# Chapter 1

# Maps – A Perverse Sense of the Unseemly

This book is an introduction to critical cartography and GIS. As such, it is neither a textbook nor a software manual. My purpose is to discuss various aspects of mapping theory and practice, from critical social theory to some of the most interesting new mapping practices such as map hacking and the geospatial web. It is an appreciation of a more critical cartography and GIS.

Why is such a book needed? We can begin with silence. If you open any of today's prominent textbooks on cultural, political, or social geography it is more than likely that you will find little or no discussion of mapping, cartography, or GIS. A recent and well-received book on political geography for example (Jones et al. 2004) makes no mention of maps in any form, although it is subtitled "space, place and politics." Similarly, Don Mitchell's influential book on cultural geography and the precursor to the series in which this book appears (Mitchell 2000) deals at length with landscape, representation, racial and national geographies, but is completely and utterly devoid of the role of mapping in these important issues (and this despite Mitchell's call for a "new" cultural geography that does not separate culture from politics!). And while a book on *Key Concepts in Geography* (Holloway et al. 2003) can state that "geographers have . . . studied the ways in which maps have been produced and used not only as objects of imperial power but also of postcolonial resistance" (Holloway et al. 2003: 79) the subject is then quietly dropped. Yet is it the fault of these authors – accomplished scholars – that maps and mappings are not considered part of larger geographical enquiry?

For there is a second silence. Cartographers and GIS practitioners themselves have had very little to say about politics, power, discourse, postcolonial resistance, and the other topics that fascinate large swaths of geography and the social sciences. Open any cartography or GIS textbook and you will find only deep silence about these matters. There are few cartographic voices examining the effects of GIS and mapping in the pursuit of homeland security. There are no journals of cultural or political cartography. What percentage of GIS applications are being created to address

poverty? Is there feminist mapping? And if GIS and mapping have always coexisted alongside military and corporate applications then how many GIS practitioners have critically analyzed these relationships? Perhaps most arresting is the increasing separation of GIS and mapping from geography as a whole. In other words the evolution of GIScience as a technology-based subject rather than a geographic methodology (for example the focus in GIScience on formal "ontologies"). In sum, one might be forced to conclude that mapping is either *incapable* of such concerns, or that it rejects them.

This book is an introduction to these questions, and in part an answer to them from a critical perspective. It is an attempt to push back against the common perception that cartography and GIS are not concerned with geographical issues such as those listed above. The basic viewpoint is that mapping (i.e., cartography and GIS) is both capable of engaging with critical issues, and has often done so. While the word "critical" may be overused and ironically is itself in danger of being used uncritically (Blomley 2006), I believe its application to mapping remains fruitful and exciting. And rather than some trendy new term, there is a long and remarkable critical tradition in cartography and GIS, if in a "minor" and subjugated way. If it did not appear full-blown on the scene in the late 1980s (as the story usually goes, see Chapter 4) the critical traditions in cartography (often accessible through a historical genealogy) demonstrate how mapping and the wider field of geographical enquiry worked together for many years.

If you look back at the history of mapping it might appear that to be a "cartographer" meant to be a mapmaker, someone whose profession it was to draw maps (the word "cartography" is of early nineteenth-century origin, but "map" has a much longer history, see Krogt [2006]). It was only in the twentieth century that one could be a cartographer who *studied* maps but didn't necessarily make them (or have any skill in making them) – that is, with the development of the discipline of cartography as a field of knowledge and enquiry. In this sense the discipline of cartography started to become divorced from its practice in the sense of map production. This might seem rather unusual. After all, there are no geographers doing geography and then a bunch of people in academia who study them and how they work! To be a geographer (or a physicist or chemist) is to *do* geography, physics, or chemistry.

But this initial distinction between mapmaking and cartography as discipline is quite hard to maintain. Although "mapmaking" in the traditional sense – as Christopher Columbus might have practiced it for example – with all of its pens, paper sheets, sextants, watermarks, and mastery of hand-drawn projections obviously has very little role in academic study today, you will nevertheless still find yourself doing mapping. Except you might call it GIS, geomatics, surveying, real-estate planning, city planning, geostatistics, political geography, geovisualization, climatology, archaeology, history, map mashups, and even on occasion biology and psychology. And in geography too we could probably agree that there are a bunch of people "doing" human geography who are distinguishable (sometimes) from the academics studying them. Just think of all those articles on the Research Assessment Exercise

(RAE) or on which journals geographers publish in. And finally there are the objects of critique, the (im)material products and processes of mapping and GIS. All three of these; objects, do-ers or performers of mapping, and the production of critique have complex interrelationships.

The point then is not that long ago there was something called mapmaking (which is now called geospatial technology or GIS) but rather that the understanding of what people thought they were doing with things they called maps has changed over time, as well as over space.

One of the stories that I was taught as a student is that cartography became scientific only recently, say after World War II. It did so, the story went, largely for two reasons. First, it finally threw off art and subjectivity (here reference was often made to the work of Arthur Robinson and his call for formal procedures of map design). Thus science was posed in opposition to art. Second, it became as it were "post-political" by throwing off the fatal attraction to propaganda and ideological mapping evidenced prior to and during the war, and promoting a kind of Swiss-like neutrality about politics. In doing so it paralleled the path taken by the discipline of political geography, which also found itself tarnished by its cooption during the war. But where political geography went into decline until the 1970s (Brian Berry famously called it a "moribund backwater" [R. Johnston 2001]), cartography tried to insulate itself from politics altogether by gathering around itself the trappings of objective science. The map does exactly what it says on the tin.

Yet both of these developments are myths. As the critical work of writers such as Matthew Sparke, Denis Cosgrove, and Anne Godlewska has shown, mapping as a discipline and as a practice failed to establish a rigid separation from art, nor did it ever become post-political. Chapters 5 and 12 document these myths in more detail and show what the critical response has been.

In a recent provocative article Denis Wood issued a heartfelt cry that "cartography is dead (thank God!)" (D. Wood 2003). By this he meant that the gatekeepers, academic cartographers, dwelling as it were like a parasite on actual mapping, were dying off. Maps themselves, meanwhile, have never been healthier – if only disciplinary academics would leave them be! While I have some sympathies for this position (who wants gatekeepers except other gatekeepers?) I'm not quite sure it's correct. Rather, first because the study of mapping continues as never before, GIS is something like a $10 billion a year corporate-military business, and the advent of map hacking and map mashups has released the inner cartographer in millions of ordinary people. And second, I'm not sure it's possible to separate mapping practice from mapping discourses quite so neatly (that minor critical tradition again!). In fact practices and discourses are intimately intertwined.

Not that discourses or knowledge go uncontested. If it was when cartography became formalized as a discipline that mapping was valorized as "scientific," then by the 1990s a number of geographers, cartographers, and GIS practitioners drew on the larger intellectual landscape to renew a critical spirit. Today we are still drawing on that renewed linkage between mapping and geography. The central rationale of this book therefore is to demonstrate the relevance of spatial knowledge production

in GIS and cartography as critical for geographers, anthropologists, sociologists, historians, philosophers, and environmental scientists.

Yet it is also plain to see that mapping has undergone a tremendous re-evaluation over the last 15 years (or longer). In accounts of this period (Schuurman 2000; Sheppard 2005), the story is told of how the encounters between mapping and its critics began with mutual suspicion and ended up with something like mutual respect. Sheppard further argues that what began with investigations of the mutual influences between GIS and society has become a "critical" GIS (with "GIS and society" representing the past and critical GIS representing the future). By this he means not just a questioning approach, but one that is critical in the sense used in the wider fields of geography and critical theory. This sense includes Marxist, feminist, and post-structural approaches among others. For Sheppard critique is a "relentless reflexivity" which problematizes various power relationships.

This narrative can itself be problematized by showing that beneath the official histories of GIS and mapping lie a whole series of "counter-conducts." These dissenting voices, sometimes speaking past one another, sometimes speaking out from below, are discussed in more detail in Chapter 2. There is therefore a minor as well as a major history of mapping and GIS, a series of "subjugated knowledges" (Foucault 2003b) that while they have popped up from time to time in the past are now making themselves felt as never before. In particular I think it is fruitful to see the history of critical GIS and cartography not as something that has only recently occurred, but one that in fact can be seen at other more distant times as well. This is what Foucault means by subjugated knowledges; ones that for whatever reason did not rise to the top, or were disqualified (for example, for not being scientific enough). But it doesn't mean they weren't there. Furthermore, Foucault suggests that it is the reappearance of these local knowledges alongside the official grand narratives that actually allows critique to take place. This is also an idea that we shall examine in the next chapter.

