for creating openings in dominant hierarchies, sometimes other strategies are more effective at actually bringing marginalized voices forward to fill those holes. Other examples of critical GIS research, and particularly those within the PPGIS research program, focus on GIS techniques and practices that can help marginalized communities and publics[3] empower themselves. This literature takes the slightly different step of using GIS as an organizing tool that can help communities reach consensus about their own needs and goals, and then to communicate these decisions to others. It thus adds an element of consensus to the dissensus of other critical work, which results in a very different conceptualization of power.

In particular, much of the consensus-oriented PPGIS research cites inspiration from planning literature, which draws explicitly from Habermasian notions of communicative action and deliberation, and therefore implicitly from Habermasian notions of power (Bailey and Grossardt 2010; Heckman 1998; McCall 2003; McCall and Minang 2005; Obermeyer 1998). Habermas (1990, 1996) develops his conceptualization of power by adapting Hannah Arendt's (1998) view that power is the ability to act together as a group. Arendt herself appropriates this view from Kant's (2006) *Critique of Judgment*, and particularly from Kant's belief that intersubjective understanding is the *telos* of communication (Arendt 1998; Ashenden and Owen

[3] Here I leave the terms 'community' and 'public' untheorized, deferring to the ways that the literature has deployed the terms. Other works have problematized these terms (e.g. Schlossberg and Shuford 2005), and my focus is on power.

1999; Johnson 1991; Norris 1996; Villa 1992). For Habermas, then, power never exists individually but is produced intersubjectively through the production of shared world views. Given his emphasis on rationality Habermas splits this understanding of power into two parts—the *generation* of power via the production of a shared world view, and the *employment* of power to produce action (Canovan 1983; Flynn 2004; Habermas 1996). Power is produced within the public sphere when individuals engage in communicative action (or deliberation) in order to generate public opinion. This public opinion is a form of power because it produces the shared vision of the world which is necessary to legitimizing action in the world. Furthermore, this opinion should drive a form of administrative power, which is centered in the institutional complexes of administration, the judicial system, and other opinion- and will-formation bodies, and involves producing change or action in the world through policy-making (Habermas 1996). A normatively valid system is one in which the power of public opinion drives administrative decisions.

A subset of PPGIS research conforms strongly to this normative vision because it emphasizes community deliberation and the transformation of community consensus into government decisions. Broadly, the PPGIS research program itself originated during early GIS & Society debates, when researchers began arguing that steps should be taken to increase participation in geospatial knowledge production by those that fall outside the (elite) social context that produced GIS in the first place (Aitken and Michel 1995; Openshaw 1992; Rundstrom 1995; Taylor 1990; Weiner et al. 1995). As it developed PPGIS "focused normatively and ontologically on supply-driven and pragmatic approaches to engage the public in applications of GIS with the goals of improving the transparency of and influencing government policy" (Sieber 2006, 242). Many PPGIS practitioners travelled to marginalized

communities, primarily in urban areas in the Global North and rural areas in the Global South, and worked to translate local decisions into state-based political action.

Before local decisions can be communicated to state officials, though, the community must arrive at this decision. Thus, geographers like Corbett et al. (2006) have worked to provide recommendations, tools, and guidelines for good PPGIS practices that promote consensus building and solidarity within communities, and Laituri (2003) lists both individual empowerment and consensus building as the dual goals of PPGIS practice. Similarly, Jankowski and Nyerges (2001) argue that participation takes four forms, communication, cooperation, coordination, and collaboration, and they go on to examine the ways in which human-computer-human interaction processes structure factors including "the likelihood of reaching a decision, time needed to do so, or level of participants' satisfaction with the deliberative process and its outcomes" (Elwood 2011). Each of these researchers tends to emphasize the strong ability of spatial representations to facilitate the sharing of knowledge and ideas, a key component of deliberation (Tate and Hogrebe 2011).

Even those PPGIS projects that give the highest priority to recognizing difference and the fluidity of identity also concede the need to reach consensus, or at least to reach some agreement on action.[4] Knopp and Brown (2008), for example, struggle to use GIS as part of a queer advocacy project in Seattle, Washington. They partnered with the Northwest Lesbian and Gay History Museum Project, a volunteer non-profit organization "dedicated to recording, saving, and disseminating the twentieth-century history of lesbians, gays, and other dissidents in the US Pacific Northwest," to produce a GIS database of sites deemed important by the lesbian and gay communities in Seattle (Knopp and Brown 2008, 41). Their project revealed a number of key

[4] Many theorists of deliberative democratic theory concede the need for pragmatic and actionable decision-making mechanisms, even if they do not take the form of formal consensus (e.g. Cohen 1997; Gaus 1997; Richardson 1997).

tensions between the anti-essentialist epistemologies of queer theory and the scientific, deductive, and representational epistemology contained within many GIS practices. Nevertheless, they ultimately endorsed a productive and pragmatic approach to mapping, arguing that they had to make concrete decisions throughout the process. The hard decisions and tensions that this pragmatic approach produced, they argued, could actually be positive for the overall process so long as all participants recognized the contingency of the truths that the map ultimately represented (Knopp and Brown 2008). This stance does not differ too greatly from Habermas's own belief in the legitimizing function of public deliberation.

The PPGIS projects described thus far assume an Habermasian model of power because they describe how GIS can be used to produce actionable, consensus-based decisions. For Habermas the government actions resulting from such processes are legitimate precisely because they are deliberative and consensus-oriented. Surprisingly, given the emphasis on local processes, not all PPGIS literature does highlight the internal processes and day-to-day negotiations of PPGIS research. In fact as Elwood (2006a) points out, much of the literature has generally "not offered detailed accounts of how participation and representation are negotiated in the grounded decisions and practices of PPGIS research, even while providing a wealth of practical strategies for conducting effective and sustainable PPGIS initiatives." [5] Instead, a majority of the literature focuses on the external relationship between communities and larger political structures, and on effective strategies for achieving community goals within those larger structures. This shift in focus results in a different conceptualization of power.

GIS and Liberal Systems Theory

[5] This is perhaps a result of the large uptake of PGIS practices by international development organizations, who are primarily interested in the large-scale and institutional implications of this methodology. This stands in stark contrast to the smaller number of critical scholars using PGIS, and their interest in local power relations (Sarah Elwood, personal communication).

Instead of viewing power as something generated through community deliberation, externally-focused projects tend to describe power as something that is possessed exclusively by the government. They then argue that local communities should use PPGIS to lobby for the use of that power. In other words the focus shifts from techniques that enable a rational consensus to techniques that can be used to achieve political goals, regardless of how individuals arrived at those goals. Bailey and Grossardt (2010) believe that this points to an inherent deficiency in Habermas's belief in rational deliberation—when practiced on the ground the rhetoric of consensus building is often simply reduced to "a game-theoretic interest group modality" (68) due to existing power structures that confound any group's ability to use only rational argumentation to further its causes. I argue, instead, that this literature shifts focus away from an Habermasian form of power toward a more classical, liberal understanding of power. More specifically, PPGIS literature with an external focus relies upon definitions of power from liberal systems theory, which Habermas (1996) often criticized. Systems theory developed in the mid-twentieth century and adopted many of the individualistic assumptions of the earlier rational choice theory (Joseph 1988). However, it focused more heavily on the macro level, arguing that "society is an interdependent whole held together by an elaborate system of exchanges between the system and its environment, and between a system and its subsystems." (Joseph 1988, 41) Within this system power was viewed as the ability to constrain the desires of individual actors in such a way that they do not destructively clash with one another. Therefore power functions to distribute scarce resources, enforce rules, and achieve the collective goals of individuals within the system (Joseph 1988). Importantly, system theorists often viewed all forms of power as legitimate. Therefore, systems theory viewed interest group politics as a legitimate source of power for influencing government authorities and achieving collective goals (Joseph 1988).

The PPGIS literature discussed here also views power as the ability to influence government actors to perform certain actions, regardless of whether that influence comes from deliberation or not. As described by Sieber (2006), a key goal of PPGIS work is to promote the goals of local groups. These group goals are widely describe in the literature, and they include objectives such as urban planning, land or resource claims, increased institutional decision-making, resource management, conservation, and more (Dunn 2007). This same literature often prioritizes descriptions of the best practices and tactics that groups can use to achieve these concrete goals over discussions of how these goals relate to democratic theory (Bailey and Grossardt 2010; Sieber 2006). In fact many PPGIS project do not always even occur within institutional contexts that privilege deliberation or communicative action (Corbett and Rambaldi 2009; Laituri 2003). Nevertheless, these authors still see benefits to enacting PPGIS projects, pragmatically recognizing that PPGIS can be useful in many different political environments so long as the project's goals can be communicated to the necessary government actors.

