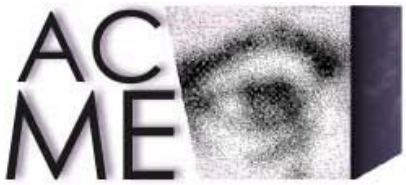

An Introduction to Critical Cartography

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Abstract

This paper provides a brief introduction to critical cartography. We define critical cartography as a one-two punch of new mapping practices and theoretical critique. Critical cartography challenges academic cartography by linking geographic knowledge with power, and thus is political. Although contemporary critical cartography rose to prominence in the 1990s, we argue that it can only be understood in the historical context of the development of the cartographic discipline more generally. We sketch some of the history of this development, and show that critiques have continually accompanied the discipline. In the post-war period cartography underwent a significant solidification as a science, while at the same time other mapping practices (particularly artistic experimentation with spatial representation) were occurring. Coupled with the resurgence of theoretical critiques during the 1990s, these developments serve to question the relevance of

the discipline of cartography at a time when mapping is increasingly prevalent and vital.

Introduction: Cartography Undisciplined

In the last few years cartography has been slipping from the control of the powerful elites that have exercised dominance over it for several hundred years. These elites—the great map houses of the west, the state, and to a lesser extent academics—have been challenged by two important developments. First, the actual business of mapmaking, of collecting spatial data and mapping it out, is passing out of the hands of the experts. The ability to make a map, even a stunning interactive 3D map, is now available to anyone with a home computer and an internet connection. Cartography's latest "technological transition" (Monmonier 1985; Perkins 2003) is not so much a question of new mapping software but a mixture of "open source" collaborative tools, mobile mapping applications, and geotagging. While this trend has been apparent to industry insiders for some time, a more social theoretic critique, which we argue is a political one, situates maps within specific relations of power and not as neutral scientific documents. One might expect a critique of the politics of mapping to weaken the power of the map and to work against a transition putting maps into more people's hands. But just the opposite has happened. If the map is a specific set of power-knowledge claims, then not only the state but others could make competing and equally powerful claims.

This one-two punch–a pervasive set of imaginative mapping practices and a critique highlighting the politics of mapping–has undisciplined cartography. That is, these two trends resist and challenge the received method and practice of mapping established when cartography became an academic discipline. This "insurrection of knowledges" (Foucault 2003: 9) has not occurred without struggle and backlash. It is operating from the ground up in a diffuse manner without top-down control. Yet it is a movement that is ongoing whether or not the academic discipline of cartography is involved (Wood 2003). It is in this sense that we can say that cartography is being undisciplined; that is, freed from the confines of the academic and opened up to the people.

This paper provides an introduction to these two critical movements of cartography. Our main argument rests on two assertions: first that critique is political by its nature, and second that today's critical movement is part of a longer cartographic critique. Mapping throughout its history has been continually contested. The explicit critique of cartography and GIS that arose in the late 1980s should therefore be understood in this much longer tradition. While the former is better known, to overlook the latter is merely to "accept what *cartographers* tell us maps are supposed to be" (Harley 1989: 1). In fact, cartography as a way of knowing the world has constantly struggled with the status of its knowledge in a manner similar to that of the geographical discipline (Livingstone 1992).

Following this Introduction we offer a brief explanation of critique and why it is political. In the third section we delve more deeply into critical cartography and provide some examples. Fourth, we trace the critique back historically. In the last section we suggest avenues for post-disciplinary mappings.

What is Critique? A critical politics of truth

A critique is not a project of finding fault, but an examination of the assumptions of a field of knowledge. Its purpose is to understand and suggest alternatives to the *categories of knowledge* that we use. These categories (i.e., assumptions and familiar notions) shape knowledge even as they enable it. For example, it is often assumed that good map design must achieve "figure-ground" separation, even though recent research on cultural differences in the perception of figure ground reveals that non-Western viewers do not have the same reaction to figure-ground as Western viewers (Chua et al. 2005). Critique does not seek to escape from categories but rather to show how they came to be, and what other possibilities there are.