This book then appears at a transitional moment in the history of GIS and mapping. Great changes are occurring and it would be wrong to say we know exactly where they are leading. The following diagram summarizes some of these tensions which are fluctuating throughout mapping. This diagram is meant to be indicative rather than complete. Imagine that the space transected by the tensional vectors is a rubber sheet being stretched out (readers with multi-dimensional imaginations could also see it as an expanding sphere). As the sheet is stretched the field gets larger – but also thinner, perhaps dangerously so in some places (Figure 1.1).

This figure illustrates how mapping is a field of power/knowledge relations being simultaneously taken in different directions. On one axis, critical approaches, with their "one–two punch" of theoretical critique (Kitchin and Dodge 2007) and the emergence of the geoweb are questioning expert-based mapping. The increasing use of mapping technologies among so-called amateurs or novices (for example the 350–400 million downloads of Google Earth) is reshaping all sorts of new spatial media, and is allowing the pursuit of alternative knowledges. Meanwhile, on another
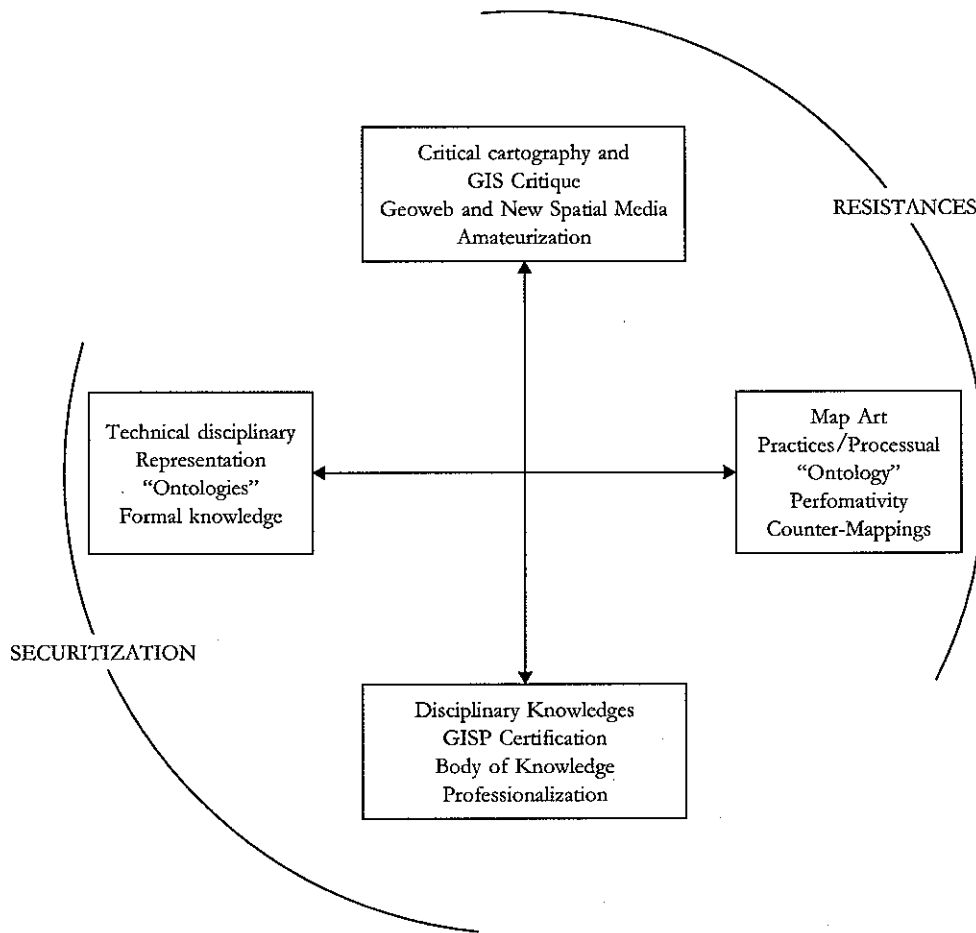
**Figure 1.1**  The field of tension in mapping.

axis, there are very real trends toward nailing knowledge down into a coherent "body" that can be mastered by experts. We'll know they are experts because they hold a certification. What we're talking about here then is a clerisy or set of experts.

The desire for mapping to be post-political is exemplified in the diagram by those who focus on the technical issues in isolation from their larger socio-political context. Many cartography and GIS journals have now become almost completely dominated by technical issues, research which no doubt reflects the research agendas pursued by the next generation of PhDs – of which you may be one.

These different directions can be broadly described as a trend toward "securitization" of knowledge in the one direction and "resistances" in the other. Securitization of information refers to the efforts that are made to anchor, control, and discipline geographical knowledges. Another example is the increasing interest among GIScientists in "ontologies" defined as formal, abstract, and computer-tractable definitions of real-world entities and their properties. Certainly it is nothing new to observe that there is a danger whenever technology is involved of taking up mapping *only*

as a technology. As the German philosopher Martin Heidegger remarked six decades ago "the essence of technology is by no means anything technical" (Heidegger 1977: 4). But because it is often ignored, the implications of this seemingly counter-intuitive claim are taken up in various ways throughout the book.

## The Need for Critique

Why is critique needed? "Critical" approaches to both GIS and cartography play important roles, but are not yet mainstream. It's possible you might feel both that maps are terribly old-fashioned (something you studied in lower school) and yet tremendously exciting (Google Earth and homemade mapping applications, geovisualization, or perhaps human geosurveillance). Where does the truth lie?

Some of these mixed feelings were the topic of discussion in a recent issue of *Area*, one of the UK's better known geography journals. Here's Joe Painter awkwardly confessing that he's in love:

> I love maps. There, I've said it. I am coming out as a cartophile. Although I became fascinated by maps when I was a child (and even once told a school careers advisor that I wanted to work for the Ordnance Survey – Britain's national mapping agency), maps have figured little in my work as an academic geographer. I suspect that many human geographers who learned their trade in the postpositivist 1980s, as I did, shared my mild embarrassment about maps. (Painter 2006: 345)

So Painter may be in love, but it's a love that dare not speak its name: maps figure little in his work. Painter's "cartographic anxiety" (Gregory 1994; Painter 2008) resonates with many people interested in maps and mappings. As the geographer-phenomenologist John Pickles has written, there's a perverse sense of the unseemly about maps (Pickles 2006). These wretched unreconstructed things seem to work so *unreasonably well*! This sense of mapping as unseemly and unwelcome is often assumed as a given by a surprisingly large segment of people. We're ambivalent. In the eyes of critical geographers the success of maps has not come without a price. Haven't maps after all provided the mechanism through which colonial projects have been enabled (Akerman 2009; Edney 1997)? Isn't there a long history of racist mapping (Winlow 2006)? Today, isn't it simply the case that GIS and GPS are essential elements of war (N. Smith 1992)? Wasn't Arthur "dean of modern cartography" Robinson an instrumental part of the Office of Strategic Services – the precursor to the CIA? At the very least, GIS is surely a Trojan horse (Sheppard 2005) for a return to positivism (Pickles 1991)?

These observations are valid. And yet, the same points could be made with reference to geography (or other disciplines such as anthropology) as a whole. Weren't they involved in colonialist projects? Doesn't the past of geography, anthropology, or biology contain racist writing and racist people? Sure.

Item: Madison Grant, who wrote the racist book *The Passing of the Great Race* (guess which race he feared was passing away), was a longstanding Council Member of the American Geographical Society (AGS) including during the time when Isaiah Bowman was Director, and agitated for quota-based laws in the 1920; he also published a version of the book in the AGS journal *Geographical Review* during wartime (Grant 1916).