This reveals that, for these PPGIS practitioners, political institutions that celebrate deliberation are not always necessary for achieving the concrete goals put forward by their projects. Additionally, even those political systems that do generally value deliberation do not value it all the time, nor do they value it exclusively. There are many different facets to decision-making within democratic governments. As Sieber (2006) points out:

> PPGIS has added value at several stages of the decision-making process, improving the articulation of stakeholders' views, increasing individuals' or groups' understanding of technology, making complex decisions more transparent and objective, augmenting deliberation and consensus, furthering communication and linkages among internal participants and between internal and external parties, disseminating or sharing information, resolving conflicts, and enabling greater exploration of ideas. (500-01)

Of the seven stages of decision-making identified by Sieber (2006), only one stage involves deliberation. Other geographers, drawing on concepts borrowed from urban planning, argue that public participation can take a number of different forms, not all of which are deliberation (Bailey and Grossardt 2010; McCall 2003; Schlossberg and Shuford 2005). The Arnstein Ladder, for example, recognizes that public participation takes forms including manipulation, therapy, informing, consultation, placation, partnership, delegated power, and citizen control (Bailey and Grossardt 2010). This reveals that, if achieving change is the goal, there are many different types of participation that might achieve change without necessarily being deliberative participation.

Even when government actors do prefer high levels of participation from the public, groups may not find deliberative discussion to be the most effective method of participation. PPGIS, as a method that produces formal relationships between communities and government (Craig and Weiner 2006), is not necessarily powerful solely because of its role as a rational piece of software. Regardless of how deliberative, rational, or communicative the process that went into producing PPGIS databases, the resulting data and maps may nevertheless be useful in producing emotive reactions in government actors (Aitken and Craine 2009; Tate and Hogrebe 2011) or in imbuing local knowledge with an expert status (Dunn 2007). GIS as an expert and emotive technology can thus imbue PPGIS projects with legitimacy without any deliberation taking place. Therefore, geographers like Craig and Elwood (1998) conceptualize local organizations, not as mini-publics, but as political interest groups. More recently, Elwood (2006b) shows that these local interest groups often utilize multiple strategies to frame their spatial narratives, so that these narratives are more politically powerful. These strategies may even involve hiding certain information that is relevant to political deliberation, or at best only sharing some information strategically (Elwood 2007). As a result, many publications on PPGIS

and PGIS projects focus more on tactics and best practices for producing effective projects, rather than on discussions of deliberation or democratic theory (Sieber 2006).

This paints a picture of power starkly different than the Habermasian notion discussed in the preceding section. For Habermas government action is only legitimate when it results from an open and rational deliberative process. This process must be communicative, and not instrumental, which is why Habermas (1990) views interest group politics as dangerous for democratic societies. In contrast, PPGIS projects view power as control of either the processes or results of government decision-making. These are substantive concerns and not procedural ones, and they correspond much more closely to the ways in which systems theory describes power.

Turning to Political Theory: Tensions of Power

Critical GIS researchers have deployed Foucauldian, feminist, Habermasian, and liberal systems theory interpretations of power in their work[6]. Unfortunately, although researchers implicitly invoke multiple interpretations of power, they rarely address the tensions between these different interpretations. In this section, then, I identify three tensions that are particularly interesting for future studies of the geoweb: conflicting understandings of the workings of power, the typology of power, and strategies of resistance. In each part of this section I highlight particular tensions or contradictions between different theories of power[7], and then offer techniques for thinking through these tensions productively.

The Workings of Power

This first section examines the tension between different conceptualizations of what power is and how it functions. As described in the first section, Foucault (1994a) broadly

[6] Again, I am excluding STS and Latourian critical GIS literature, given Latour's ambivalent stance on power.
[7] I should note that I am choosing to prioritize discussion of some models of power over others throughout this section. In particular my focus is centered on debates between Foucault and Habermas. This decision is partially rooted in space considerations. Additionally, systems theory contains many similarities to Habermasian theories of power, while Haraway adopts much of her description of power from Foucault.

distinguishes between juridical models of power, to include liberal and Marxist models, and disciplinary models. A key distinction between these two models is whether they conceptualize power as repressive or productive.

Foucault (1994a) argues that both liberalism and Marxism conceptualize power in terms of their economic functionality. In the case of liberal theory, power is something which "one is able to possess like a commodity, and which one can in consequence transfer or alienate, either wholly or partially, through a legal act or through some act that establishes a right" (Foucault 1994a, 26-7). In the context of the liberal strain of systems theory identified in this paper, power is conceptualized as the ability to constrain actors in an integrative fashion (Joseph 1988). For example, when an individual enters a subsystem she agrees to play by its rules (thus giving up some of her ability to impose her will on others) in exchange for rights which protect her from others' abilities to impose their will on her. Rights, as a form of power, thus repress what actions others can perform in order to protect individuals from coercive acts.

Habermas (1996) adds considerable nuance to this view of power, but nonetheless continues to work within a model of repression. In his critique of systems theory, he argues that the fragmentation of the world through subsystems has produced two particular opportunities for coercion. First, in the realm of civil society, the use of strategic action in the pursuit of individual goals has produced conditions in which some individuals dominate others through possession of the means of production. Second, in the realm of law, lobbying (another form of strategic action) allows interest groups to illegitimately advance their own causes over the needs of other groups. Each of these situations is particularly problematic for Habermas because he, drawing on Enlightenment ideals, situates the private realm as "one of freedom that has to be defended against the domination of the state [and money]" (Calhoun 1992, 7). Already, then, his normative

goal is to conceptualize a form of power that can *constrain* individual actions in civil society and government in order to protect individual freedom. He believes that communicative action, and its sedimentation into Constitutional Law, allows citizens to (1) protect their own freedom within the private sphere from the coercion of others while (2) taking part in the production of the laws so that they do not feel that those laws are a form of illegitimate coercion (Habermas 1990, 1996; Calhoun 1992).

In both liberal systems theory and Habermasian theory, then, power is something that can be possessed and exercised in order to protect oneself from the coercive acts of others. In liberal systems theory power tends to be distributed evenly, according to philosophically-determined rights, so that each individual (hypothetically) has an equal opportunity to act free of the coercion of others. In the Habermasian model, power is not so much distributed as it is produced through, and held as a result of, participation in communicative action and the production of law. As Foucault (1994a, 31) points out, these technical differences in how power is distributed and exercised are a result of theorists asking the philosophical question, "How is the discourse of truth, or quite simply, philosophy as that discourse which *par excellence* is concerned with truth, able to fix limits to the rights of power?" In contrast Foucault (1994a) believes that the production of truth (philosophy) is complicit with power. His question thus becomes how rights, and the truths that delimit how they are defined, distributed, and exercised, are productive of relations of power. In this case one cannot escape coercion by invoking a right because rights, the truths that produce rights, and thus the very invocation of rights are all produced by (and productive of) a particular configuration of power.

In his genealogical examinations of truth, Foucault argues that the Christian church first helped shift power away from sovereign relationships in the Middle Ages (Hekman 2004).

Rather than focus on the ways in which a Machiavellian sovereign exercises law to control territory, the church employed a configuration of (pastoral) power which individualized its subjects and then arranged "things in such a way that, through a certain number of means, such and such ends may be achieved (Foucault 1991, 95). For the church this meant making each individual responsible for her own salvation and then prescribing certain means for obtaining that salvation. Broadly, Butler (2004, 193) argues that power thus becomes the "very modes by which we affectively seize upon or release a fundamental sense of identity." More recently the strategy that attaches an individual to her identity has shifted from the telling of religious truth to the telling of scientific truth. This shift from pastoral to disciplinary power produces the conditions in which the use of scientific markers of normality can channel individual "behavior in the 'right direction'" while defining "other activities as abnormal, deviant." (Hekman 2004, 201) Thus, power is no longer something that is possessed and exercised in order to prohibit the coercive actions of others. Instead, power "categorizes the individual, marks him [sic] by his own individuality, attaches him to his own identity, imposes a law of truth on him which he must recognize," (Foucault qtd. in Butler 2004, 189) and thus drives the individual to act in certain (productive) ways in order to conform to this truth of identity.

The rise of disciplinary power, of course, has not necessarily done away with the operation of juridical forms of power (Rose 1999). The tension, then, does not involve a questioning of which model of power is more valid, but rather results from the ways in which the two models co-exist and interact with one another. Administrative and social forms of coercion do exist, and they can be repressed through the invocation of rights produced through communicative action. However, these rights (and the communicative process that produced them) also act as forms of disciplinary power in that they attach an individual to a particular

identity of (liberal) citizenship and, thus, to particular (normalized) performances of resistance. For instance, many Foucauldian indigenous theorists warn against the ways in which indigenous claims to state-based rights work to transform indigenous peoples into disciplined citizens, thereby foreclosing more radical critiques of whether the state should have juridical authority over these peoples (e.g. Alfred and Corntassel 2005). Recourses to juridical notions of power can thus disguise (and even produce) disciplinary relations of power. On the other hand by rejecting recourses to rights, a preoccupation with disciplinary power may limit individuals' abilities to resist very real forms of coercion. Thus, the co-existence of repressive and productive theories of power should be negotiated carefully, lest one model of power blind researchers from the realities of the other.