This sense of critique was developed by Kant, especially in the *Critique of Pure Reason* (1781, 2nd Edn. 1787). For Kant a critique is an investigation which "involves laying out and describing precisely the claims being made, and then evaluating such claims in terms of their original meanings" (Christensen 1982: 39). Kant's essay on the question of the Enlightenment (Kant 2001/1784) describes critical philosophy as one in which people constantly and restlessly strive to know and to challenge authority.

The modern emphasis on critique owes a substantial amount to the Frankfurt School's development of critical theory. The Frankfurt School, known formally as the Institute for Social Research, was founded in Germany in 1923 and moved to New York in 1933 when Hitler came to power. The writers most closely associated with the school included Max Horkheimer, Theodor Adorno, Walter Benjamin, Herbert Marcuse, and later Jurgen Habermas. Many of these writers sought to release the emancipatory potential of a society repressed by technology, positivism and ideology. For example, Adorno argued that capitalism, instead of withering away as Marx had predicted, had in fact become more deeply established by co-opting the cultural realm. The mass media, by pumping out low quality films, books and music (and today, TV or internet) substituted for people's real needs. Instead of seeking freedom and creativity, people were satisfied with mere emotional catharsis, and were reduced to making judgments of value on monetary worth. Frankfurt School writers sought to dispel such harmful and illusory ideologies by providing an emancipatory philosophy which could challenge existing power structures.

Reflecting on Kant's critical philosophy Michel Foucault observed that critique is not a question of accumulating a body of knowledge, but is rather "an attitude, an ethos, a philosophical life in which the critique of what we are is at the one and the same time the historical analysis of the limits that are imposed on us and an experiment with the possibility of going beyond them" (Foucault 1997: 132). This emphasis on the historical conditions that make knowledge possible led Foucault to his explorations of how knowledge—including knowledge that aspired to scientific rationality such as disciplinary knowledge—was established and enabled through historically specific power relations. Such a historical emphasis is also a part of the cartographic critique.

However, by power Foucault did not mean the same thing as the "false consciousness" of ideology in the Frankfurt sense. For Foucault power is not a negative force that must be dispelled, nor does he conceive of subjects as being constrained from reaching their true potential by a repressive state power (Ingram 1994). Foucault's conception of power was more subtle, one that emphasized the politics of knowledge. Power did not emanate from the top of a class hierarchy, but rather was diffused horizontally in a highly differentiated and fragmented fashion. Furthermore if power had repressive effects it also produced subjects who act freely. The possibility of "going beyond" the limits, of resisting, is a real one. This construction of rationality does not occur in a void however, but has been "historically and geographically defined" (Foucault 1991: 117). Foucault's sensitivity to geographic and spatial aspects of rationality makes him of particular interest because he shows that many problems of politics require spatial knowledge (Crampton and Elden 2006).

In sum then, the answer to the question "what is critique?" is that it is a politics of knowledge. First, it examines the grounds of our decision-making knowledges; second it examines the relationship between power and knowledge from a historical perspective; and third it resists, challenges and sometimes overthrows our categories of thought. Critique does not have to be a deliberate political project. If the way that we make decisions (based on knowledge) is changed, then a political intervention has been made. Critique can therefore be both explicit and implicit. Furthermore, the purpose of critique as a politics of knowledge, is not to say that our knowledge is not *true*, but that the truth of knowledge is established under conditions that have a lot to do with *power*. In the next section we elaborate on these points in the context of the cartographic critique more specifically.

The Cartographic Critique: Some Examples

Critical geographers who have not been paying close attention and think of cartography as a technical field that has produced one or two interesting critical

articles in the last twenty years are woefully out of touch. In fact cartography is a rich transdiciplinary field. Not only is the theoretical critique contributing to our understanding of the theoretical aspects of mapping, but the increasingly ubiquitous and mobile mapping capabilities are changing the structure of map production and labor. Maps are no longer imparted to us by a trained cadre of experts, but along with most other information we create them as needed ourselves. Both of these developments serve to change the conditions of possibility of the discipline. Critical cartography has targeted such disciplinary knowledge in two developments, one theoretical and one in practice.