Item: former President of the Association of American Geographers, Robert DeCourcy Ward, professor of geography at Harvard University, wrote a series of frankly racist eugenicist papers bitterly complaining about the low quality of immigrants into this country (Ward 1922a; 1922b). To influence anti-immigration laws he founded the "Immigration Restriction League" which succeeded in getting a literacy test into the Immigration Act of 1917.

Rather than drawing a veil over these facts, or saying that mapping is essentially a racist or capitalist tool, any honest intellectual history will seek to examine them – not least because their arguments are still reprised today. For instance, biological race is being reinscribed in genetics (Duster 2005) and advocates of English as the official language of the US are still active (30 US states and at least 19 cities have adopted English as their official language).

The first response to "why critique?" is that it is not *un*reason or something fundamentally unknowable that is at stake here, but rather the need to examine the very rationality that animates mapping and GIS today. Not only can this rationality be explained, but it can also be challenged, and it is the job of a critical GIS and critical cartography to do just that.

A second question revolves around the historical complicity of mapping and GIS in military, colonial, racist, and discriminatory practices. It is tempting to see maps and GIS as "essentially" complicit and best avoided. Maps are "nothing more" than tools of capitalist expansion and exploitation. (Sometimes one suspects that this tactic explains the silence of those critical geographers we began with. Maps and GIS are embarrassing!)

One popular response is to deny that maps and GIS are "essentially" anything in particular. Maps and GIS are "neutral" technologies that can be used for both good and bad purposes (whatever they are!). On this view we might readily acknowledge the complicity of geography in colonial projects but also point out that maps and GIS can be used to track organ donations, manage global air travel, and empower local communities to fight off Wal-Mart. They are a little like technologies sitting on a shelf, waiting to be pulled down and used. A direct analogy comes to mind here: atomic power. It can be used to build atomic bombs or to power the national grid. We might argue that each one should be judged on its own merits. The same thing goes for mapping, we might then argue. Sometimes maps are used for bad purposes but sometimes they are used for good ones. Those that are, on the whole, bad, we could criticize. Those that seem to be positive we could praise. This results in an *economy of morality*; a balance between good and bad and which one outweighs the other.

If we take this view, it has the merit of being very flexible. We could assess a range of geosurveillance techniques with it for example (Monmonier 2002b). Monmonier

resists the involvement of cartography in anything that might seem "political." Not surprisingly, when I once asked him about the possibility of there being such a thing as a "political cartographer" in an interview, he replied that he thought it a "glib phrase" and that he "would apply the label political cartographer [only] to people who draw election-district maps" (Monmonier 2002a).

Too often however, this response is just a cover for a do-nothing approach. It is a way of fobbing off the power commitment we make whenever we assert or produce knowledge. This view that maps are politically neutral was recently put forward by the influential National Academies of Science (NAS) in a report entitled "Beyond Mapping" (Committee on Beyond Mapping 2006). The committee was comprised of well-known scholars in GIS, cartography, and geography including Joel Morrison (Chair), Michael Goodchild, and David Unwin. The committee was not unaware of the need to examine the societal implications of GIS and mapping as technologies. For example, they write:

> Geographic information systems and geographic information science appear to be benign technologies, but some of their applications have been questioned; as is true of any technology, *GIS, though neutral in and of itself,* can be used for pernicious ends. (Committee on Beyond Mapping 2006: 47, emphasis added)

A critical approach would argue that this appeal to the neutrality of mapping knowledges is a failure.

The things I have been talking about so far constitute some of the aspects of what Derek Gregory once called "cartographic anxiety" (Gregory 1994). His influential little phrase captures how people sometimes seem to feel about maps. An anxiety is a disorder, and if pronounced enough becomes a subject for psychological investigation – a clinical case. It's a contrary and split kind of anxiety (a schizophrenic anxiety?), because on the one hand we have maps involved in those colonialist projects, to de- and resubjectify people, or perhaps in which powerful cartographic imagery is invoked to justify an "axis of evil" (Gregory's more recent work is sustained by a sense of moral outrage at Abu Ghraib and Guantanamo Bay [Gregory 2004; Gregory and Pred 2007]). So we're anxious about using any such uncritical devices that work all too well to establish concrete realities – the *unseemly* perversity, in the sense of the word as unwanted, not in good taste, out of place.

And then there's the other kind of anxiety that Gregory talks about; the anxiety of uncertainty which maps and geographical knowledges produce when their authority is undermined. Citing Gunnar Olsson and Brian Harley's work on "deconstructing" the map (see Chapter 7) Gregory talked of an anxiety (or we might say it is the *perversity*) that arises when knowledge is destabilized, though he was quick to say it did not mean a descent into "giddy relativism" (can we ask why not?) (Gregory 1994: 73).

So now this anxiety has two contradictory parts – on the one hand maps are incredibly powerful devices for creating knowledge and trapping people within their

cool gleaming grid lines, on the other they seem to be nothing at all, just mere bits of fluff in the air.[1] Maps are sovereign; maps are dead.

## The Third Way?

One might register a few problems with both of these viewpoints however. It is noticeable that the second viewpoint, that of technology being non-essential or "neutral," often crops up when a new technology appears and people are thinking about it for the first time. It's as if people want to try and get things straight in their mind and that this can be done by considering each application "before" or outside of untoward influence. Bringing in politics only serves to muddy the waters.

The problem with these ideas is that they miss the point. Even casting a cursory glance at the history of cartography should lead us to suspect that mapping and maps have a whole series of engagements in politics, propaganda, crime and public health, imperialist boundary-making, community activism, the nation-state, cyberspace, and the internet. That is, mapping has a politics. It is hard to imagine mapping that does not in some way or other involve politics, mapping is itself a political act.

As a politics of mapping, critical cartography and GIS question what kinds of people and objects are formed through mapping. As the Canadian philosopher Ian Hacking puts it, how are people made up (Hacking 2002)? This is a question about how categories of knowledge are derived and applied, a question as old as Kant and as contemporary as racism.

Maps produce knowledge in specific ways and with specific categories that then have effects (i.e., they deploy power). Categories are useful, but at the same time they encourage some ways of being and not others. Often, some ways of being are accepted as somehow typical and are called "normal," while others are called "abnormal." Then there is a tendency to try and correct, eliminate, or manage the abnormal.

Maps and mapping are not the only rationalities at work in society, but it is interesting that the maps we commonly find in modern-day GIS (i.e., thematic maps) were all invented around the same time: the early nineteenth century (Robinson 1982). This was the time that another set of great techniques were developed that we increasingly rely on, namely statistics and the emergence of the theory of probability (Hacking 1975). Both maps and statistics were two great technologies of management that are used extensively by governments to get a grip on risk and threats to the country. The most recent demonstration of this was the aftermath of the terrorist attacks of September 11, 2001. Maps and GIS were deployed to analyze "at-risk" targets, or to surveille "risky" populations. For example, the FBI deemed that mosques in the USA were risk factors, and shortly after 9/11 began building a database of all the mosques in America (Isikoff 2003).

What is the result of such surveillance and what kinds of people does it "make up"? This is a different kind of question than one that weighs the plusses and minuses of technology. It is one focused on power, discourse, politics, and knowledge. These

are the questions that critical cartography and GIS is interested in: the "third way" between saying that we should examine the *essential* nature of mapping, and saying that mapping is empty or neutral. It would examine instead the way that maps and GIS are situated in specific times and places, what knowledges they produced, and with what effects.

When this third way of critical mapping started to become more noticeable about 15 or 20 years ago, maps and mapping were only studied by cartographers. When GIS started becoming popular around the same time (the early 1990s) it was no longer possible to see mapping as a minority interest, if only because a number of well-placed geographers raised serious objections to it. Perhaps the most famous was the comment in the late 1980s by the then-president of the American Association of Geographers (AAG) that GIS did not belong in the "intellectual core" of the discipline, being merely a technique (Jordan 1988). These comments did little to endear critics to GIS users and vice versa (Sheppard 1995; 2005). This series of dissenting voices, sometimes speaking past one another, sometimes speaking out from below are taken up in Chapters 2 and 4.