Given its general emphasis on adapting theoretical insights to practice, feminist theory has a long history of working across many different theoretical traditions (Bryson 2003). For example, Haraway (1991) utilizes many of Foucault's insights into power but nevertheless melds them with normative goals in order to empower marginalized individuals in a practical fashion. As a result feminist theories, as a set of political positionings, may provide some lessons for negotiating this tension. Some feminists worry that Foucauldian theory, in its problematization of the possibility of protecting stable subjects with rights and laws, "deprives women of the right to be included in a humanist universality" at the very moment that women are "beginning to become subjects in their own right" (Butler and Scott 1992, xvi). Even strongly poststructuralist thinkers like Judith Butler (1992, 15) admit that they would not contest the "political necessity to speak as and for *women*" in the pursuit of legislative efforts. Nevertheless, these theorists also recognize that as soon as individuals are forced to attach themselves to stable identities ('woman') in order to exercise particular rights, then those individuals have already become

subject to the workings of disciplinary power. The key lesson that we can take from these theorists is that this tension can become a productive one, so long as one doesn't become blind to one mode of operation of power when analyzing the other. Thus, McWhorter (2004) argues that it can be important to protect 'women' with rights, so long as individuals are free to move around within the labeled identity. As she puts it, laws should not be thought of in terms of their ability to preserve the category 'woman,' but rather in terms of their ability to protect 'women' as "an important site for the emergence of a […] becoming that occurs as what woman is overcomes itself and surpasses itself toward an open future." (McWhorter 2004, 158)

Here McWhorter attempts to use juridical power as a tool to shield women as they grapple with the disciplinary powers that affect them in their everyday lives. Haraway, similarly, attempts to protect the cyborg as a space or node in which marginalized individuals and groups can grow and change. At this point, though, we have begun to pass from an examination of the workings of power to a discussion of the ways in which individuals can resist power. Before continuing this discussion, I think it is important to first turn to a more detailed discussion of the topology of power. In this way we might better understand where power is produced, where power is deployed, and where individuals should position themselves in order to practice effective forms of resistance.

The Topology of Power

Crudely speaking, we might describe juridical power as centralized within particular spaces or institutions, while disciplinary power is dispersed. However, a turn to theory helps to etch out a more nuanced understanding of the topological differences. Already my description of Habermas's theory reveals a number of sites implicated in the production of power, including private spaces, civil society, the public sphere, and government (administration). While each site

differs slightly in its relationship to power, each can nonetheless be roughly labeled as either a space of power or a space of freedom (lack of power). Essentially, Habermas (1996, 1990) views civil society and government administration as spaces of power and coercion, while he views private spaces and the public sphere as spaces of freedom[8]. This stance is rooted in his description of communicative and strategic action, as described within his reformulation of speech act theory (Habermas 1984, 1987, 1996).

As discussed in the first section, Habermas identifies intersubjective understanding as the *telos* of communication (Ashenden and Owen 1999; Johnson 1991). However, the fragmentation of the lifeworld into many different subsystems has made it difficult for individuals to reach intersubjective understandings of one another because each subsystem is imbued with its own set of rules and values. As a result individuals have little incentive to pursue understanding, and they instead orient themselves toward the pursuit of individual goals. This difference in orientation, between prioritizing understanding and prioritizing individual goals, forms the basis of the distinction between communicative and strategic action (Johnson 1991). Therefore, communicative action "consists of attempts by actors to cooperatively define the context of their own interaction in such a way as to enable them to pursue their individual plans." (Johnson 1991, 183-84) Here consensus comes before individual action. Furthermore, consensus requires that individuals put forward claims about action in such a way that all other individuals (capable of making rational speech claims) have an equal opportunity to contest and deliberate about the claim. This deliberative process allows individuals to rationally reach a consensus on the issue, thus establishing the truth and normative rightness of the claim (Ashenden and Owen 1999). In contrast, strategic action does not hold consensus as a goal, and it therefore utilizes coercive

[8] I should be careful to note that when I say the public sphere is a space of freedom, I mean that the actors inside this sphere are uncoerced while participating in deliberation. This is not to say that the public sphere is not implicated in the flow of power, since it does produce power through the production of public opinion/communicative action.

forms of speech like influence or manipulation to coordinate interaction between individuals. In this case strategic action is "parasitic on the orientation of speech acts to mutual understanding in which the redeemability of the claims offered in the speech act is presupposed." (Ashenden and Owen 1999, 4). In other words strategic action takes advantage of individuals' assumptions about common understanding in order to subordinate those individuals to the goals of the actor pursuing strategic action.

Returning to the different sites implicated in Habermas's theory, it is now easier to understand the topological workings of power. Habermas concedes that strategic action is inevitable within the economic sphere of civil society, and that this will inevitably affect private spaces of freedom. However, by coming together in communicative action individuals can create public spaces free of coercion. Within these spaces of freedom individuals deliberate to arrive at consensuses over the types of strategic actions they believe are permissible. These deliberations then guide the coercive administrative power of government, so that the free space of the public sphere regulates the ways in which coercion enters the free space of the private. The key point to take away from this discussion is that Habermas theorizes an inside and an outside to power—public spheres of deliberation are able to direct the power present in government and civil society in such a way as to protect both itself and private spaces from illegitimate forms of coercion. Critically, the existence of a communicative action capable of reaching transcendental truths, and orientations toward mutual understanding, are prerequisites to producing these protected spaces.

In strong contrast, Foucault's belief that knowledge and power are co-productive makes it impossible to establish power-free spaces through the intersubjective use of reason. For Foucault (1994b) the will to truth, whether present in science or within deliberative public spheres, is

always a will to power. This is the case because statements of truth establish a particular epistemic field which "structures consciousness […] in terms of criteria governing what counts as an object of knowledge, how we reflect on objects of knowledge, and what is the *telos* of knowledge." (Ashenden and Owen 1999, 9) This is particularly dangerous in the context of a claim to transcendental truth, since this moment of unconditionality "tends to freeze certain juridical ways of thought and action at the expense of an ethic of critical enquiry into the limitations of and alternatives to these arrangements" (Tully, qtd in Ashenden and Owen 1999, 13-14). This line of thinking is in direct tension with Habermas's theory of communicative action, since Habermas attempts to establish the normative conditions in which the establishment of transcendental truth is possible. Habermas is thus establishing his own terms of unconditionality that blind citizens to the possibilities of other forms of political arrangements (Dean 1999). Furthermore, because Foucault does not believe that individuals can speak from a space of unconditionality, his topology of power has no outside (McWhorter 2004). Power circulates throughout all of society, has a net-like organization, and uses individuals both as targets and as its elements of organization (Schmidt and Wartenberg 1994). As McWhorter (2004, 155) describes, power operates as a grid of intelligibility which allows *everyone* to be "fully characterized […] in terms of norms and deviations from norms."

This topological property of power does not sit well with Habermas, who believes that the autonomy of discourse and power, and thus the ability of critique to hold power at bay, are required for any form of theorizing or resistance (Kelly 1994a). At root Habermas (1994a, 1994b) is arguing that it is not possible to critique, or resist, reason from within reason. In other words critique is only possible if one can perform critique from needs a position that is completely free of coercion. Without such a position the critique has no normative basis.

Foucault's response to this criticism helps to demonstrate how it is possible to stage forms of resistance, and even achieve freedom, without requiring an outside to power. This requires a number of clarifications that Habermas glosses over. First, Foucault differentiates between power and configurations of power (Schmidt and Wartenberg 1994). Power, as a form of practice that constitutes desire and identity through the establishment of truth, is always present so long as desiring individuals and claims to truth exist. However, the ways in which truth is configured to produce power is not always the same—Foucault's genealogy demonstrates how the epistemic fields that structure the relationship between individuals and truth are constantly changing. Thus, while power cannot be opposed, the ways in which power is configured can be opposed and even changed. Of course, the one configuration of power will always be replaced by another. This is where another distinction becomes important—that between relations of power and relations of domination (O'Grady 2004). In contrast to relations of power, relations of domination are entrenched and show little chance of changing or reversing. For Foucault relations of domination are more dangerous than relations of power, because it is the act of reversal itself that presents the possibility of freedom. An individual will never be able to constitute herself through recourse to a discourse outside of the reaches of power, but she may nonetheless utilize the various discourses of power to construct an ever-changing self that evades normalization:

> Normalization gives us ourselves as perpetually developing. Technologies of normalization then attempt to control the direction and rate of that developmental energy. We cannot defy normalization insofar as it gives us ourselves entirely, but we can resist and gradually perhaps dismantle normalizing technologies and disciplines. We can affirm ourselves as developing beings, ever-changing beings, while at the same time adopting disciplinary practices—techniques of caring for ourselves—that affirm the movement of our own becoming at the expense of predetermined vectors and norms." (McWhorter 2004, 155)

Thus, in contrast to Habermas's claims, Foucault's final project is not to establish some Archimedean point from which to criticize knowledge/power. His project is far more limited in that it advocates constant, local critique. The possibility of transformation becomes the possibility of freedom (Kelly 1994b). This means that the technologies of domination are often the same as technologies of self-transformation, and that the tools we use to self-police are often also, *at the same time*, the tools we use to fight for our freedom (Ferguson 2004, Valverde 2004).