Theoretical Critiques

The theoretical critique of cartography addresses post-war academic cartography's search for ever better and more veridical representations of a pre-existing reality. But instead of participating in this search, critical cartography assumes that maps *make* reality as much as they represent it. Perhaps John Pickles expresses this best when he says:

> instead of focusing on how we can map the subject…[we could] focus on the ways in which mapping and the cartographic gaze have coded subjects and produced identities (Pickles 2004: 12).

Pickles rethinks mapping as the production of space, geography, place and territory as well as the political identities people have who inhabit and make up these spaces (Pickles 1991, 1995). Maps are active; they actively construct knowledge, they exercise power and they can be a powerful means of promoting social change.

Increasing attention was paid to how maps inscribe power and support the dominant political structures. Wood's *The Power of Maps* (1992) was particularly significant in this regard. It was both a major institutional exhibition at the Smithsonian and a best-selling book (a Book of the Month selection). It exerted a considerable influence on academics and non-academics through its argument that maps expressed interests that are often hidden. Its populist message that those interests could be made to work for others was a manifesto for many counter-mapping projects. Turnbull (1993) for example includes the story of a map of Aborigine Dreaming trackways in the Great Victoria Desert. Although made by a westerner this map was accorded great significance by the Aborigines, and it was successfully used in a land dispute.

The standard historiography of critical cartography is that it developed during the 1980s and early 1990s in opposition to post-war epistemologies of mapping (Schuurman 2000; Schuurman 2004). Often this account cites the

theoretical writings of Brian Harley (see for example, Harley 1988a, 1988b, 1989, 1990b, 2001; Harley and Zandvliet 1992) or critiques of GIS (Openshaw 1991; Pickles 1991; Taylor 1990). And in fact this is not incorrect; that time period did see a stimulating sense of engagement with the implications of cartographical knowledges. However, as we shall see in Section Four, they are part of a longer critique.

Brian Harley's papers introduced the ideas of power, ideology and surveillance, arguing that no understanding of mapping was complete without them. These ideas were new to the discipline, if not to geography (Edney has pointed out that Harley was well read in radical human geography, (Edney 2005a). Rejecting the binary oppositions until then dominant in cartography, such as art/science, objective/subjective, and scientific/ideological, Harley sought to situate maps as social documents that needed to be understood in their historical contexts. Harley then argued that mapmakers were ethically responsible for the effects of these maps (Harley 1990a). In this way he could explain the dominance of seemingly neutral scientific mapping as in fact a highly partisan intervention, often for state interests.

Other writers took up this last point and applied it to the field of GIS. Pickles suggested that GIS represented a return to technocratic positivism (Pickles 1991), while Smith made a forceful argument that GIS enabled American militarism in the Gulf War (Lacoste 1976; Smith 1992). GIS practitioners responded in kind, accusing social theorists of ignoring the tremendous insights possible with GIS (Openshaw 1991) and of attacking one of the few real contributions of geography beyond the discipline. For a few years the arguments constituted geography's own version of the "culture wars." However, as Schuurman has documented, there was a strong vested interest in reconciliation, which has resulted in some recognition of the validity of each other's arguments (Schuurman 1999, 2000; Schuurman 2004). During the 1990s there was an effort to develop an approach that has been labeled social or critical GIS which shares many affinities with critical cartography.[2]

The most notable of these is that GIS has been taken outside the academy and used for community participation (Craig et al. 2002). As yet however, there has

[2] The terms critical GIS and critical cartography overlap but do not coincide. While they spring from the same critical philosophy described above, critical GIS refers to the social implications of geographic information systems, the hardware and software for interactive spatial data visualization and analysis, while critical cartography is a broader term referring to maps, mapping and mapmaking more generally. How one differentiates between these terms can vary depending on one's understanding of the linkages between GIS and cartography. In this essay therefore we shall not attempt to make strict partition between cartography and GIS, but to focus on mapping itself, as it is common to both GIS and cartography.

been little uptake of social GIS from human geographers despite the fact that GIS plays a large role in social decision-making such as public health analysis (Schuurman and Kwan 2004).