Some of these voices are well known, such as that of Arno Peters who launched an attack on cartography for its complicity in racist geographies (and who in return was vividly counter-attacked by virtually all cartographers). Other voices are less well known. Who today remembers J. Paul Goode as anything but the successful author of the standard college atlas? Yet he railed against the "evil Mercator" projection in terms remarkably similar to those of Peters (Chapter 7). Other voices are coming from outside academia entirely. The phenomena of map-blogs and the "geospatial web" operating for the most part well outside the view of academia raises the question of where and how innovation is occurring in mapping today. Is it occurring within the discipline at all? If not, what does that mean about the quality of mapping – and the future of the discipline? Is there a new populist "peasantry" on the march (Chapter 3)?

In denying a relationship between mapping and politics, cartography and GIS have evidenced similar intellectual histories as other technological fields that generate knowledge (Misa et al. 2003). But if knowledge can be generated in these technical fields, then that knowledge is always put into play, as it were, in competition, with some knowledges succeeding (especially those with a scientific orientation) and others being relegated. So again, knowledge is related to power. Some knowledge is easy to obtain, while some, if it is not actively suppressed, is marginalized and ignored. Native or indigenous cartographic knowledge, for example, is a case in point. Until fairly recently very little was known about non-Western cartographies because they were not easy to reconcile with a story of cartography as an ever-more accurate and scientific representation of the landscape. Against this, Edney has called for a "history [of cartography] without progress" that would recognize the backtracking, "wrong" turns, and diversions even within the Western tradition (Edney 1993). Meanwhile the rich tradition of indigenous mapping that operates independently of such terms as progress and science is attracting renewed attention (Sparke 1995; 1998; Turnbull 1993; Woodward et al. 2001).

A second disciplining process can be traced to the period following World War II, when modern cartography came of age. As I discuss in Chapter 5, during the war a number of American scholars led by Arthur Robinson worked to draw cartography together into a discipline. As they did so however, they created a certain view of mapping (and, by extension, GIS) that shied away from any involvement of maps with political issues. Perhaps understandably, these writers took from their wartime experiences the need to avoid the excesses of propaganda that had infected cartography and had caused what Pickles calls a "crisis of representation" (Pickles 2004). Instead of propaganda, maps should be used to tell the truth as clearly as possible, within the limits of the map form. This meant not only paying attention to map design (a field more or less invented only after the war, but which drew heavily from graphic design), but also to the way that maps were used by actual people, or in other words the field of map user studies. This move took cartography away from politics in much the same way that political geography also shied away from politics in the same period and for essentially the same reasons (political geography was at the time called a "moribund backwater" by Brian Berry [quoted in Agnew 2002: 17]).

These two reasons then – the positioning of cartography as a technological or scientific field, and the post-war move away from socio-political issues – have, I would suggest, served to isolate cartography from the wider discipline of geography.

## A Note on Terminology

Over the years much has been written examining the relationship between two fields of practice: cartography and GIS. I remember at the 1996 meeting of the Association of American Geographers (AAG) the then-president, Judy Olsen (a cartographer), held a Presidential Plenary session on the question "has GIS killed cartography?" This reflected a fear in the cartographic community that GIS would be the end of cartography (either as a discipline or as an employment option). Now, more than ten years later, it would appear that many of those fears have come to pass, but in a somewhat contradictory way. The job market is certainly one which speaks of GIS and geospatial information. But instead of being "killed," mapping transformed itself, firstly by emphasizing itself as "geographic visualization" in the 1990s, and secondly through its role in map hacking and the geospatial web (see Chapter 3 [and D. Wood 2003]). And it turned out that GIS was most often used to make maps anyway, and is a lot less quantitative and more qualitative than some people might think (Kwan and Ding 2008; Pavlovskaya 2006).[2] Ironically, now it is GIS that is playing catch-up, as the public flocks to software such as Google Earth and map mashups (Erle et al. 2005). The use of maps and mapping tools (and hence if you like the number of cartographers – amateur as well as professional) has never been higher.

This perspective has a number of advantages. It allows us to focus on the question, what is mapping, today? This in turn allows us to cut short any attempts to say,

once and for all, what mapping, cartography or GIS essentially are, as if they existed outside time and to divide this portion into something called cartography and this portion into GIS. For this reason I will not (perhaps surprisingly) offer an answer to the question "what is a map?" (Vasiliev et al. 1990). Where in a recent article Martin Dodge and Rob Kitchen try to get the reader to answer this question at the ontological level (Kitchin and Dodge 2007) I will speak of maps as historically situated practices and discourses. That is, I will lay my cards out by admitting that what interests me the most is epistemology or knowledge: its creation, its relation to power and politics; in sum its effects on people and places.

This opens up a whole historical perspective. For anyone who, like me, was dulled into submission by high school history, it is something of a liberation – and something of a shock – to realize that history is not dead, gone, and useless, but something which actively shapes us here and now in the present. There are good reasons then for what we are now, and, through an intellectual history, these reasons can be traced out, with a view perhaps to breaking the grip of that past and of creating something new.

In order to make some headway in all this I will make the claim that it is not so much the specific technology that should concern us, but rather the "mapping tradition" that exists in any given moment. I define "mapping" deliberately loosely as a human activity that seeks to make sense of the geographic world, it is a way in which we "find our way in the world" (Crampton 2003). What are the possible ways of knowing, geographically? Whether this is via the dreamtime maps of native Australians, the latest release of GIS software, or handheld devices that audibly announce our location to us matters less than that human yearning for understanding. In this book I shall therefore use the term mapping to refer to *both* cartography and GIS because despite their differences I believe they are both part of that tradition, a tradition that stretches back to the earliest recorded human history – and even longer (Smith 1987). Furthermore, I shall agree with Clarke (2003) that GIS has its roots in cartography and is in that sense the way that mapping is practiced today (GIS was developed as a technology in the 1960s and as a science – GIScience – in the 1990s [Goodchild 1992]). I know from my contributions to the GIS trade journal *GeoWorld* there are many professional GIS users who would disagree with this assertion and who believe that today cartography is part of GIS, not the other way round. But I think that this both ignores the historical dimension of the mapping tradition, and gives undue emphasis to cartography and GIS as chiefly technical endeavors. At bottom, we deploy both maps and GIS analysis because we want to make sense of the geographical world.

## Notes

1   Cf. Communist Manifesto, "all that is solid melts into air."
2   I once this mentioned to a geology colleague who was insisting that GIS could only be quantitative. "Maybe I have misunderstood what GIS is then," he said, puzzled. To which the response would be – yes.

# Chapter 2

# What Is Critique?

## Introduction

This book is a *critical* introduction to mapping and GIS. It is part of a series of books that provide critical introductions to various aspects of geography. Looking around, we find interest in critical geography has blossomed over the last ten or fifteen years, with books, articles, conferences, and even an online discussion list. So what *is* critique? Where does it come from? Is everyone critical now and if so how is it different from "uncritical" geography?

First, we might clear a common misunderstanding. 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. Michel Foucault, who often worked in a spirit of critique, put it this way:

> A critique does not consist in saying things aren't good the way they are. It consists in seeing on what type of assumptions, of familiar notions, of established, unexamined ways of thinking the accepted practices are based. (Foucault 2000c: 456)

These "unexamined ways of thinking" (i.e., assumptions and familiar notions) shape our knowledge. For example, in cartography textbooks it is often assumed that good map design must achieve "figure-ground" separation (the separation of the main object from its background), 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). For example, in Figure 2.1 many readers with Western backgrounds will be able to make two different interpretations, one in the foreground and one in the background.

Chua et al. discovered that due to cultural differences, people from Europe and Asia will "see" a scene in different ways. For over 50 years cartography textbooks have had long discussions on how to achieve figure-ground through good map design,

**Figure 2.1** *All Is-Vanity* (1892). A woman in front of her "vanity" (make-up table) or a grinning death mask? This famous optical illusion was drawn by the American artist Charles Allan Gilbert.

but these discussions assumed that everybody would pick out the figure from the ground in the same way.[1]

Critique therefore does not seek to escape from categories altogether, but to show how they came to be, and what other possibilities there are. This sense of critique was developed by Immanuel 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.

This was a radical step. At the time, most people got their knowledge from the church or from classical writers such as Plato and Aristotle. But perhaps dating from the fifteenth and sixteenth centuries and the religious struggles of the time, some people started to question these authorities. By the time of the Enlightenment therefore, there were the beginnings of a questioning attitude that would be fully developed by Kant.