How does one move forward from this tension between repressive and productive notions of power? At root all of the topological differences between the two models of power are rooted in the hopes that they pin to critique (Kelly 1994b) Habermas believes that critique and deliberative reasoning can provide a direct link to universal normative claims, and through this belief he can conceive of an outside to power relationships. Foucault, on the other hand, does not believe that a moment of transcendence will ever occur, and he therefore deploys critique locally and internally to ongoing relations of power. At first blush this makes the two frameworks appear incommensurable. In practice, though, the two thinkers may not stand so far apart, and they might even learn from one another. On the one hand, since most of Foucault's sites of analysis were explicitly sites of hierarchy, such as the prison and the asylum, it's entirely possible that other sites correspond more closely to Habermas's public sphere, or at least that they allow somewhat equal relationships (Fraser 1994). Foucault himself does leave "open the possibility that other ways of conceiving of power and social relations more generally, including conceiving of them as consensual or collective, may be compatible with his analysis" (Allen 2004, 250). Habermas (1992) also makes a concession to Foucault when he admits that every public sphere he can think of has depended on some form of violence. On a practical level, then, he is conceding that all relationships, including those that take place in the public sphere, involve

some type of unequal power relation. He nevertheless believes that the public sphere can serve as a useful regulative ideal, arguing that "at least the public sphere is an attempt to exclude violence, if only to reproduce some sort of violence internally again but in a criticizable fashion." (Habermas 1992, 479) In a move that sounds suspiciously like Foucault's local critique, he thereby positions the public sphere as an attempt to continuously fight "all modes of settlements that are somehow unjust" (Habermas 1992, 479). In sum, it is possible that Habermas might be able to teach Foucault the value of desiring and working toward equal relationships, and Foucault might help Habermas to understand the traces of power that inevitably postpone the achievement of this equality.

Strategies of Resistance

Thus far I have explored tensions related to how and where power functions, and these discussions have certainly hinted at the ways in which power can be resisted. In this section I will further explore strategies of resistance, with an explicit focus on whether these strategies are performed at an individual or collective scale. In particular I will argue that Foucault's theorization of power leads him to advocate an individualistic form of resistance, while feminist and Habermasian understandings of power allow for collective or public action.

As described above, much of Foucault's early work is a description of subjectification, or the ways in which power acts on the body in order to attach that body to a (truthful) identity (Barber 2004; Butler 2004). In his later work, and particularly in the second and third volumes of *The History of Sexuality*, Foucault shifts focus slightly to subjectivation, the aesthetic struggles undertaken by the body to fashion itself according to its own rules (Barber 2004; Bloem 2004; Deleuze 1994; Schmidt and Wartenberg 1994). As Ferguson (2004, 35) points out, "the distinction here is not a clear-cut dyad between being a subject versus being an object, but rather

a less clear contrast between writing oneself and being written as self." Naturally, this self-writing is difficult because there exist no truths or identities that cannot somehow be plotted within the grids of normalization described as disciplinary power. Nevertheless, Foucault argues that the subject can develop certain rules for herself that allow her to constantly reflect upon how her identity has been produced, detach herself from the rules that governed that production, and transform the self through the selection of new rules (Barber 2004). Thus, the subject doesn't become free in the sense that she escapes power relations, but rather obtains "the freedom to use materials made available in the culture, materials found in a plurality of ethical schools, to shape and distinguish" herself (Sawicki 2004, 169).

On one level, Foucault's description of the technologies of the self does conceptualize the subject as a (restricted) sovereign mediating the relationship between their individual body and the external world (Pritsch 2004). In this way these technologies do presuppose a social world and also allow care for the self to develop into care for others. However, based on his fear of being written as self, Foucault nevertheless positions one's care of and relationship to the self prior to relationships with others (Allen 2004). For example, note Foucault's stress on the subject's *own* actions and states of being in his definition of care of the self as:

> techniques that permit individuals to effect, by their own means, a certain number of operations on their own bodies, their own souls, their own thoughts, their own conduct, and this in a manner so as to transform themselves, modify themselves, and to attain a certain state of perfection, happiness, purity, and supernatural power. (Foucault qtd in Allen 2004, 243)

This emphasis also shows through in Foucault's selection of three techniques of the self: writing letters to friends, reviewing one's own actions, and testing oneself (Allen 2004; Ferguson 2004). In each case the subject either acts entirely on her own (reviewing one's action, testing oneself) or, at best, only includes others instrumentally to perform work on the self (Thompson 1999). In

this way Foucault's technologies of the self only "serve to delimit heterogeneous elements out of that gradually stabilizing monologue that the subject […] holds with itself" (Habermas 1994a, 52-3). In this process isolation and supervision become the panoptic "gaze of the rational subject who has lost all merely intuitive bonds with his environment and torn down all bridges built up of intersubjective agreement, and for whom in this monological isolation, other subjects are only accessible as the objects of nonparticipant observation." (Habermas 1994a, 54) Foucault's account thus kills off dialogical relationships and transforms "subjects, who are monologically turned in upon themselves, into objects for one another, and only objects." (Habermas 1994b, 54)

This stands in stark contrast to the positions taken by both Haraway and Habermas. As I argued in the first section of this paper, Haraway adopts many of Foucault's understandings of power, but uses them to conceptualize a hybrid subject oriented toward collective action. In effect Haraway accepts Foucault's initial premise but denies his conclusions (Pritsch 2004). Thus, like Foucault, Haraway understands power as a net which connects individuals to one another and to experiences and ideas. Within this net the individual can be understood as a kind of knot, composed of the metaphorical strands of power. Just as Foucault's subject can choose to transform the rules by which she forms herself, so Haraway's knots, or cyborgs, can "be reworked over and over again by linking their elements to different nets." (Pritsch 2004, 133) However, where Foucault assumes a world in which the individual always has many sets of rules to choose from, Haraway points out that the effectiveness of the cyborg's transformations depend on the number of connections from which the cyborg can choose to compose herself. In this way the subjectivation of the cyborg is wholly dependent on its relationships with others, and plurality becomes a normative values for Haraway (Pritsch 2004). Where Foucault posits care of

the self as a prerequisite to ethical relationships with others, Haraway posits relationships with others as a prerequisite to an ethical care of the self.

Given his emphasis on intersubjective understanding and communicative action, Habermas also poses relationships as a prerequisite to the resistance of coercion, although in a more public fashion. Extending the Hegelian model of mutual recognition, Habermas argues that "'the conditions of symmetry and reciprocal recognition' are 'the unavoidable presuppositions of communicative action (Habermas 1992b: 201)." (Thompson 1999, 202) The development of this recognition takes two phases. In the first phase, primary recognition, individuals develop their own particular identity through processes of mutual recognition undertaken with family or primary caregivers (Honneth 1995; Thompson 1999). In essence, the need to solve social problems leads an individual to strive to understand how others react to her. In this way the individual comes to understand herself as an objectified (and particular) 'me,' as seen through the eyes of others (Honneth 1995). However, as individuals develop they also undergo a secondary phase of recognition, in which their interactions with many others forces them to generalize these others. This process allows individuals to view both themselves and others in terms of abstract rights and positions of symmetry, and thus to communicate with others through the utilization of rational deliberation (Thompson 1999). Therefore, for Habermas identities are produced dialogically through processes of reciprocal recognition, and the intersubjective relations that result from these processes are the same relations that allow for the very possibility of communicative action. Because communicative action is the force capable of keeping power at bay, collective action is a necessary component of any form of resistance.

In many ways this tension, between individual, collective, and public forms of resistance, is a direct result of the topological properties of power described above. From Foucault's

perspective both Haraway and Habermas require an outside to power from which to mobilize resistance. Haraway's cyborg serves as an outside which privileges hybrid, marginal, and pluralistic perspectives; Foucault might argue that this privileging risks a simple reversal of how identities are normalized rather than a rejection of normalization. Similarly, Habermas posits the deliberative public sphere as an arena in which all are equal and uncoerced. However, when he describes secondary recognition as a process of abstraction and generalization, and then positions this process as a prerequisite to communicative action, he forces the other to be "pulled into the subject's own horizon, and judged by the standards to be found there." (Thompson 1999, 207) These standards thus act as a form of disciplinary power that normalizes those entering the public sphere. On the other hand, Foucault's belief that power permeates all relationships leaves him incapable of theorizing intersubjectivity and thereby "undermines the sort of coordinated political action that the defence [sic] of alterity would require." (Thompson 1999, 196) Those without the ability to write themselves have nowhere to look for assistance or allegiances.

