Chapter 3

Subjectivity in Mapping

The need for a more participatory cartography is predicated on the exclusion of many from the practice of mapmaking as it stands today. Even more importantly, it depends on the point of view that mapping is an inherently non-neutral practice, and that for maps to serve wider and more democratic interests, it must accommodate diverse viewpoints. Maps serve interests, and understanding their role not as documentation of what makes up the world, but as rhetorical, tactical, and *subjective* tools is an important prerequisite to what this document argues.

3.1 The mythical 'complete map'

One common sentiment often heard in contemporary map literature is that the earth is more or less completely mapped. The availability of satellite imagery in tools like Google Earth, and the ability to zoom shockingly far into a dizzying array of places, from power plants in North Korea to the top of Macchu Pichu, gives the casual user the impression that we have indeed created a complete map of the world. However, if one attempts to find imagery of places with lower global economic relevance, it becomes clear that while there may not be many *blank* spots on the map, there are an abundace of *blurry* spots.

Figure 3.1: Kutaisi, the second largest city in Georgia. Google Maps, July 2010

This of course sidesteps the fact that an aerial image does not a map make — that is to say, in order to take advantage of the many applications of geographic data, vector maps which geometrically and semantically describe features must exist, including labels, tags, metadata, and even relations, which may be parsed into driving routes. These are almost entirely absent from many areas of the world (see Chapter 4). Amongst cartographers, the idea that maps accurately,

or even completely depict a location is not entertained in a literal sense, yet there persists a sense that complete maps are possible. Within certain realms, communities such as OpenStreetMap have declared completion, as in an email by Etienne Cherdlu to the project's developer mailing list in 2006, entitled 'UK Motorways 100% Complete':

> I'm pleased to announce that the main carriageways of all mainland UK motorways have been completed. Over 3,000 km of roadway.

Still, OpenStreetMap's tagline describes the project as an 'editable map of the whole world', and the scope of the project is growing. The inclusion of increasingly subjective data has transformed the project, from road conditions ('surface=unacceptable') to contested political boundaries such as the borders of Palestine or the existence of Western Sahara as a sovereign nation, to the possibilities of including indoor features such as rooms and hallways. Yet the premise of mapping the entire planet should remain an obvious fantasy; in fact, the fiction of such a complete map has been explored by several authors, most notably in a short story by Jorge Luis Borges and Adolfo Bioy Casares, entitled 'On Exactitude in Science':

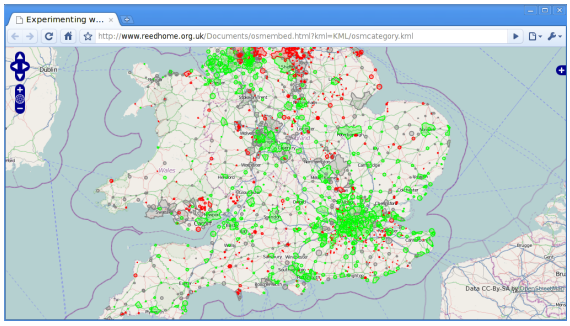

Figure 3.2: A map depicting all 'incomplete' areas of OpenStreetMap in the UK. (http://www.reedhome.org.uk/Documents/osmembed.html?kml=KML/osmcategory.kml)

> ...In that Empire, the craft of Cartography attained such Perfection that the Map of a Single province covered the space of an entire City, and the Map of the Empire itself an entire Province. In the course of Time, these Extensive maps were found somehow wanting, and so the College of Cartographers evolved a Map of the Empire that was of the same Scale as the Empire and that coincided with it point for point. Less attentive to the Study of Cartography, succeeding Generations came to judge a map of such Magnitude cumbersome, and, not without Irreverence, they abandoned it to the Rigours of sun and Rain. In the western Deserts, tattered Fragments of the Map are still to be found, Sheltering an occasional Beast or beggar; in the whole Nation, no other relic is left of the Discipline of Geography. [11] [1]

Beyond the technical impossibility of *total mapping* lies the trend towards increasingly individualistic, subjective, and divergent models of the world, which inevitably occur as maps become more ubiquitous and more detailed. Rather than pursuing the goal of a single canonical representation of the planet and attempting to encompass conflicting interpretations, participatory mapmaking should embrace diversity, and allow for separate but related means of describing the world. [2]

[1] The idea of a 1:1 map of a whole country was originally mentioned in Lewis Carroll's novel **Sylvie and Bruno Concluded**.