These theoretical critiques were made possible and given strength by the fact that throughout its history mapmaking has butted up against marginalized and local knowledges that were not scientific. As the ongoing *History of Cartography* project has repeatedly shown (1987), indigenous, pre-scientific or undisciplined mappings abound in many human cultures. In Volume I of that series founding editors Harley and Woodward adopted a new definition of the map in order to include examples of maps that did not fit with textbook cartography: "maps are graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world" (Harley and Woodward 1987: xvi). By emphasizing the role of maps in human experience, rather than the look or form of maps (as had been typical, see for example (Robinson 1952)), Harley and Woodward opened the door to many non-traditional and non-western mapping traditions. Their project, with its consideration of hundreds of new examples of maps, almost certainly informed Harley's theoretical work, and not the other way around (Edney 2005b; Woodward 1992, 2001).

Critical Mapping Practices

If the theoretical critique cleared conceptual space for alternative mappings it has fallen to a variety of practitioners outside the academy to explore what this has meant in practice. Perhaps the most noteworthy has been map experimentation by the artistic community, especially with representation and the map's role in creating a sense of geographical meaning (Casey 2002; kanarinka 2006a).

For example, a number of artists have explored how maps are political and how mapping can be a political act. Such an appropriation of the politics of representation has long historical roots, from the avant-garde artistic movements at the turn of the century (George Braque, Paul Cezanne) to the Situationists and "psychogeographers" of the 1950s and 1960s. These latter groups sought to radically transform urban space by subverting cartography as part of a project of political resistance (Harmon 2004). Their "subversive cartographies," by assuming that cartography was always already political, created different arrangements of space (such as the famous 1929 surrealist map of the world, reproduced in Pinder (1996, 2005). As with the Frankfort School, part of their critique was that modern society's basis in consumer capitalism caused deep alienation. Guy Debord's book *The Society of the Spectacle* acts as something of a guide by emphasizing that everything has become represented and thus devalued, everything is a media spectacle (Debord 1967/1994). This work has produced a tremendous legacy, aided by the infusion of mapping technology in the late 1980s which set the stage for an

explosion in "locative art" and psychogeographical mapping (Casey 2002; Cosgrove 1999, 2005; Harmon 2004). More recently the artists Malene Rrdam and Anna Mara Bogadottir used a map of Copenhagen to navigate the streets of New York City. Lee Walton averaged all the coordinates on a tourist map of San Francisco to come up with a single "Average Point of Interest" where he installed a bronze plaque (kanarinka 2006b). These map events question the commensurability of Euclidean space, a basic assumption of much GIS. Euclidean space is a key component of the scientization and regularization of space, for example it is assumed in "interoperability" where one dataset is commensurable with another. Critiques of Euclidean space which point to its ideosyncracies, localness or its contingent nature show that not all knowledge can be "scientized."

But if "spectacle" was the target for some, others turned the very tools of mass distribution to other uses, bringing mapping technologies to the people more directly. In doing so, they by-passed once more the disciplinary avenues of academic expertise and control; a "people's cartography." Among the powerful are open-source mapping, sometimes called "map hacking" (Erle et al. 2005). Map hacking is the practice of exploiting open-source mapping applications or by combining one site's functionality with another's (sometimes also known as "mashups"). These exploitations are possible because of extensible markup language (XML) and application programming interfaces (APIs). APIs define the way one piece of software connects up with another. When these are open-source (e.g., those provided under the GNU Free Software Foundation license) it means that independent developers can connect their software to others such as Yahoo!, Google and Flickr. Google's June 2005 release of Google Earth (a highly realistic 3D interactive digital earth, complete with 3D buildings, fly, tilt and zoom capabilities) attracted a significant amount of map hacking, presumably because the company is well known. The Google API allows other data to be fed to it and displayed as a Google map. For example, a map hack has taken the City of Chicago's database of arrests, categorized them (drug busts, traffic violations, etc.) and fed them into Google Maps.