Again, though, it is perhaps possible to synthesize these two sides, using Haraway and Habermas to formulate techniques for creating spaces of intersubjectivity and collective action while recognizing, with Foucault, that these spaces must be constantly problematized for the exclusions they produce. Thompson (1999), for example, argues that Foucault's and Habermas's positions might become more compatible if one were to reconceptualize communicative action as a form of agonism. In this way the public sphere is transformed from a powerless space into a space which strives to ensure the constant reversals of power relations between participants. Following this path of thought, it may also be productive to explore Mouffe's (1993, 2005) conceptualization of agonistic pluralism, since it allows individuals to come together in strategic alliances without ever seeking some final consensus. For Mouffe (1993, 15), accepting

Foucault's belief "that there cannot be an absolute separation between validity and power […] does not mean that we cannot distinguish within a given regime of truth between those who respect the strategy of argumentation and its rules, and those who simply want to impose their power." However, unlike Habermas, Mouffe (2005) also recognizes that these rules of the game are never neutral, and that at best only a 'conflictual consensus,' which is itself a form of violence and in need of contestation, is ever possible. Here we have the possibility of (transitory) collective actions without the need for a neutral or transcendental space from which to construct this collective.

The Geoweb and Power

Critical GIS researchers have implicitly deployed a number of models of power, many of which stand in tension with one another. Unfortunately those same critical GIS researchers rarely examined these tensions, resulting in research with mixed normative implications for our understanding of geospatial technologies and practice. For instance, with few exceptions (e.g. Wainwright 2008), critical GIS researchers have tended not to rigorously examine the ways in which PPGIS forms of resistance also work to discipline individuals in a Foucauldian fashion. Without addressing tensions like this, it is difficult to fully understand the ethical implications of PPGIS practice.

More recently many geographers have shifted their attention from traditional forms of GIS to the emerging technologies of the geoweb. In contrast to GIS, geoweb technologies and practices tend to be founded around the collaborative principles of Web 2.0. As Elwood et al. (2013) note, Web 2.0 is "characterized by a more decentralized mode of production, the role of servers as accumulator of content from distributed sources, and the exchange of content among users" (574). The geoweb's decentralized mode of production allows an increasing number of

individuals to use and contribute geospatial data in the geoweb. Importantly these users may not have training in geography, cartography, or computer science. Instead, many are so-called neogeographers who "have been empowered by the widespread availability of cheap positioning devices, fine-resolution imagery, and mapping software and are able to make maps that reflect personal and often transitory needs" (Elwood et al. 2013, 573). As a result of this change, the content of the geoweb is characterized by varied topics, large amounts of data ('big data'), and varying quality (Elwood et al. 2013). Furthermore, with the rise in mobile technologies, the geoweb is likely to become increasingly accessible and ubiquitous (Elwood 2008). The geoweb is thus being used for a myriad of activities including finding local businesses, rating a restaurant from one's phone, sharing geo-located photos with friends, participating in scientific data collection, and even contributing to global crises management efforts (Elwood et al. 2013).

Despite all of the new aspects of these emerging geospatial technologies and practices, critical geographers have continued to ask many of the same questions about the geoweb as they asked about GIS over twenty years ago. As Elwood (2008) explains, geographers are now asking how the geoweb "might foster new forms of surveillance and further erosions of privacy (Obermeyer 2007); enable new forms of activism, participatory democracy, and civic life (Miller 2006; Turner 2006); or exacerbate existing inequalities and creating [sic] new forms of exclusion (Zook and Graham 2007a, b)." (174) Unfortunately they are asking these questions, once again, without fully theorizing the models of power implicitly invoked by them. As a result, work on emerging geospatial technologies invokes contradictory interpretations of power, and thereby risks producing a fractured understanding of the geoweb.

In this final section, then, I utilize the deep theorization of power developed in this paper to more thoroughly interrogate the geoweb. In doing so I highlight some of the key areas of

concern in the developing geoweb research agenda, and I also work to move that agenda forward past the empowerment/marginalization binaries inherited from those early GIS & Society debates. Thus, for example, it is not enough to examine the geoweb's implications for participatory democracy (empowerment, in an Habermasian sense) and privacy (marginalization, in a Foucauldian sense) as two separate issues. We must also ask how participation within the geoweb is *predicated upon* a loss of privacy. By examining the answers to this question, in addition to questions exposed by the other tensions explored in the last section, geographers are forced to confront the contradictions implicit in their adoption of conflicting models of power. Such a confrontation will inevitably open up new and productive areas of investigation for future research.

The Workings of Power: Empowerment and Responsibilization

Literature on the geoweb has inherited notions of both juridical and disciplinary power from critical GIS work, without attempts to address the tensions between the two models. Traditionally, PPGIS work has relied on Habermasian and liberal notions of power, which each conceptualize power juridically. While this can lead to very real legal gains for the participating communities, PPGIS projects often underexamine the ways in which legal claims work to normalize communities to conform to particular practices of citizenship. In contrast Foucauldian strains of critical GIS work tend to problematize the ways in which GIS practices marginalize particular voices and epistemologies through the normalization of particular visions of the world. However, this work doesn't always focus on applied strategies for advancing the legal protection of GIS users, thereby missing an opportunity to empower individuals in a juridical sense.

Research on the geoweb covers parallel themes through exploration of empowerment and participatory democracy (e.g. Crampton 2009c; Crutcher and Zook 2009; Elwood and

Leszczynski under review; Goodchild and Glennon 2010; Lin 2012; Loader and Mercea 2011; Warf and Sui 2010; Zook et al. 2010) on the one hand, and the loss of privacy and increased surveillance (e.g. Dodge and Kitchin 2007; Elwood 2008, 2010; Elwood, Goodchild, and Sui 2012; Elwood and Leszczynski 2011; Goodchild 2008; Obermeyer 2007), on the other. Like PPGIS literature, discussions of empowerment within the geoweb often tend to focus on the benefits that the geoweb provides in harnessing juridical forms of power. The focus here is on whether the geoweb presents a democratic forum for participants, as well as on who is and who is not capable of or currently participating in the geoweb. In contrast research on privacy and surveillance tend to illicit more Foucauldian notions of discipline. In each case there is a missed opportunity to force the two different conceptualizations of power into conversation with one another.

Thus, for example, a prevalent narrative surrounding the geoweb is that of opening cartography to broad-based democratic participation—ideally the geoweb extends the emancipatory promises of PPGIS to anyone with access to the Internet. Along these lines Loader and Mercea (2011) argue that social media platforms from Facebook to the blogosphere provide a space for "the self-actualized networking of citizens engaged in lifestyle and identity politics" (758). For these authors Web 2.0 does not represent a public sphere of rational deliberation, but rather a space for citizens to self-organize around causes that matter personally to them. Furthermore, Warf and Sui (2010) connect this to an institutional context when they point out that this networked action is having democratizing effects on decision-making processes related to everything from public health to environmental protection. In a related vein of thought, Crampton (2009c) focuses on the ways in which the geoweb enables citizen activism in US elections, highlighting the role of blogs to disseminate grassroots opinions throughout the

population. Similarly, Elwood and Leszczynski (under review) review the many ways in which geoweb applications are being used for activism and civic engagement. While much of this work is done within the US context, researchers like Lin (2012) perform similar investigations in China. Lin (2012) is interested in the ways in which Chinese 'netizens' are using VGI to "reconfigure and create spaces of civic participation in China." (11) She examines three particular case studies, each of which involves individual activists using geoweb applications to disseminate information about political and current events affecting the country. Interestingly, rather than using the systems-theory verbage of networks, Lin instead turns to Habermas and views these actions as evidence of the geoweb's existence as "a multitude of public spheres" (10). In each case, though, there is a clear interest in the ways in which the geoweb can contribute to democratic participation.

Perhaps the largest amount of literature, though, is devoted to describing the ways in which the geoweb politically empowers citizens in cases of crisis management (Goodchild and Glennon 2010). In a US domestic context, for example, Crutcher and Zook (2009) describe the ways in which geoweb applications, including the Google Earth Community and Sciopionus.com, were used in the aftermath of Hurricane Katrina in New Orleans. For instance Sciopionus.com used the Google Maps API to post information about conditions in particular locations throughout New Orleans, which could be used by affected individuals seeking safety (Crutcher and Zook 2009). Even after the primary emergency response, organizations such as the Center for Social Inclusion and the Brookings Institute have continued to rely upon geoweb technologies to continue to monitor the recovery of neighborhood communities (Mills 2008). Within an international context, Zook et al. (2010) describe how crowdsourcing applications "can empower activists and citizens on the ground during crises [like the earthquake in Haiti] to

work for the public good." (10) In the case of Haiti, two key phenomena were observed (Forrest 2010; Hesse 2008; Maron 2010; Zook et al. 2010). First, geoweb applications including OpenStreetMaps, CrisisCamp Haiti, and GeoCommons allowed users from around the world to produce maps that could be used to direct the emergency management practices of international organizations. For instance, OpenStreetMaps users from around the world used satellite imagery to trace out information about streets, buildings, and more in Haiti (Zook et al. 2010). Second, other crowdsourcing applications, such as Ushahidi, allowed survivors to use SMS, MMS, or online interfaces to send messages directly to emergency responders (Zook et al. 2010). This allowed survivors of the earthquake to text for help, and for emergency response units to quickly and efficiently locate and respond to these incidents. In each case the geoweb was empowering because it helped to direct the juridical power of aid organizations to help citizens.