This questioning attitude is not unrelated to the question of power, because it asks "what is an authority?" and "who shall have authority?" The church? The military? The government? These questions are political ones, and indicate that critique, as well as asking about the unexamined assumptions behind our practices, can also therefore open up other ways of doing things. It asks "well, we seem to be doing it this way, *but do we have to? Isn't* there an alternative?"

To return to Foucault:

> I will say that critique is the movement through which the subject gives itself the right to question truth concerning its power effects and to question power about its discourses of truth. Critique will be the art of voluntary inservitude, or reflective indocility. The essential function of critique would be that of desubjectification in the game of what one could call, in a word, the politics of truth. (Foucault 1997b: 32 translation modified by Eribon 2004)

In other words critique is a political practice of questioning and resisting ("voluntary inservitude"!) what we know in order to open up other ways of knowing. I dwell on these points here because of another misunderstanding about critical cartography and GIS which has sometimes characterized them as purely rejectionist. For example, critique is sometimes described as if it rejected all forms of knowledge or truth. The point though is not to reject, but to carefully consider the truth claims of maps and GIS (and there are a lot of such claims, as we shall see, beginning with the idea that the map is a natural reflection of the landscape). In other words, knowledge does not just exist "out there" but is created and then is privileged by being divided between truth and falsity. How truth comes to dominate is due to some fairly specific rules. Many of these rules have geographic centers, or occur at particular points in time. Critique can uncover these rules and the times and spaces in which they occur.

The modern emphasis on critique in many of the social sciences 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 Jürgen 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.

## Critical Cartography and GIS: Some Basic Principles and Examples

Critique has a number of basic principles. First, it examines the (often unexamined) grounds of our decision-making knowledges; second it situates knowledge in specific historical periods and geographic spaces (rather than being universal for all time); third it seeks to uncover the relationship between power and knowledge; and fourth it resists, challenges, and sometimes overthrows our categories of thought. The purpose of critique 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*. Critique is therefore a politics of knowledge. As Gregory put it: "critical theory is a large and fractured discursive space, by no means confined to the Frankfurt School and its legatees, but it is held in a state of common tension *by the interrogation of its own normativity*" (Gregory 1994: 10, original emphasis).

Blomley recently reviewed critical geography (Blomley 2006) and found that while it is often invoked "it is rarely nailed down" (2006: 90). It is diverse and does not depend on a single theory. For Castree (2000: 956) critical geography is used as an umbrella term for a "plethora of antiracist, disabled, feminist, green, Marxist, post-modern, post-colonial, and queer geographies." Blomley's review highlights the centrality of representation in all this: "hegemony turns, in many ways on its imaginary geographies. Denaturalizing, contesting and altering such imaginaries, then, is vital critical work" (2006: 91).

Blomley identified the following as generally characteristic of critical geography:

1.   It is oppositional: it targets dominant forms of oppression or inequalities.
2.   It is activist and practical: it wishes to change the world.
3.   It is theoretic: it rejects positivist explanation and embraces critical social theory.

But as he remarks, there "is a remarkable confidence in the power of scholarship to reach the benighted, and in the transformative capacities of people to overcome alienation through reflexive self-education" (Blomley 2006: 92), and it should be remembered that academic scholarship only takes you so far. Critical cartography and GIS is only in part a matter of scholarship, for the other half of our one–two punch, we have to turn to actual interventions, protests, transformations, and

community mappings. Included in this would also be art work, blogs, mashups, and the "geospatial" web.

What has been going on in cartography and GIS that makes it 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 20 years are woefully out of touch. In fact cartography is a rich transdisciplinary field with something of a history of critique. This tradition of questioning has undergone an amplification in the last two decades and has perhaps finally achieved some disciplinary purchase. But this tradition has always appeared at the margins, outside the main textbooks, and sometimes outside academia altogether.

Given what we have seen so far it is possible to distill four principles or strands of critical thought in cartography and GIS. The purpose here is to sort through the rich variety of work, but there's also a danger that these strands are taken to be definitive rather than the flexible suggestions they are meant to be. The emphasis on these strands varies from one work to another, but they can usually be found to some degree. I will be coming back to these strands time and again throughout this book. You can compare these four principles of critical cartography to the more general ones that Blomley identified for critical geography.

1.  The first principle of critical mapping is that maps are incredibly useful ways of organizing and producing knowledge about the world, but that these orders of knowledge also incorporate *unexamined assumptions* which act as limits which deserve to be challenged.

2.  One way to challenge these orders of knowledge is by putting them into historical perspective. This *historicization* of knowledge not only shows that other times did things differently, but by providing an intellectual history it allows us to see the edges of our own limits, and to conceive of other knowledges that might be useful. Critical mapping also emphasizes that the way maps and spatial knowledges have been deployed has varied tremendously between cultures and places. This can be described as a *spatialization* of knowledge.

3.  Critical mapping also holds that geographic knowledge is shaped by a whole array of social, economic, and historical forces, so that knowledge does not exist except in relation to *power*. When we speak of maps as political, it is this relationship between knowledge and power that is at stake.

4.  The critical mapping project is also one which has an activist, *emancipatory* flavor to it. Sometimes this approach is concerned with overthrowing the influence of official knowledges (such as those of the government or the state) by showing their historical and spatial contingency (Livingstone 2003; Sparke 1998). At other times this approach seeks to dismantle more specific forms of knowledge, such as recent work by feminists in critical GIS or community activism in participatory GIS (Elwood 2006b; Kwan 2002a; Schuurman 2002).

These four principles are meant to act as a guide to a deeper appreciation for the critical project in mapping and GIS, rather than a definitive categorization. They overlap not only with each other but as we have seen with other critical work. Rather than going through each principle in turn I will aggregate them slightly and

discuss how they are used in two larger fields, that is, in theory and in practice. This division is not meant to mark a definitive division between theory and practice – we don't wake up and decide to do theory one day and practice the next. Rather they are aspects of the critical project which are part of each other.

## Theoretical critiques

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 bestselling book (e.g., it was a Book of the Month selection). It exerted a considerable influence on academics and non-academics. Wood argued that maps express the interests of certain groups and that these interests are not always explicit. But Wood was no conspiracy theorist, he showed that the map interests could be made to work for others. This was a very well received argument and it proved something of a manifesto for many counter-mapping projects (see Figure 2.2).