To get an idea of how popular these everyday (ubiquitous) mapping practices are consider Google Earth (GE). GE was released in late June 2005 and came to public prominence during Hurricane Katrina in August. Aerial photographs of the disaster were made available by a variety of agencies (as well as Google itself). Although Google does not release download numbers, Google's specialized bulletin boards by the end of 2005 had recorded over 275,000 people registered, with over 40,000 joining each month (registering and joining are not required to use Google Earth; the forums are used mainly by people providing and discussing new spatial data). A reasonable estimate of GE usership would have to numbers in the millions.

While these capabilities are based on geospatial technology, the point is that they did not spring from the disciplines of cartography or GIS. They have been

developed by programmers intrigued by mapping's potential to deliver meaningful information. Indeed, it is rare to find references to the cartographic literature in these new developments. The earth's representation in photo-realistic detail is used to navigate and visualize data that have a geographically meaningful component. It matters *where* this information is. Since we live our lives fundamentally in mobile everyday worlds (Roush 2005), these *performative* mapping capabilities are intriguing (Laurier and Philo 2003, 2004). Open-source mapping means that cartography is no longer in the hands of cartographers or GIScientists but the users.

Open-source mapping is only effective when people have access to the technology, whether it be the internet, a PC powerful enough to run the software, and perhaps most importantly the knowledge to use it. The distribution of these resources is spatially uneven, as a number of studies of the digital divide have shown (Chakraborty and Bosman 2005; Crampton 2003; Zook 2005). The digital divide consists of a "disparity lag" between different social groups by race, age, location and education. That is, these groups suffer from a lag (sometimes of significant duration) as each new technology is adopted. Therefore the divide is not just a problem of providing a particular technology (for example hundred-dollar laptops, Blau 2005), valuable as that may be, but of *ongoing* disparities in access to technology. Thus the divide is like a series of innovation waves washing on the shore, covering the beach unevenly. As the United Nations Development Program (UNDP) documents each year, many countries around the world face problems that technology alone cannot solve. Misa et. al (2003) have argued this means a full understanding of technological issues must include investigations of how technology and society work together. For GIS and critical cartography, founded in a post-war sensibility of internal empiricism, the social relevance critique has proved a difficult one to absorb as we shall discuss in the next section.

Critical Cartography in Historical Perspective

As we remarked earlier, the critique of cartography and GIS that arose in the late 1980s should be understood as part of a much longer tradition. Cartography came to fruition alongside many other academic disciplines during the late nineteenth and early twentieth centuries. Previous eras did of course use maps, but it was only at this time that experts started to organize knowledge about them into a coherent body of knowledge with scientific aspirations, that is, a scientific *discipline* of cartography. With disciplinization came critique and contestation, aimed at the scientific approach itself, or as a means of promoting ways of understanding mapping excluded by the scientific approach.

Professional organizations such as the Association of American Geographers (AAG) (established in 1904) sought intellectual distance from the explorer's clubs such as the American Geographical Society (AGS) or Royal

Geographical Society (RGS). Knowledge was formalized and structured; indeed the very word "discipline" carries with it connotations not only of rigor, but also control and constraint. Spatial knowledge was ordered and the world made knowable through specific calculations of space for reasons of government and management as noted above (Crampton 2003, 2004). Perhaps the most influential idea was that space could be conceptualized into points, lines, areas, and surfaces (Wright 1944); a spatial data model that has been remarkably influential in GIS. Following the Second World War cartography continued to adopt the methods of science, particularly in its research agenda. As Montello has recently discussed, a significant influence on the field at this time was the application of the scientific method to cognitive research (Montello 2002). Instrumental in this impetus was the work of Arthur Robinson (Robinson 1952, 1991).

Following the Second World War, anxieties about the quality of maps available and problems in training new cartographers were the driving force behind the flourishing of Anglo-American cartography in the 1950s. This was not the origin of scientific cartography—for that we need to go back to the late nineteenth and early twentieth centuries, but it did set in motion a focus on empirical map design and communication usually accredited to the post-war writings of Arthur Robinson. Robinson's work has been ably discussed elsewhere (Edney 2005b), and his position as Chief of the Map Division with the Office of Strategic Services (OSS) from 1941-6 (for which he received the Legion of Merit) has often been noted as the impetus that drove him to call for research on map design (Robinson 1979, 1991; Robinson et al. 1977). Robinson's great achievement is that he included the map user in the equation. This design focus had the goal of improving the efficiency and functionality of maps as communication devices via empirical experimentation. Disciplinary apparatus was engaged for this project: personnel (faculty with cartography specialties, cartographic technicians), facilities (the cartographic "laboratory"), and a range of courses (design, projections, etc.).