In contrast, other geographers have highlighted the darker side of the geoweb by exploring the ways in which it erodes privacy and increases surveillance (Dodge and Kitchin 2007; Elwood 2008, 2010; Elwood, Goodchild, and Sui 2012; Elwood and Leszczynski 2011; Goodchild 2008; Obermeyer 2007). Elwood and Leszczynski (2011), for instance, examine the ways in which societal negotiations over privacy within the geoweb "rework the objects of privacy concern and the roles and relationships of actors involved in information production and disclosure." (11) Of particular note here is their identification of the geoweb as a particularly immediate and direct representation of virtual selves. This is particularly problematic for these authors because these representations easily allow other users to draw "conclusions about individuals and their activities" that they are increasingly likely to "be taken as definitively 'true'." (Elwood and Leszczynski 2011, 11)

Elwood and Leszczynski (2011) have some reservations about immediately connecting these privacy issues to surveillance, arguing that surveillance "implies a unidirectional power relationship between viewers and viewed" (8). For them the geoweb is more of an omnopticon than a panopticon, meaning that it allows the many to surveil the many. Nonetheless, their analysis resonates well with Dodge's and Kitchin's (2007) description of life-logging project. Dodge and Kitchin (2007) worry that the conveniences of the geoweb lead individuals to perform sousveillance, or surveillance of the self, by logging all of the details of their everyday lives. Regardless of whether this is evidence of surveillance or erosion of privacy, panopticism or many-watching-many, it is nevertheless strong evidence of disciplinary power at work within the geoweb. In each case the geoweb collects large amounts of information which can be arranged as a grid of intelligibility for understanding individuals. The danger, of course, is that this data is an immediate and direct representation of a person that is difficult to destroy, so a loss of privacy tends to lead to a loss of control over how one shapes one's own long-term identity. The grid, instead, begins to shape that identity, and it tends to discipline individuals in a myriad of ways, from controlling their shopping patterns to affecting job prospects.

Naturally, all of this analysis is critical to understanding the effects of the geoweb. Nevertheless, by focusing on either empowerment *or* privacy, this research misses the opportunity for a more complex investigation of the social processes that produced the geoweb. Instead, we should be asking how empowerment within the geoweb is predicated upon increased surveillance, decreased privacy, and, in the words of Obermeyer (2007), volunteered (geo)slavery. This will help us to better understand the stakes of democratization through the geoweb, and how real gains in democracy also structure our attitude toward surveillance and privacy. For example, when Crutcher and Zook (2009) argue that all individuals "deserve a voice

in cyberscapes," (533) and describe as problematic the fact that voices are not represented equally, they evade the question of whether all voices and all truths wish to be visible for all to see. Similarly, they fail to ask whether it is desirable that citizens must report their situations of crisis online in order to receive the full benefits of crisis management. As researchers we must be careful not to equate presence with power, nor absence with marginalization.

In a world in which participation also often means responsibilization, and in which responsibilization means the abdication of one's privacy, researchers must explore both the politics of participation and also the politics of which silences should remain (Nagar, personal communication). Many lessons can be drawn here from PPGIS—Elwood (2006a) for example points out that, in negotiations with state agencies, it may benefit local organizations to *not* share information, since that information represents a bargaining chip for those organizations. Similarly, many PPGIS projects working with indigenous peoples are quick to stress the need to protect sensitive and sacred knowledge from public consumption, even as they work to use that same knowledge as a political tool (e.g. Gilmore and Young 2012). These examples hold no less true for the geoweb. Naturally, this is not to say that presence in the geoweb is not important, nor that the legal and democratic gains produced by the geoweb should be wholly avoided. Instead, by asking questions that directly relate disciplinary and juridical notions of power, researchers will be better able to understand the marginal effects of each, and thus to start to tackle these complex issues.

The Topology of Power: Working Toward (In)Equality

The conflict over the topology of power is between wanting to identify and pursue an outside to power, or a space of equality, and realizing that power inevitably structures relations within all spaces. The key to negotiating this conflict, then, lies in one's ability to recognize that

power does operate differently (and even, sometimes, more fairly) in different spaces, but also in one's ability to constantly perform critical reflection upon how improved spaces reintroduce inequality. In many ways this tension was the one best understood by critical GIS and PPGIS researchers, and thus the least problematic within current studies of the geoweb. For example, while many of the PPGIS researchers did adopt an Habermasian view of their project, and thus sought to create spaces of equal participation for their participants, they nevertheless recognized that PPGIS projects also introduced new, or perpetuated ongoing, power relationships within communities. They thus problematized terms like 'public' and 'participation' even as they sought to produce public and participatory environments. (e.g. Schlossberg and Shuford 2005).

This process, of seeking greater equality but then problematizing it, is a useful framework for thinking about current work on the geoweb. For example, while many originally heralded the geoweb as a democratization of cartography, researchers are now extremely interested in the ways in which digital divides, or lags, reproduce inequality in the geoweb (Crampton 2003; Crutcher and Zook 2009; Elwood, Goodchild, and Sui 2012; Gilbert 2010; Hinchcliffe 1996; Halford and Savage 2010). Already, I have recounted Crutcher's and Zook's (2009) analysis of the inequalities present in the geoweb response to Hurricane Katrina. Graham and Zook (2013) later perform a similar analysis of the languages present within Google Maps content. They argue that the accessibility of the geoweb to different groups, as well as the algorithms that sort which representations of place are most visible, produce uneven distributions of whose knowledge counts within the geoweb. For example, they found that North America and Western Europe are far more densely annotated than other countries and that certain languages, like English, enjoy far more prominence than others across the globe (Graham and Zook 2013). The authors thus argue that this type of analysis reveals insights into the changing landscape of

inequality within the globalizing world economy. Authors like Gilbert (2010) go further, arguing that presence within the geoweb is also determined by non-demographic characteristics like interest, social networks, and technological capacity. For the geoweb to provide a space in which all can be represented, these authors argue, greater social inequalities must be addressed.

Here, again, is a new vision for an outside to power, or at least a space of relative equality—a geoweb in which all have equal representation. Against this vision, I might ask how this desired 'outside' blinds us to other unequal power relations already operating within the geoweb. For example, in what ways does active participation (*if* that is what one desires) still not guarantee fair representation? Boulton (2010) offers one answer in his examination of the different tiers of citizenship possible within the Google Map Maker community. He traces out the ways in which the online community vets new participants, until they are trusted to contribute with minimal moderation, as well as the ways in which most participants are excluded from the 'full citizenship' of being able to modify the Terms of Service. This analysis reveals very explicit ways in which the geoweb remains a space of power relations, even if the space of expertise is now controlled by corporate technologists instead of state cartographers.

Another answer, drawing from Foucauldian discourse analysis and feminist critiques of epistemology, looks for more hidden and implicit inequalities within the discourses and technologies that structure the geoweb. Even if all individuals could equally access the geoweb, this does not mean that all *discourses* or *ways of thinking* will become equally permissible. All forms of media, including the geoweb, are framed in particular ways in order to "influence how audiences interpret and evaluate issues and policies." (Tewksbury and Scheufele 2009, 17) Within the context of this paper, then, it is important to identify and understand the particular ways in which the discourses and technologies of the geoweb shape (1) the ways in which

individuals understand the spaces of the world and (2) the types of contributions that fit, and are thus permissible, within the spatial *episteme* of the geoweb. Google Maps gives an excellent example of the potential impact that these frames have on contributions to the geoweb. For instance, a cursory examination of Seattle, Washington as described by Google Maps reveals that, after roads, restaurants are the most commonly represented feature. Additionally, while many of these restaurants have been rated and described by users, these ratings are guided by very specific categories such as 'Value' and 'Quality of Service'. Instead of thinking about Seattle in terms of its relation to issues of social justice, political ecology, or indigenous politics, the user is led to think, in a very instrumental sense, about how to navigate to a particular spot to purchase the best (culinary) experience. This makes sense given Google's own emphasis on commercial advertising. The geospatial technology itself plays into this frame, since it only allows users to rate places at the scale of buildings; it is much harder to describe places at larger scales, such as neighborhoods. Users are thus led to think about place in terms of buildings and businesses. Lastly, because Google Maps relies entirely on user contributions, it is entirely possible that previous contributions might frame the way in which new contributors add their own descriptions. In this case it is quite possible that the tyranny of the expert has been replaced by the tyranny of the crowd, in that crowdsourcing serves to crowd out alternative views.