The Smithsonian exhibition included many exhibits that would not normally be thought of as "political" or "interested" maps. One of the most popular was Wood's analysis of the North Carolina road map. This is the kind of map given away for free at rest stops at various places on American interstates. It is not the kind of map you would suspect of harboring hegemonic purposes! In fact, Wood showed that through a combination of inclusions (such as the state governor and his family standing next to a large car; while the back of the map was covered in adverts for local businesses) and exclusions (any depiction on the state map of paths, bike lanes, or public transport) an image of the state as pro-business and car friendly was created. The resulting impression was that North Carolina was a good state in which to live or invest (part of the importance of this is that the state gives these maps out at rest-stops *just inside* the Carolina border). Wood's analysis here was very much influenced by those that were performed by the French author Roland Barthes (e.g., Barthes 1972) in which he took everyday objects (the *guide bleu* travel book for example) and revealed their hidden meanings.
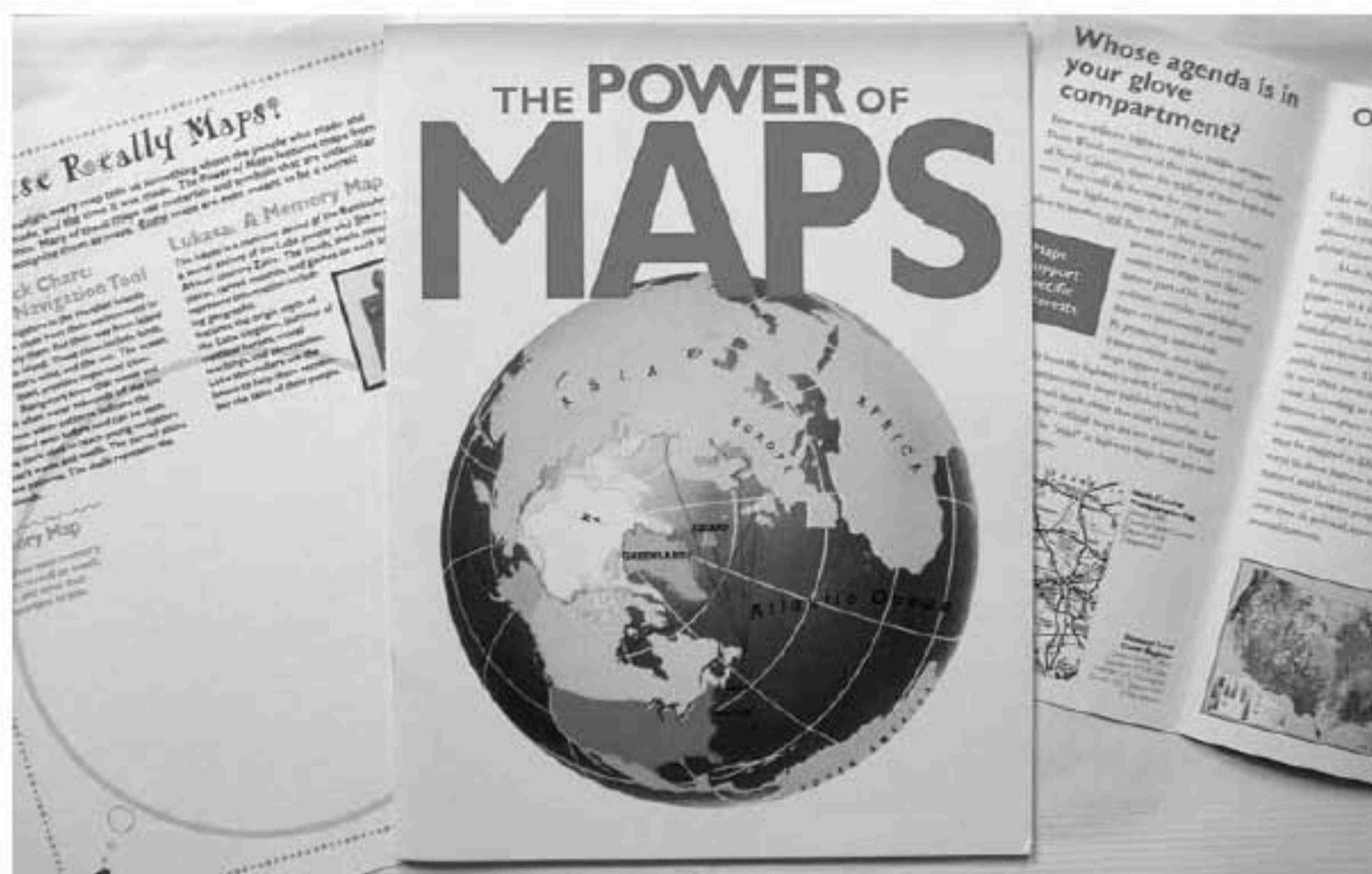
**Figure 2.2** Power of Maps Smithsonian catalog, brochure and children's activity kit.

Wood's reappropriation of the map's agenda was a significant move for a least two reasons. On the one hand, it showed that maps did not just have to serve the state, although they obviously did so in the past and continue to do so (Buisseret 1992). Maps could also work for "the people," a theme that has been at the heart of not only the recent surge in map hacking and the geospatial web but of participatory GIS as well. Mapping became something that could actually be used to resist the state, especially in its guise as an authoritative power. The weapon of the map could be turned to other ends beyond those of the state. It is significant that this understanding of mapping (that it exists not just for the state) is also an understanding of power. Whereas previously we might see an opposition between the state as the locus of power on one side, and ordinary individuals in the other, what Wood alludes to is that power may circulate from below just as much as from above.

Turnbull (1993), for example, includes the story of a map of Aborigine Dreaming trackways in the Great Victoria Desert. In 1981, Kingsley Palmer of the Australian Institute of Aboriginal Studies in Canberra collected information about the myths and trackways in this part of Australia. Palmer then transferred this information to a Western topographical map and took the map with him as a gift to the Pitjantjatjara Aborigine community, who responded to the map with great interest. In fact, the community regarded the map as extremely precious, and full of secrets that should be known only to them (a number of the myths Palmer had inserted on the map should only be discussed by grown men of the community). So it was agreed to put the map in a bank vault in a nearby town, where it could only be withdrawn with the community's permission.

One of the reasons for this was that the community was involved in a long land dispute with the government to decide if the lands would be returned to the community. In order to resolve this question, the government flew some representatives to meet with members of the community. Palmer was also invited, and when he got there he says he was found that his map had been withdrawn from the bank vault, and "at a suitable time when the men had taken the parliamentarians to one side, the map was unrolled on the desert sands . . . the Aboriginal people were at great pains to point out the extent of the Dreaming tracks and the numerous sacred sites that were noted on the map" (Turnbull 1993: 60).

As a result, the lands were returned to the community in 1984 and the map was kept as a kind of title deed in the local bank. Thus although it was drawn by an outsider to the community, indigenous people were able to successfully use it in a struggle against the state in a land ownership case.

Both these examples rely on critical theory to deal with relations of power, but notice also that they have practical ends. Wood points out that if maps are powerful, that power can be used by anybody, not just those in powerful positions. Turnbull's account of the Pitjantjatjara Aborigine community is an example of how maps can be used against the state.

One scholar's work has been of undeniable importance in furthering the theoretical development of critical cartography. In a series of papers toward the end of his life, Brian Harley brought into the discipline the ideas of power, ideology, and surveillance, arguing that no understanding of mapping was complete without them (see Chapter 7). Harley brought these ideas into cartography from its margins, and often indeed from well outside it. Edney has pointed out that Harley was well read in radical human geography (Edney 2005a), and Harley also scattered his texts with references to Derrida, Roland Barthes, and Foucault. Harley therefore represents an opening of the discipline of cartography to extra-disciplinary ideas in a way that had not occurred since the immediate post-war years when Arthur Robinson imported ideas from behavioral psychology and architecture.

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. GIS practitioners responded in kind, accusing social theorists of ignoring the tremendous insights possible with GIS (S. 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 1999b; 2000; 2004). During the 1990s there was an effort to develop a more social or critical

GIS. 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 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).

So the theoretical critiques of the 1980s and 1990s did not arise from nowhere. They were made possible and given strength by the fact that throughout its history mapmaking has butted up against marginalized and local knowledges. While the history of cartography during the twentieth century is one of increasing scientific aspirations, there has all along been a parallel series of mappings that were not scientific. As the ongoing *History of Cartography* project has repeatedly shown, indigenous, pre-scientific, or simply non-disciplinary mappings (that is, those developed outside the confines of the cartographic discipline) abound in many human cultures. In Volume I of that series founding editors Harley and Woodward adopted a more expansive 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). Such a definition places emphasis on the role of maps in human experience, rather than the look or form of maps (as had previously been typical [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 1992a; 2001).

## Critical mapping practices

If the theoretical critique cleared conceptual space for alternative mappings it has fallen to a variety of practitioners, most of them from outside the academy, to explore what this meant in practice. Here we need to focus almost entirely outside of academic cartography and GIS. Two developments are especially notable: artistic appropriations of mapping and the storming success of map hacking, mashups, and the geospatial web. Each of these will be discussed in more detail later (Chapter 3).

The artistic community has long experimented with maps, their meaning as representations and as efforts to find our place in the world (Casey 2002; kanarinka 2006). The philosopher Edward Casey argues that in the last 50 years mapping and art have experienced a dramatic convergence:

> On the one hand, ways of painting have developed that can be considered mapping – not just incidentally or partially, but through and through. On the other hand, a new art form has evolved, that is, earth works, which map by their very essence and not just exceptionally. (Casey 2005: xxii)

Wood has pushed the dates back even further, citing nearly a hundred years of map art (Wood 2008). Many of these artists are interested in geographical re-mappings, and have worked with the assumption that maps are political without explicitly saying so. This artistic appropriation of the politics of representation has long historical roots, from the avant-garde artistic movements at the turn of the century (Georges Braque, Paul Cézanne) 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 (Pearce 2006). 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 [Pinder 1996; 2005]. See Figure 2.3).