[2] My belief in the value of a divergent paradigm for digital mapmaking was also the impetus for my development

3.2 A 'ground truth' policy for collaborative mapmaking

OpenStreetMap has in fact begun to encounter a number of challenges due to the inherently subjective nature of mapmaking — especially as the project has grown to encompass dozens of countries, cultures, and socio-political perspectives. Due to the project's open and wiki-like architecture, occasional disagreements occur between users, and a convention has been established to resolve such disputes. OpenStreetMap can accommodate an unlimited number of language translations for the label of a map feature, but the **default** label is what is displayed on the web map at OpenStreetMap.org. The 'on the ground' policy, as it is known, places any editorial decision in the hands of 'the people on the ground at that location'. The policy, whose definition was led by Mikel Maron, was originally proposed in response to an 'edit war' in 2007 between Turkish-speaking mappers from northern Cyprus and Greek-speaking mappers from southern Cyprus. [58] While such a policy has in general served the project well, its necessity is an indication that as mapmaking becomes a more widespread and inclusive practice, the increasing diversity of viewpoints will make a single canonical map less feasible.

3.3 Privacy and mapping, privacy and open geodata

Privacy is of course yet another reason to shy away from total mapping. Indeed, for any publicly available map to include such details as the positioning of my coffee table or wifi router [3] offers a more clear view into my personal space than I care to allow. The further Google Street View and similar services invade that space, the more the public will feel uncomfortable with such overreaching cartographic enthusiasm. Appropriating these technologies in support of bottom-up efforts can invert these issues, and the ability to make maps *for oneself* as analytic tools, or to publish selective geographic information to a specific audience for tactical or advocacy reasons, can recast such technologies as empowering and enriching.

One of the most difficult aspects of participatory mapmaking, is that I am often asked questions such as, 'Why would a community allow you to come take aerial pictures of their homes?' This is a fair question, but one which thoroughly misconstrues what I am advocating. My work is intended to teach and assist communities and individuals to map themselves, for themselves. This includes building literacy and proficiency in geographic tools and information, and making good choices about how to publish their maps — if at all. The maps which I have published here are only those for which I have requested specific permission to reproduce for purposes of education and research. The decision of a community to publish their work is one which I am very cautious to encourage, as another question I am asked is, 'Isn't mapping just a means for the state to exert influence and control over geography?' If communities and individuals are not in control of their own geodata, the answer may be 'yes'!

of the Cartagen web mapping framework, which shifts the interpretation and rendering of map feature data to the client side (rather than generating a single canonical server-side rendering), allowing for endless variety of representation.

[3] A discussion of Google's collection of personal WiFi data can be found here:
http://bits.blogs.nytimes.com/2010/05/14/google-admits-to-snooping-on-personal-data/

3.4 Mapping: a tool of empowerment or control?

The idea that mapmaking is a kind of cartographic harvesting of the most vulnerable places and people on the planet is a justifiable fear, however it is based on a relatively one-sided reading of history, and especially of contemporary mapping practice. Maps can just as effectively be used to defend as to conquer, as a wide variety of cartographic activists have demonstrated. B'Tselem, a progressive Israeli human rights group based in Jerusalem, has used maps of Israeli settlements in the West Bank to support their the critique of those settlements as the illegal annexation of traditionally Palestinian land. Jai Sen, a political organizer in Calcutta in the 1980's, used maps of urban slums as a form of testimony, effectively proving that people lived on the land before authorities bulldozed it and claimed that it was uninhabited from the start.