Additional examples of spaces of equality which require more problematization come from the Global South. In addition to utilizing the geoweb for emergency management, international organizations are also increasingly using it as a component of their development practices. The World Bank, for example, has recently begun the Open Aid Partnership to map its development projects. In this way the World Bank hopes to both increase the transparency of its projects and also to empower local citizens by allowing them to directly contribute feedback

about the projects to the organization (Open Aid Partnership 2012). This discourse surrounding the Open Aid Partnership paints a picture of a space of empowerment in which all users get an equal chance to shape the development projects that affect them. However, Foucauldian analysis often reveals that the development pushed by the World Bank is not universally empowering of all global citizens, but rather produces and reinforces neoliberal norms within the Global South (Ferguson 1994; Lawson 2007). Thus, development is framed in terms of fiscal discipline, privatization, deregulation, and financial liberalization, thereby foreclosing discussions about alternative forms of development (Lawson 2007). Here, rather than extending a space of equality and democracy to the Global South, discourse about development may actually serve to silence and distort the voices of the subaltern (Spivak 1999). Thus, an analysis of geoweb applications like Open Aid Partnership must ask how these applications frame participation. Are all discourses equally possible within the application, even if they radically problematize World Bank notions of development? Or are all contributions framed in terms of a technical discussion about whether current projects are successful or not, given an already agreed-upon notion of (neoliberal) development? Answers to these questions are necessary for a fuller understanding of the equality of different discourses within the geoweb.

Naturally, none of this is to say that we shouldn't continue to fight for a more accessible geoweb. It is simply a reminder that this more equal geoweb is, in certain ways, just as dangerous as its predecessors. Thus, an appropriate framework for our investigation of the geoweb is one that vacillates between trying to improve the geoweb and criticizing those same improvements.

Strategies of Resistance: Networked (Inter)Subjectivity

This final area of tension involved the contrasting strategies of individual and collective forms of resistance. Here, one can imagine a spectrum of strategies ranging from personal forms of resistance inspired by Foucault, to the flexible alliances or collectives advocated by many feminist scholars, to Habermasian deliberation within large public spheres. As one moves from the individual to the public end of this spectrum, one becomes both more capable of garnering collective support and also more susceptible to the disciplining power of others. Thus, for instance, at the Habermasian end of the spectrum PPGIS projects can harness the collective resources of entire communities but may subordinate individual needs to community goals (Schlossberg and Shuford 2005).

Because the geoweb offers the possibility for both individuals and groups to participate in the production of spatial knowledge, geographers need this full spectrum of theory. Foucauldian analysis can be quite useful in understanding the ways in which the geoweb allows individuals to practice an ethics of self. In fact, when Lin (2012) describes how individually-initiated projects in the geoweb help users to perform work on their own subjectivities and then share the results with others, she is describing a process that closely parallels Foucault's ethical technique of writing to others. Similarly, Foucault's work offers unique insights into the ways in which surveillance affects individuals within the geoweb (e.g. Brownstein, Freifeld, and Madoff 2009; Kingsbury and Jones 2009; Obermeyer 2007; Perkins and Dodge 2009; Sparke 2011), or into the ways in which spatial representations mediate how individuals perceive the world around them (e.g. Dodge and Kitchin 2007; Graham and Zook 2013). Lastly, when conceptualizing the geoweb as "a crowdsourcing 'market place' that matches needs with resources" (Meier 2011, no page) using a 'techno-libertarian' attitude, researchers open the door to using the same

Foucauldian theories of governance that they currently level at the individualizing effects of neoliberalism.

However, as Haklay et al. (2008) point out, within the geoweb there also exist many technologies which enable different levels of collaboration. While Foucault offers ways in which collaborative practices can be problematized, he neither provides convincing models for describing intersubjectivity nor suggestions for building a geoweb supportive of more politically powerful collective practices. There thus remains a great deal of room for research that utilizes feminist and democratic theories to analyze the collaborative practices of the geoweb. For example, what lessons might decades of feminist grassroots organizing teach us about effective ways to configure political social networks on the web? One might imagine critical insights concerning how one weighs the need for inclusivity in building these networks against the desire for privacy controls to maintain control over group membership. Similarly, Haraway's (1991) work on hybridity offers researchers theoretical strategies for examining, and transforming, the disciplinary labels attached to collectives. From another angle feminists like Staeheli (1996) might offer insights into the political strategies these collaborative networks can use to effectively enter wider public spheres. Together, these types of investigations can help reveal the motivations, technologies, and techniques that allow individuals to form intersubjective relationships with others within the geoweb.

Finally, at the far end of the spectrum, democratic theorists like Habermas provide tools for understanding the normative implications of the most public aspects of the geoweb. For example, crowdsourcing as a process relies on large amounts of people to produce some truth[9]. This concept has been cited numerous times as a key attribute of the geoweb (e.g. Elwood, Goodchild, and Sui 2012; Goodchild 2007), yet no one has fully examined the political

[9] A process that sounds suspiciously like Habermas's deliberation.

implications of the many different technological mechanisms and political-economic configurations that allow crowdsourcing. As an illustration, take the difference between the crowdsourcing techniques used by Wikipedia and Google Maps. Wikipedia, which was founded by Internet entrepreneur Jimmy Wales in 2001, is an attempt to create an encyclopedia using collaborative authorship tools which give all users nearly complete control over article editing and production (Benkler 2006). Not only can users edit contributions from others, but they are also encouraged to justify their new claims in a 'Talk' section associated with the topic in question (Wikipedia 2012). Furthermore, Wikipedia also provides a Community Portal which facilitates collaboration and discussion. As Benkler (2006) points out, these tools have produced a vibrant community as well as thousands of high-quality articles, whose production is generally guided by a "self-conscious social-norms-based dedication to objective writing." (72) This is evidence of a highly deliberative process, in which users come together in communicative processes that must be justified using communally-defined standards of reason. In contrast, Google Maps allows users to search for specific places and then contribute a review of that place, which includes both text and a star rating. Unlike the communally produced articles of Wikipedia, Google Maps reviews are generally separated, in a list, from one another. There is no overt need for reviewers to interact with one another, and thus no particularly deliberative or communicative process tends to take place within these reviews. The most crowd-oriented aspect of the process lies within the star ratings, since each reviewer's rating is aggregated with the ratings of others to produce an average rating. Once again, though, this sort of agglomeration does not meet the communicative requirements of deliberation—it is much more akin to the view of democracy ascribed to by social choice theorists, who believe the goal of politics is "the optimal compromise between given, and irreducibly opposed, private interests." (Elster 1997, 3)

Rather than relying on deliberation as a method for arriving at forms of crowdsourced truth, social choice theory relies on Condorcet's Jury Theorem to argue that the individual opinions of members within a crowd can be mathematically aggregated to arrive at some notion of truth (Estlund 1997). In this case individuals arrive at a decision through the aggregation of votes, or ratings in the case of Google Maps, instead of through deliberative consensus. Thus, while both Wikipedia and Google Maps are forms of crowdsourcing, the implications of each on how intersubjectivity is forged are quite different. In particular, deliberative democrats argue that social choice theory remains both individualized and instrumental, and therefore deficient when it comes to producing communicative interaction. As a result the forms of power that can be generated by each of these processes can also be quite different.

These normative visions for how the geoweb should be engendering collective action can be productive, especially when trying to influence technological design. At the same time, Foucauldian critique remains quite useful for proposing individualized forms of resistance to oppose any violence perpetuated by collective action. Similarly, as geographers expand the work done at these different levels of analysis, theorists like Mouffe (1993) may also be able to provide frameworks for examining the ways in which one form organizing does violence to, and thus should be held in productive tension with, other forms of organizing. In conclusion, then, a whole range of practices and theories are needed to understand and intervene in the full range of ecologies of practice being negotiated through the geoweb (Gerlach 2010).

Conclusion

The goal of this paper has been to explore the different ways in which studies of the geoweb have inherited the concept of power, in order to highlight how this mixed heritage continues to shape how we think about geospatial technologies and the social relations they

produce. To do so, the first section of the paper reviewed literature from the critical GIS research program, including GIS & Technology, feminist GIS, queer GIS, qualitative GIS, and PPGIS literature. Throughout this review, I found that critical GIS researchers have implicitly drawn upon four different models of power, drawn from the theories of Michel Foucault, Donna Haraway, Jürgen Habermas, and liberal systems theorists. Some critical GIS researchers have also drawn upon STS conceptualizations of society, and particularly upon the work of Bruno Latour, but I found that this work falls outside the scope of this paper because its primary focus is not power. Unfortunately, because most, if not all, of the research into critical GIS only drew upon these theories implicitly, this literature does not do a good job of fully conceptualizing how these different theories shape the ways in which we understand GIS. Most troublingly, researchers have not examined the contradictions produced through their utilization of these varied theories, nor have they asked how these contradictions might hinder their research program more broadly.