In this map, the USA is omitted except for a hyper-sized Alaska that faces off against Russia (shades of Sarah Palin!). The territory where it "should" be is occupied by "Labrador." Greenland and Russia appear in exaggerated sizes, reminiscent of their distortions on many maps. The equator is labeled, but seems to meander at will through a maze of islands in the Pacific Ocean. South America is shrunken and consists only of Peru and Tierra del Fuego, Mexico replaces the continental United States (a reference to Frida Kahlo?). Each coastal outline is largely devoid of any interior (only two cities are named; Paris and Constantinople: someone took a trip on the Orient Express?). The line work is wavy and uncertain, as if the artist was elderly or bored. The map is centered not on a country, but on empty ocean.

As with the Frankfurt School, part of the Situationist 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 (Harmon 2004). 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 (Debord 1967/1994). 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 (Casey 2002; Denis Cosgrove 1999; 2005; Harmon 2004). These "map events" challenge the commensurability of Euclidean space, a basic assumption of much GIS. That is, if you import a map of Copenhagen into your GIS it will georeference itself into a European space, and will not be overlaid on New York City – the two spaces are physically separated by the Euclidean coordinate system. If you break from Cartesian space what new perspectives are thrown up? What strange conjunctions and serendipitous new knowledges? Like the surrealist map the answer to these questions is not a distorted map, but an impossible one, yet one that exists and can be created. Perhaps it is better to say it is a paradoxical map.

These few examples could be multiplied, but the bottom line for the moment is that the disciplinary field of knowledge, cartography, that has corralled maps and mapping practices for half a century is undergoing a transition. Some see this as a result of the rise of GIS and the spatial database (GIS "killing" cartography to put it in stark terms). Others see it as the result of the closure of geography departments

in Europe and the Americas. But there is a larger picture too, and that is that mapping has passed beyond the hands of the old discipline. It's passed beyond it in terms of critical theory and in terms of mapping practices. So while the cartography discipline may be in disarray, mapping has never been healthier. It is this paradox that confronts us today.

For GIS and critical cartography, founded in a post-war sensibility of internal empiricism and the map communication model, the social relevance critique has proved a difficult one to absorb. In subsequent chapters, we shall delve more deeply into where and how this legacy arose.

## Note

1   The first mention of figure-ground in a cartography textbook is in Robinson (1953) who appeared to derive it from work in psychology.

# Chapter 10

# Cyberspace and Virtual Worlds

### Science Fiction?

Google Earth (GE), Microsoft Virtual Earth (VE), and NASA's Word Wind exploit the idea of the "digital earth" (see Chapter 3) popularized in the 1990s by then Vice-President Al Gore. Imagine the following scenario, he said, which he acknowledged sounded a bit like "science fiction":

> [i]magine, for example, a young child going to a Digital Earth exhibit at a local museum. After donning a head-mounted display, she sees Earth as it appears from space. Using a data glove, she zooms in, using higher and higher levels of resolution, to see continents, then regions, countries, cities, and finally individual houses, trees, and other natural and man made objects. Having found an area of the planet she is interested in exploring, she takes the equivalent of a "magic carpet ride" through a 3-D visualization of the terrain. Of course, terrain is only one of the many kinds of data with which she can interact ... she is able to request information on land cover, distribution of plant and animal species, real-time weather, roads, political boundaries, and population. She can also visualize the environmental information that she and other students all over the world have collected ...
>
> She is not limited to moving through space, but can also travel through time ... she moves backward in time to learn about French history, perusing digitized maps overlaid on the surface of the Digital Earth, newsreel footage, oral history, newspapers and other primary sources. (Gore 1998)

Gore's vision was not correct in detail (no head-mounted display or voice-control has ever become popular, nor do we need to go to a special museum to use a digital earth), but he captured several important points:

1. data are displayed "naturistically" as if on a planet as seen from space;
2. the display is interactive, allowing zooming and rotation (the "magic carpet ride," still an unfamiliar concept for geographical data in 1998) and querying by simple clicking on objects;
3. data from different sources can be integrated and easily layered;
4. time can be incorporated.

We saw in Chapter 3 how "peasants" (that is, everyday people such as students, amateur photographers, and so on) are adopting easy-to-use and widely available mapping tools. Importantly, not only are they using these tools, but they are providing stories about their lived experience. A facility like Google "MyMaps" allows people to annotate Google maps with their own content (text, photographs, videos) from their own lives. This content may not be meaningful on a wide scale (e.g., a stranger's wedding pictures), but for the people involved and among whom it is shared it is vital. After MyMaps was released in early 2007, millions of personal maps were created with it. Even Google was amazed at its popularity. It was not so much the use of their tools, but the creation and sharing of stories without the mediation of experts that was amazing. This is completely different from the traditional picture in geography and GIS which has always operated through a top-down, expert-driven process.

In effect: *Google Maps has become the Wikipedia of the geoweb*. It acquires and has data submitted to it, it edits and quality controls that data, and it publishes and makes that data modifiable.

This raises the critical question: is Google good for geography? (Here, I use Google as a shorthand for the geoweb more generally.)

### Tensions in the Web: GIS vs. the Geoweb

Elsewhere in the book we have examined the possibilities afforded by the geoweb, and in particular the challenge that it makes to traditional Big GIS. But we have also noted that as a technology, it is not essentialist. As such "actually existing" technologies need to be understood in their particular socio-political contexts.

Some of the ways in which Google/the geoweb have come under criticism include: loss of privacy (e.g., through StreetView), issues of censorship (Boulton 2009); homogenization of maps (Wallace 2009); dumbing down of mapping – making maps that are very basic or lack richness (BBC 2008); contributing to the end of paper maps and/or the destruction of the mapping industry; and the proliferation of amateur(ish) maps made by non-experts ("McMaps," see Dodge and Perkins 2008).

Dodge and Perkins examine an apparent decline in map production and map use in some surprising places – including geography journals. At the same time the map is still emblematic of geography to the non-specialist: "[o]n the street and in

the pub, British geography is still about maps" (Dodge and Perkins 2008: 1272).
corporate quasi-monopolies such as Google and Yahoo, which after all are med
companies rather than cartography suppliers, have led to a proliferation of McMap
are we any better off?

Recall Figure 1.1 and the tensions in cartography. Concerns over "undisciplined
and amateurish mapping are exactly what fuels the push to certify knowledg
and establish bodies of knowledge. Our relationship to mapping is a profoundly
ambivalent one (the unseemly perversity of maps that work too well).

If the geoweb is to grow up and be understood not just as the amateur version
of what the professionals do, it needs to fight for legitimate recognition of its own
professionalism. It should continue to critique and undermine the expensive,
limited, and ill-designed capabilities of traditional GIS. It should not be happy to
be just accepted as a minor co-player "alongside" professional GIS.

How can it do this? I would suggest by pointing to the following inherent factors
which provide tremendous advantages for the geoweb:

1. "crowdsourced" data as for example in Wikipedia;
2. open source tools and services;
3. participation and syndication (the Web as platform).

## Crowdsource

Here I will focus on crowdsource and the Web as platform (see Chapter 3 for
discussion of open source). Crowdsource refers to the way that large numbers of
distributed people can work on the same project in a very powerful manner,
creating something where the whole is more than the sum of the parts. The online
encyclopedia Wikipedia is a paramount example. Indeed, Wikipedia is an outgrowth
of another encyclopedia project, called Nupedia, which accepted articles in a highly
peer reviewed manner. Submission of articles was slow and the project eventually
was canceled. Wikipedia on the other hand has an open, community-based approach
where in principle anybody with a computer can edit or submit content (although
material is subject to editing by power users and others at Wikipedia, but there is
no peer review, nor is submission limited to "experts"). The key here is that Wikipedia
and other projects are done by community consensus, not chaotically. These
projects are self-organizing. The results are pretty clear: Wikipedia receives more
than 450 times as many daily visitors as does the online *Encyclopedia Britannica*.[1]

The term crowdsource may be new but the principle is old. The Wikipedia
entry on crowdsource cites the prize by the British government for the solution to
the longitude problem in the eighteenth century and its eventual winner, John
Harrison, as an early example of crowdsource.