VirtualGaza, a project by Josh Levinger, published narratives by victims of the 2008 war in Gaza, linking the cartographic representation (one reason for the conflict) with the human stories and images of the destruction it caused. The OpenLayers-based map, available at http://virtualgaza.media.mit.edu, protected participants' locations by purposely categorizing them by region instead of displaying more precise coordinates. Levinger's second project in the area, GroundTruth, demonstrated a routing algorithm which could, given a user's legal status, create a travel plan which would avoid IDF checkpoints, actively seeking to disrupt the balance of power in the region with the tactical use of cartographic information.[4] Other cartographers have during the same conflict in Gaza, Mikel Maron defended his work towards the participatory creation of a free and open map of Gaza:

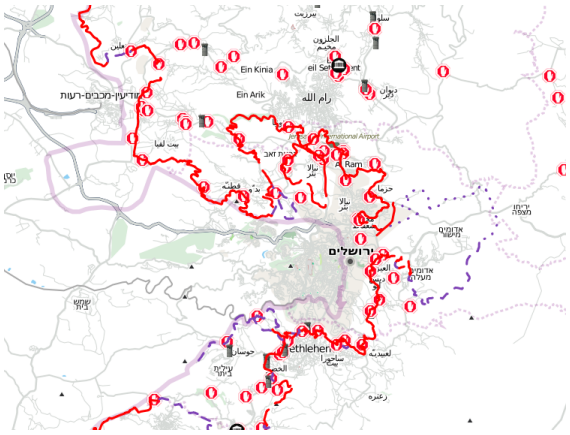

Figure 3.3: The Green Line, Israeli settlements, and checkpoints near Jerusalem and Ramallah, on Josh Levinger's GroundTruth interactive map. (http://groundtruth.media.mit.edu)

> ...it's frankly the same security through obscurity argument peddled for centuries... a strategy on the verge of finally dissolving in a world of openness and transparency. The IDF have access to much better intelligence and imagery than we'd ever have, they fly drones over Gaza, there's a 2m resolution commercial limit in all satellite imagery over Israel — guess who gets to see the sub-meter imagery? Gazans have nothing to gain by trying keep secrets, the asymmetry of that game is overwhelmingly not in their favor. [43]

Maron later refined his position to except certain highly vulnerable groups [5]:

[4] The routing system was disabled when it became clear that up-to-date checkpoint information was unavailable, and that users might be presented with obsolete data.

[5] See Section 2.2.1 for a discussion of PGIS ethics

> In general, I view these edge cases as a question of power. Hiding information protects those already in power, but not those that are already marginalized. Legitimate cases [for obscuring data include] only information that puts dis-empowered people at risk, such as refugee routes along the Burmese-Indian border. [44]

However the gist of his argument is sound — that cartography is necessarily a losing game only for those who are unable to participate in its creation. Those who are unable to communicate in the relevant cartographic language of power – be it GeoJSON, TMS or just paper – never even know they are being mapped, or what that might mean for their well being or safety.[6] In some ways, this is a subset of the debate championed by Evgeny Morozov, Clay Shirky, and Patrick Meier[7] over whether new media is a force for democracy, or at least whether it supports 'popular resistance against repressive rule' as Meier puts it. [50] Morozov even specifically mentions mapping, for example when he ridicules the sappiest anecdotes of the technological 'freedom fighters':

> ...Burmese monks defying an evil junta with digital cameras; Filipino teenagers using SMS to create a textual revolution; Egyptian activists using encryption to hide from the all-seeing-eye of the Mukhabarat; even Brazilian ecologists using Google maps to show deforestation in the Amazon delta. [52]

In Morozov's opinion, the belief that such technologies can disrupt power relations '...requires certainty that only pro-western and pro-democracy forces will participate.' His examples, though anecdotal, are sobering: 'In Russia, the internet has given a boost to extreme right-wing groups like the Movement Against Illegal Immigration, which has been using Google Maps to visualise the location of ethnic minorities in Russian cities and encouraging its members to hound them out.'