Robinson's job at the OSS was to provide unbiased and reliable maps of the military theaters and landing zones. At a time of increased cartographic propaganda by both sides—Nazi maps claiming to show Germany surrounded by enemies for example—Robinson wanted to ensure that map design was clear, efficient and effective (Edney 2005b). He also distanced cartography from art and design, as these approaches to mapping may serve in "awakening responses not necessarily of beauty" (Robinson 1952: 18) that is, design for political purposes. Cartography was based on "convention, whim, and fancy" and Robinson sought to eliminate these, as well as the evocative arts, from good map design through an approach that would "study and analyze the characteristics of perception as they apply to…a map" (Robinson 1952: 19).

Robinson's initial thesis was laid out in several works starting in the early 1950s (Robinson 1952; Robinson and Petchenik 1976) as Krygier has discussed (Krygier 1996). Robinson, and a few other influential academic cartographers such

as George Jenks, sought to place cartography on a firm footing, perhaps even with its own departments: "the scope of…cartography…is broad enough to justify the organization of independent departments" of cartography (Jenks 1953: 321).

But this yearning for academic segregation was questioned at the time for being naively technical and internalist. It flew in the face of the geographic discipline's understanding of maps as central to their endeavor and was criticized as such at the time. Hartshorne declared "[s]o important, indeed, is the use of maps in geographic work, that…if (the) problem cannot be studied fundamentally by maps—usually by a comparison of several maps—then it is questionable whether or not it is within the field of geography" (Hartshorne 1939: 249). Mackay claimed that "cartography by itself is sterile" (Mackay 1954: 13) while Beishlag had been even more forthright:

> Many of the new enrollees in cartography classes will not want to learn to be cartographers but to be better geographers…If cartography teachers put these new students to learning hand-lettering or to constructing a series of different map grids from mathematical calculations, then good relations between cartography and geography may be jeopardized. Such training is neither interesting nor very useful to most geographers (Beishlag 1951: 6).

What is most important here is not the discomfort with technology (hand-lettering then, GIS software now) but the implication that maps, as methods, are related in fundamental ways to concepts and theories of geography. What kind of concepts and theories are embedded in the particular version of cartography that was to be excised from geography and studied in "independent departments"? What kind of concepts and theories were excluded? Continuing foci, then, for critical cartography are the substantive relations between maps as methods and the diverse (and often incommensurable) concepts and theories in geography.

Despite early concerns, a segregated and a-political cartography developed throughout the 1970s, when Morrison predicted that the science of cartography would soon result in "the freedom to map abstractly and to develop methodology free of specific real world distributions" (Morrison 1974: 9). From the 1950s to the 1970s cartography repeatedly came under scrutiny from geographers who had particular conceptual and theoretical concerns with the disciplined cartography promoted by academic cartographers. Some critiques called into question the suppression of the political in cartography. One critique that continues to resonate today in the minds of many critical geographers, was that maps were part of the imperialist or post-colonial project. The French Marxist geographer Yves Lacoste over three decades ago pointed to the larger political motivation of much mapping:

> The map, perhaps the central referent of geography, is, and has been, fundamentally an instrument of power. A map is an abstraction from

> concrete reality which was designed and motivated by practical (political and military) concerns; it is a way of representing space which facilitates its domination and control. To map…serves the practical interests of the State machine (Lacoste 1973: 1).