Thus, the second section turns its focus to the political theories identified in the first section. In particular this section identifies three different tensions that run through literature on power—tensions over how the different thinkers theorize the workings of power, the topology of power, and the strategies of resistance to power. In addition to identifying these tensions, this section also offered techniques for reconceptualizing them in a productive manner. For instance, while Foucauldian and Habermasian models of power fundamentally disagree about whether there exists an outside to power from which to resist power, Chantal Mouffe's notion of agonistic pluralism may help researchers to move past this disagreement.

Finally, section three extends this improved understanding of power to the geoweb. This section first argues that research on the geoweb has inherited two things from the critical GIS

agenda—both use of the four different models of power used by that agenda, and also a lack of theorization of the tensions between these different models. I argue that, by ignoring these tensions, the geoweb agenda remains fractured. Moreover, by explicitly engaging these tensions, this section attempts to offer geographers potential tools and critical questions for pushing forward future investigations of the geoweb. For instance, by recognizing that a digital presence within the geoweb is both potentially empowering, from an Habermasian perspective, and disciplining, from a Foucauldian perspective, geographers can begin asking how empowerment within the geoweb is predicated upon increased surveillance and decreased privacy. This line of questioning could provide a more complete picture of the geoweb than could separate examinations of empowerment, on the one hand, and privacy, on the other. A full engagement with power provides many other similar lines of questioning that can be used to frame the geoweb.

I should acknowledge that many silences remain despite my exploration of power. It is perhaps surprising that, given the breadth and depth of work on geospatial technologies, most of this work can nonetheless be tied to only a handful of theories of power. Political theorists like Chantal Mouffe (1993), and many others, offer productive manners to think about the complex ways in which power operates through and within geospatial technologies, yet, with limited exceptions (e.g. Ramsey 2008), remain absent from the literature. More problematically, all of the predominate theories of power circulating through critical research on GT emanate from the Western philosophical tradition. Despite the extensive effects that geospatial technologies, in the form of both PGIS work and the geoweb, have had within the Global South, few critical GIS researchers have utilized postcolonial or indigenous forms of theory within their work.[10] There is

[10] Notable exceptions include Johnson et al. (2007), Sparke (1995, 2010), Turnbull (2000), and Wainwright (2008), among others.

no doubt that concepts of power borrowed from these strains of thought could be used to productively utilized to understand the geoweb, and it is critical that geographers explore these concepts to avoid reproducing the violences so prevalent throughout the history of the West. I hope, then, that this work might serve only as the limited beginning to a much broader discussion about the many ways in which emerging geospatial technologies produce, affect, and are affected by the political.

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Chapter 4: Conclusion

Summary of Arguments

This thesis has identified two areas of undertheorization within critical research on geospatial technologies. In each case geographers have utilized terms from political theory without fully conceptualizing those terms, and in each case this has limited the questions that these geographers can ask about the political impact of emerging technologies. In order to overcome these limitations, Chapters 2 and 3 of this thesis have focused on deepening our conceptual understanding of the concepts of empowerment and power.

Over the past three decades geographers have asked critical questions about geospatial technologies that have generally been centered "around similar questions of inclusion, exclusion, and knowledge claims" (Elwood 2010, 351). Thus, while technologies and practices have changed, geographers nonetheless have remained interested in the politics of participation in spatial knowledge production, and thus more broadly in the ways in which power operates within and through maps (Elwood 2008, 2010; Elwood, Goodchild, and Sui 2012). Despite this constant interest, GIS & Society and Critical GIS literature has proven itself incapable of thoroughly defining what it means by the concept 'power'. The closest this literature has come to providing an adequate definition of power is through various attempts to conceptualize 'empowerment'.

Unfortunately, as Chapter 2 argued, even these conceptualizations of empowerment tend to fall short of describing the full range of ways in which GIS can positively impact marginalized communities. PPGIS research has given rise to many of these conceptualizations, and this research has a strong history of focusing on pragmatic and applied uses of GIS. As a result empowerment has been described almost exclusively in terms of the ways in which local groups receive power from government actors. For instance PPGIS maps may empower grassroots

NGOs by helping them to achieve certain material benefits, such as funding or rights to land, or by helping them to gain more sway over official decision-making processes (Elwood 2002). In each case empowerment describes a process by the government transfers power (vaguely defined as material objects or procedural control) to those with little power.

This definition of empowerment places far too much emphasis on the ways in which government action can improve the lives of the marginalized. Not only does this conceptually grant the government the exclusive capability of generating power, but it also often hides the beneficial effects that the *process* of creating maps has within communities. In particular Chapter 2 argues that common interpretations of empowerment hide the ways in which PPGIS methodology produces affective/emotional geographies within communities themselves. Throughout our work with the Maijuna, for instance, we witnessed many instances in which the map-making process elicited pride amongst participants and caused them to bond politically with one another. Similarly, PPGIS methodology could just as easily produce negative affective/emotional effects within a community; in the case of the Bowman Expedition, communities experienced distrust, fear, and pain because of decisions that PPGIS researchers made along the way (Steinberg 2010). Even if this Expedition had produced effective maps that gained the participants certain political goals, it would be hard to say that these participants were truly 'empowered' based upon their experiences along the way.

Rather than offering a new-and-improved definition of empowerment, Chapter 3 turns to the underlying concept of power. An extensive literature review of GIS & Society and Critical GIS research revealed that geographers have implicitly used no fewer than four different models of power—Foucauldian, feminist, Habermasian, and liberal systems theory models—throughout their work. However, these geographers rarely outline the assumptions intrinsic to these different

models, and they never examine the incompatibilities between the different models that they employ. These incompatibilities can be fairly extreme. Chapter 3 outlines three such tensions, including tensions in how power functions, in the topology of power, and in the strategies capable of resisting power. For instance, Habermas's conceptualization of power is repressive (i.e., it is the ability to constrain the actions of individuals), whereas Foucault understands power as productive (i.e., the ability to discipline individuals to act in certain ways). These two interpretations of power are diametrically opposed to one another, and yet they are each regularly employed to explain and critique the political effects of GIS.

Identifying these tensions is not merely an exercise in theoretical purity—research on the geoweb has inherited these tensions, and this inheritance is limiting the types of questions that geographers are asking about emerging technologies. Instead, geographers need to explicitly engage these tensions. For instance, geoweb research currently tends to use an Habermasian framework of power to describe the ways in which the geoweb is empowering, but also a Foucauldian framework to describe the ways in which the geoweb surveils and disciplines individuals. While each of these are important areas of research, if the two areas do not talk to one another then geographers miss the opportunity to ask interesting questions. Instead of looking at empowerment and surveillance separately, researchers should ask how empowerment within the geoweb is actually predicated upon increased surveillance and decreased privacy. This provides a more holistic picture of the geoweb, as well as the geoweb's implication in wider political-economic processes. At the very least, this fuller understanding of how geographers use power certainly provides more nuanced opportunities for research than do simplistic discussions of empowerment.

Significance of Research

This research is significant in its attempt to provide a deeper theorization of the political concepts that geographers use to investigate and understand geospatial technologies, data, and practices. First, while geographers have defined empowerment, these definitions are narrowly focused on describing instrumental benefits that communities might receive from the government. These definitions thus obscure some of the other effects that mapping practices have on individuals and communities, and they particularly hide the political effects of the affects/emotions produced by such practices. This is the first work that analyzes the political implications of affect/emotion in community-level PPGIS projects, and it goes on to connect those implications to the methodological choices of practitioners. As a by-product, this work also provides a detailed framework for understanding the relationships between affect and emotion, and how each concept can provide useful tools for understanding political processes. Taken as a whole my work on empowerment provides an important theoretical foundation for future work on the geoweb—just as it is important to not focus purely on the final map produced by a PPGIS project, it is also important to not focus only on the data and representations circulating in the web. Geographers must also focus their attention on the processes that go into producing these data and representations, and how these processes produce affective/emotional geographies that have political importance.

Second, this work provides the first detailed examination of how geographers have used the concept of power in their description of geospatial technologies and practices. Given the political nature of GIS & Society, Critical GIS, and Geoweb research, a strong understanding of power is valuable *prima facie*. For every theorist described in this thesis, power is both the very foundation of politics and also a precondition to any type of empowerment. More importantly, the tensions between the many different models of power inherited by geoweb researchers have

produced blind spots in current research. By addressing these tensions head on, this research has provided several different questions and frameworks for future research on the geoweb. These questions include:

- In what ways is empowerment within the geoweb predicated upon increased surveillance and decreased privacy? What are the wider implications of this for political and democratic action within and through the geoweb?
- What silences should remain within the geoweb? How are different bodies affected differently by the empowering and disciplining technologies of the geoweb?
- In what ways does the geoweb remain a space of inequality, even beyond issues of access? In what ways do the discourses and technologies of the geoweb frame participation so as to promote certain forms of participation over others?
- How do varying levels of individualization and collaboration within the geoweb affect the type of power practiced through the geoweb? How do different models of power enable different explorations of the types of politics taking place in the geoweb?

I hope that I can capitalize on some of these opportunities as I continue on to my doctoral research.

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