(rev. see following quote)

The problem with this debate is that it is too abstract. We cannot say universally that mapmaking (or any other technology) will support local needs over those in power, but by working closely with local participants in a sensitive manner, we can invert the flow of information and affect power relations on a local scale. Balloon and kite mapping is not a scalable technology — it would be impractical for Google or governments to use these techniques to map entire countries. However it is ideal for small-scale use, and has important advantages in cost, repeatability, resolution, and speed in that context. My attempts to apply these tools and techniques have focused on these benefits, and in the specific settings in which I have worked, they have allowed local groups to produce better maps than anyone else, albeit for a limited but *highly relevant* area. In a time when many in the crisis community were struggling to get large organizations such as Google, the United Nations, etc. to release satellite imagery[8], the Louisiana Bucket Brigade actually licensed map data to Google — data gathered using Grassroots Mapping tools and techniques.[9]

Ultimately, the ability of mapmaking tools to empower local interests has more to do with the degree of adoption and appropriation of those tools by participants than it does with any overarching

[6] A common criticism by PGIS practitioners of so-called 'remote sensing'. See Section 5.1

[7] See http://www.prospectmagazine.co.uk/2009/11/how-dictators-watch-us-on-the-web/ for the Morozov/Shirky debate, and http://irevolution.wordpress.com/2010/01/07/morozov-vs-shirky/ for Patrick Meier's analysis.

[8] See Section 4.4.1

[9] See Chapter 8

technical aspect of the project. For this reason, I have focused on improving collaboration and building trust with the communities I work with, in addition to an aggressive program of workshops, demonstrations, and user-friendly guides to build a strong pedagogical platform. This approach builds upon the rejection of technological determinism in political processes advocated by Philip Agre, who argues:

> Research on the Internet's role in politics has struggled to transcend technological determinism — the assumption, often inadvertent, that the technology simply imprints its own logic on social relationships. An alternative approach traces the ways, often numerous, in which an institution's participants appropriate the technology in the service of goals, strategies, and relationships that the institution has already organized. [3]

3.5 Maps as truth

Maps carry a sense of authority that few other forms of evidence share. This is in part due to an understanding of satellite or aerial maps as a kind of 'window into the world', depicting the planet 'the way it really looks'. In photography, by contrast, the editorial and subjective role of the author is accepted, despite the damage which 'photoshopping' has inflicted on the perceived truth or objectivity of the photographic image. Maps, however, continue to be understood as direct representations of reality, desipte the inherent subjectivity of image selection, color, brightness, and contrast processing, not to mention the editorial eye necessary in reading and interpreting such imagery.

Figure 3.4: 'Image 16: Chemical weapons leaving Al-Musayyib' [7]

The best example of this attitude is of course the use of satellite imagery by Colin Powell at the UN Security Council in February 2003, which he presented as evidence to support the existence of weapons of mass destruction in Iraq, and to justify the invasion of the country. While the subsequent complete absence of weapons did little to diminish the public's faith in such imagery as objective evidence, Powell mentions in his testimony how difficult it is to interpret satellite imagery:

> Let me say a word about satellite images before I show a couple. The photos that I am about to show you are sometimes hard for the average person to interpret, hard for me. The painstaking work of photo analysis takes experts with years and years of experience, poring for hours and hours over light tables. But as I show you these images, I will try to capture and explain what they mean, what they indicate to our imagery specialists. [33]

Later, after showing a purported chemical weapons site, he explains:

> How do I know that? How can I say that? Let me give you a closer look. Look at the image on the left. On the left is a close-up of one of the four chemical bunkers. The two arrows indicate the presence of sure signs that the bunkers are storing chemical munitions. The arrow at the top that says security points to a facility that is the signature item for this kind of bunker. Inside that facility are special guards and special equipment to monitor any leakage that might come out of the bunker.
>
> The truck you also see is a signature item. It's a decontamination vehicle in case something goes wrong. [33]

Despite the 'years and years of experience' he claimed, an earlier analysis of the imagery to which Powell had access classified the claims as 'weak' and points out that the so-called contamination vehicles are in fact simply water trucks. Though they acknowledge that these **could** have been used for chemical weapon decontamination, the doubt they express stands in contrast to the assertion of 'facts' that Powell presented to the UN:

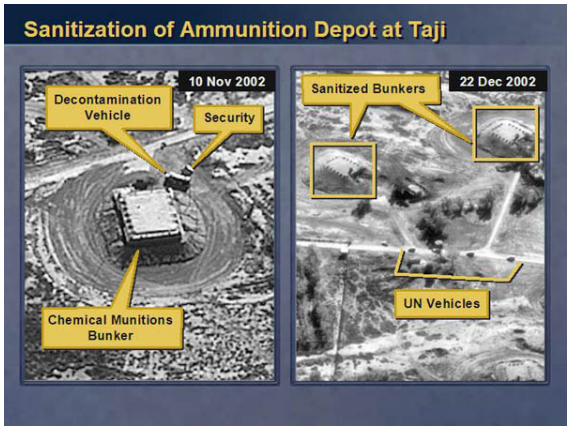

Figure 3.5: 'Image 13: Sanitization of Ammunition Dump at Tajii' [7]

> '— 10-11.***/WEAK. We support much of this discussion, but we note that decontamination vehicles–cited several times in the text–are water trucks that can have legitimate uses. A safer characterization is, 'a vehicle used for chemical weapon decontamination.'
>
> — 11.***/WEAK. We agree there has been suspicious activity [redacted], including presence of a decontamination vehicle. We caution, however, that Iraq has given UNMOVIC what may be a plausible account for this activity–that this was an exercise involving the movement of conventional explosives; presence of a fire safety truck (water truck, which could also be used as a decontamination vehicle) is common in such an event.' October, 2002, classified National Intelligence Estimate (NIE) 'Iraq's Continuing Programs for Weapons of Mass Destruction' [71]

What is most alarming about this kind of rhetorical use of map imagery is that it represents a means for those in a position of power to assert or manipulate truths about places they have never been, without the involvement of human testimony from those who have. The public perception of maps as an objective, quantitative standard of evidence is likely due to the difficulty and expense of producing map imagery, and the traditional monopoly of the government and high-tech industry in the production of such imagery. Still, as we see in Powell's testimony, even the highest levels of government are complicit in the construction of maps as a supposedly authoritative and objective form of information.

3.6 Maps: rhetorical, even tactical

This use of mapping as a form of political persuasion is nothing new, from a historical perspective, but the increased obfuscation of such information in technical terminology and the use of precise measures — referring to maps by their 'centimeter accuracy', for example — has made maps more difficult for lay persons to critique. As Dennis Wood points out in his classic 'The Power of Maps', such metrics give the 'false impression of "scientific accuracy" and completeness', serving to purposely exclude the public from cartographic discourse. [86]

3.6.1 Activist cartography

A new generation of mappers, including many from the experimental geography movement and increasingly amongst neogeographers, has turned this authoritative dimension of mapping on its head by employing many of the same techniques to advance alternative agendas. The increasing democratization of mapmaking technology, and the rapid advances of open-source and inclusive techniques have enabled individuals to leapfrog traditional mapmaking regimes.

It is precisely the rhetorical qualities of mapping which the Institute for Applied Autonomy explores in 'Tactical cartographies' — but as that name suggests, the Institute goes beyond rhetoric to incite action. Defining tactical cartography as 'the creation, distribution, and use of spatial data to intervene in systems of control affecting spatial meaning and practice', they are not only fighting a war of words (or pictures) in highlighting issues of concern. Their maps act as tools in the direct intervention in problematic situations, transitioning from the (still important) discursive products of maps-as-information to their use as informational weapons in a direct engagement in 'politics and power'. [28] In this vein, the Institute authored a pocket map in 2002 depicting all surveillance cameras in Manhattan, so that users might not only learn about the increasing prevalence of a surveillance society, but actively avoid zones under surveillance in their daily life. This movement beyond a symbolic role for mapping — to legal, activist, and primarily action-based outcomes, is what I have attempted to achieve in the Grassroots Mapping project.