Writing in an important book on humanist geography, Wood argued that "unlike contemporary academic cartography, a cartography of reality must be humane, humanist, phenomenological…It must reject as inhumanly narrow both the data base and subject matter of contemporary academic cartography" (Wood 1978: 207). Even quantitative geographers such as Bunge and Harvey launched critiques of cartography, fearing, it seems, that the conceptual and theoretical basis of cartography may limit the viability of mapping as a method for quantitative geography. Scientific cartography and scientific geography were potentially in conflict. Harvey, in his *Explanation in Geography* wrote, "The use of the map, like the use of any kind of model, poses a number of problems concerning inference and control. It is time, therefore, that these methodological issues were explicitly and comprehensively discussed (Harvey 1969: 376). Both Harvey and Wood suggest that other cartographies – for quantitative and humanistic geography in these two instances – need to be developed, suggesting, again, a productive path for work in critical cartography beyond the critique.

If cartography was so susceptible to these critiques, why did it adopt such an internalist approach, eschewing engagement with larger societal and political issues? In the post-war period cartographers came to identify any relationship of mapping with politics as bias, lies and exaggeration. This development can be understood in light of the parallel with the disciplinary history of political geography. Political geography entered a quiescent phase after the Second World War for much the same reason, that is the threat of its use as a geopolitics complicit with lebensraum and racism (Agnew 2002). Such was political geography's backing away from politics that it was described as a "moribund backwater" by Brian Berry (quoted in Agnew 2002: 17). In cartography the emergence of Robinsonian cartography was in part a reaction to the "political" uses of maps by the Nazis and Allies, and in part a call for improved training and rigor in map creation needed to make maps for the war. In this sense it was inherently contradictory.

For an example of this internalist technological perspective, we need look no further than the Peters projection controversy, which burned most intensely between about 1974 and 1990. This story has been told numerous times from different perspectives (Crampton 1994; Monmonier 1995), but suffice it to say that Peters was brought up in an activist household during the 1930s, a time when his father was imprisoned by the Nazis. Their family was no stranger to politically active foreign visitors such as that of William Pickens, NAACP activist and field secretary. After getting his doctorate in history Peters felt that global maps such as the Mercator were racist: it was "a fully false picture, particularly regarding the

non-white-peopled lands…it over-values the white man and distorts the picture of the world to the advantage of the colonial masters of the time" (Morris 1973: 15). Robinson led the response:

> cleverly contrived, cunningly deceptive attack against the "outmoded theories" and "myths" of cartography [it] misrepresents, is illogical and erroneous, and one's initial reaction is simply to dismiss it as being worthless…[Peters is a] skillful merchandiser, and his self-serving campaign can do the image of cartography great harm (Robinson 1985: 103).

There was a mismatch of critique and response. Where Peters developed maps for his political activism, the response from the field was to engage Peters at the level of his cartographic claims, with the politics of representation coming second (if at all).

Robinson was not the first to seek a scientific footing for cartography, but where he sought to study an a-political mapping without reference to an outside world, an earlier tradition took a much different approach. Where Robinson emphasized research on how maps are understood by users, early twentieth century cartography focused on how maps could be applied to solve socio-political problems. These mapping efforts were "political" without explicitly articulating a politics—that is, map discourse was political economic discourse (Crampton 2004).

The work of Mark Jefferson provides another example of this. Jefferson (1863-1949) was a cartographer and geographer at Eastern Michigan University, an early President of the AAG in 1916, and Chief Cartographer at the Paris Peace Conference in 1919 where he worked alongside Isaiah Bowman of the American Geographical Society (Martin 1968). One of Jefferson's longstanding interests was population distributions; where people were, how many were there and what sorts of people were in each place. In one sense Jefferson's interest in this topic were shaped by his involvement in the Versailles Peace Treaty and the problem of the new boundaries of Europe following the war. This problem was one of territory and ethnic identity. But in another sense Jefferson's work was an exemplar of its time, for there had been attempts to map socio-demographic attributes of populations, especially languages, dating to at least the mid-nineteenth century.

All previous population maps, Jefferson argued, were deficient because they assumed that places existed naturally prior to the act of mapping, with pre-existing political boundaries (for example the city boundaries). A truer sense of place however (which he called the anthropographic city, Jefferson 1909) was created by the act of mapping itself. For Jefferson therefore, maps were applied political economy and were no less political for being applied. This remarkable work at the birth of the cartographic discipline was suppressed by developments in post-WW2 academic cartography. Thus the relations between political economy

and mapping are a viable, yet seldom explored avenue for contemporary research in critical cartography.

Conclusion: Mapping Possibilities

Today, mainstream academic cartographers have moved beyond some of the key tenets of Robinsonian cartography. For example, most now accept that the map communication model is no longer an adequate account of how maps work (MacEachren 1995). One of us has already discussed this elsewhere (Crampton 2001) but suffice it to say that geovisualization expanded the emphasis on the delivery of information to also encompass its exploration. Two consequences of this are that mapping is no longer in the hands of the experts (which is still playing itself out in the previously mentioned practice of map hacking), and that the scientific method of hypothesis testing and pattern confirmation was no longer adequate. Instead maps and GIS are used in what the semiotician Charles Peirce called "abduction" or exploratory methods of data mining and pattern-seeking (Staat 1993). These exploratory methods are now well known in mapping, GIS and collaborative work (Edsall et al. 2000; Kraak and MacEachren 1999; MacEachren 1992; MacEachren et al. 1998a; MacEachren et al. 1998b; MacEachren and Kraak 1999; MacEachren and Monmonier 1992; MacEachren et al. 1999).

Robinson's establishment of modern (post-war) cartography on a-political, empirical and scientific grounds, segregated from context, has been a target of critique from its beginnings. Some critiques were ends in themselves; other critiques were an impetus for the exploration of cartographies beyond the conception offered by academic cartographers. Contemporary critical cartography is situated in this long critical tradition, is important for the intellectual history of cartography, and is a source of ideas and avenues for work in contemporary mapping.

To paraphrase Rolnik (1998), a critical cartography "refers to the choice of new worlds, new societies. Here, the practice of the cartographer is immediately political." The critical approach is therefore an ethos and a practice, a Kantian process of questioning. In this paper we have identified two areas where the traditional disciplinary modes of cartography have come under question. On the one hand a theoretical enquiry which seeks to examine the social relevance of mapping, its ethics and power relations, and on the other hand, the development of open-source and pervasive mapping capabilities. A diversity of mappings are made possible through this critique – some already noted in this paper, some in reviews and monographs on contemporary critical cartography (Perkins 2003; Perkins 2004; Pickles 2004). Any attempt to draw definitive conclusions will only serve to close off these openings. Instead we offer five possible areas we feel deserve further exploration in the spirit of critique.

Artists continue to provide an incredibly rich and varied appropriation of mapping (Casey 2002; Cosgrove 2005; Case 2006; Krygier 2006; Schiller 2006; Varanka 2006; Wood 2006a, 2006b). As Wood has observed:

> Map artists ... claim the power of the map to achieve ends other than the social reproduction of the status quo. Map artists do not reject maps. They reject the authority claimed by normative maps uniquely to portray reality as it is, that is, with dispassion and objectivity" (Wood 2006b: p.10.).

Map artist kanarinka claims artists working with maps have an "ethics of experimentation" that is "anything but arbitrary: ...artists experiment with a particular territory in specific ways to reach unforeseen destinations" (kanarinka 2006: p.39,24.). Although impossible to reduce to a single perspective, the effect of these works is to fundamentally challenge received notions of space, knowledge and power.

Everyday mappings, whether performative (Krygier 2006), ludic (Perkins 2006), indigenous (Lewis 2006), affective and experiential (Cieri 2003, 2006) or narrative (Pearce 2006), creatively illuminate the role of space in people's lives by countering generalized and global perspectives. A recent cartography text (Krygier and Wood 2005) implicitly integrates critical cartography, ideas from the arts and everyday mappings, and is designed with a populist intent.

Maps as resistance, counter-mappings and participatory GIS, take up maps and politics in an explicit manner to provide alternative mappings of space not represented by official state agencies (Sparke 1995; Cobarrubias et al. 2006).

Map hacking provides a whole series of inexpensive or open source capabilities that combine spatialized knowledges in ever new ways (kanarinka 2006a, 2006b). As we stated above, it is not the technology that is important, but how it is used, and with what effects.

Finally therefore, there is also a necessary role for the *theoretic critique* to challenge assumptions and place matters in historical perspective. These emancipatory avenues begin to reveal the promise of critical cartography.

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