When the skilled aviator Steve Fossett went missing in September 2007, Richard
Branson, one of Fossett's friends, coordinated with Google to examine its imagery,
and Amazon's crowdsourcing technology known as the Mechanical Turk was once

again used as it had been in the case of Jim Gray. The Fossett search reportedly
covered over 300,000 squares miles by some 50,000 people. (The search was unsuc-
cessful, and some participants and search and rescue members have criticized it for
distracting from official efforts since each flagged image has to be double-checked.)

While crowdsourcing has often been successful elsewhere, the lesson from the
Fossett search indicates the parameters of the search by amateurs need to be clearly
specified. The adage "many hands make light work" is central to crowdsourcing
and volunteered geographic information (VGI) (Goodchild 2007), but it works better
where the group's decision-making can be well coordinated. Surowiecki discusses
methods of improving the wisdom of crowds, including these four principles:

1. have a diversity of opinion within the group;
2. have independence so that people's decisions aren't influenced by those around
   them;
3. have decentralization so that people are able to draw on local knowledge;
4. have good methods of aggregating opinions into a collective decision (Surowiecki
   2004).

## The Web as platform

The very nature of the Internet permits people not only to gain information but
to *participate* as well. The Internet allows us to create new content and new knowledge.
This participatory nature of information (sometimes called the "read/write" Web)
includes community-based websites such as YouTube, Wikipedia, MySpace, Face-
book, and the millions of blogs that constitute the "blogosphere" (the sum total of
all blogs). Some of these blogs are read by a few people, some by thousands a day.
Some make no money, some make over a million dollars a year (e.g., the tech blog
Boing-Boing, see Tozzi 2007). Yet they all evince a desire and a need to share their
views and ideas with others by using publishing tools that are widely and publicly
available. It has been suggested on more than one occasion that the read/write Web
may directly affect the kind of society that we live in and its politics – effectively,
it has the potential to renew participatory democracy. Al Gore wrote recently:

> The Internet has the potential to revitalize the role played by the people in our con-
> stitutional framework. Just as the printing press led to the appearance of a new set
> of possibilities for democracy, beginning five hundred years ago – and just as the
> emergence of electronic broadcasting reshaped those possibilities, beginning in the
> first quarter of the twentieth century – the Internet is presenting us with new pos-
> sibilities to reestablish a healthy functioning of self-government. (Gore 2007: 259–60)

The phenomenon of blogs is certainly one that bears watching. There are untold
millions of blogs (Technorati gave up counting at 112 million), and most traditional
media outlets now include blogs. Yet a word of warning: blogs also suffer from the

"long tail" effect, that is, only a few are widely read (the head), while there are untold numbers that make up the long tail that are hardly read. In the Internet then, information and knowledge are just as unevenly distributed as in the physical world – the digital divide has certainly not gone away (Chakraborty and Bosman 2005; Zook and Graham 2007a).

The concept of the Web as platform is much more than blogging however, for it refers to the idea that gradually we will shift from desktop-based activities to Internet-based ones. Some writers call this "cloud computing" – that software will increasingly move to the Internet where it can take advantage of being massively distributed and collaborational. As such even our operating systems (Windows, MacOS, Linux, etc.) may reside on the Web. For example, Google Apps provide spreadsheet, slide presentation, and word processing tools that enable people to simultaneously work on the same document. Alan MacEachren and his colleagues have also developed sophisticated "geocollaboration" (MacEachren and Brewer 2004; MacEachren et al. 2005, 2006). Notice that this aspect of the Web as platform draws on crowd-sourcing to harness the power of the group.

## Size Does Matter!

Any account of the geography of cyberspace (i.e., the Internet and the Web) deserves to begin with a few awe-struck comments about its sheer size. How much human knowledge is there? As we saw earlier (Chapter 5), estimates range from 5 to 281 exabytes. But data (never mind information or knowledge) has a tendency to occur in clumps. As William Gibson (the author of the great cyberpunk novel *Neuromancer*) stated "the future is already here – it's just not equally distributed." This is a clever way of referring to what is generally called the *digital divide*: the difference between the haves and the have-nots in the information economy.

But will universal answering services pose other problems? Will the world be turned into factoids? Will the Internet begin to substitute for lengthier, deeper reflections? Recently, the history department at Middlebury College in New Hampshire decided that it would no longer allow Wikipedia citations in student papers (Read 2007). Others worry about the ability of students to critically evaluate Internet-sourced information, fearing that information obtained over the Internet is inferior or not authoritative (because not peer reviewed). These questions remain unresolved.

## Cybergeographies: The Work of Martin Dodge

One of the enduring questions about the Internet is some variant of "What does it look like?" ("Where is the Internet?", "Who is connected to whom?" etc.). At first glance, a map would provide ready answers to these questions. Yet despite the thousands

of maps and other visualizations of the Internet, there probably is no satisfactory way to answer these questions, for the following reasons:

1. To conceive of the Internet as a distinct and separate entity ("cyberspace" or the "virtual") rather than a set of heterogeneous processes and capabilities that are inextricably intertwined with our daily lives is probably a mistake.
2. However it is conceived, the Internet is changing not only from day to day, but from second to second.
3. The Internet anyway may not be the best way to conceptualize the total impact of the virtual.

But what does this landscape consist of? We use terms like "cyberspace," "cyber-geography and cybercartography," "the Internet," "the Web," and "the virtual" as if they were all the same thing, but obviously they are not. Some are technical terms for quite specific things – the Web is the network of hyperlinked documents accessible via the Internet, whereas cyberspace is much more nebulous. The term "virtual space" for example was used as long ago as 1953 to describe the spaces created by paintings and artwork (Cosgrove 2005: fn. 11).

None of this has stopped people from attempting to picture and map the Internet. Many of these visualizations have been tracked by Martin Dodge as part of his cybergeography project, particularly his *Atlas of Cyberspace*, an online project he maintained between 1997 and 2004 (Dodge and Kitchin 2001). Dodge is a leading researcher on the geography of the Internet, and with his American colleague Matthew Zook has done important work on the various geographies of the Internet.

### Maps in cyberspace

Dodge and Zook distinguish between three kinds of cartographies related to cyber-space: maps *in* cyberspace, maps *of* cyberspace, and maps *for* cyberspace (Zook and Dodge 2009). The first category, maps in cyberspace, is a way of describing how traditional cartography is now available through the Internet – maps are available online and with far greater interactivity than previously. This category essentially sees the Internet and the Web as a publishing and distribution medium, albeit one that allows new kinds of maps to be made. This category is therefore by far the largest of their three categories; covering everything from Google Maps, map mashups, Yahoo, MapQuest, Microsoft Virtual Earth, map libraries whose collections have been scanned, to online and community-based participatory GIS. Anybody or any institution (and there are a lot of them) who has put a map online is part of this category.

Finding these maps has become less of a problem with the development of image search tools. It is an instructive exercise to search for these maps. Say we are interested in cartograms. A text search will give us the description and definition of this map type, but an image search will give us actual cartograms. (In a test I did just

now on Google, the work of the geographer Danny Dorling came up in the first page of results.) This makes it very much easier to see if what we are getting is useful or not. It hardly needs to be said therefore that the *size* of the Internet has raised the question of how well search engines work. Just consider this problem for example: which result should come up first in the listing? The most popular – which can be manipulated and may not be the most relevant. The most recent? The most nearby? Ordered by amount of payment to Google? If you are a business which of these schemes would you prefer – and would a user prefer the same scheme? As Zook and Dodge point out, a large business can appear above a nearer but smaller business. In other words, mapping is coming under the control of corporate interests: "control over these maps and the algorithms used to generate them, is vested in private companies without accountability to the public who uses them" (Zook and Dodge 2009: n.p.). It also tends to reinforce an adage as old as the Bible: "to them that hath shall be given, and to them that hath not shall be taken even that which they hath" (Matthew 13:12, also known as the Matthew Principle or effect [Merton 1968]).

Here's a typical experience. Using Google My Maps, I zoom in to Philadelphia, USA, where I am currently staying. As it happens, I am living in a house just around the corner from the Eastern State Penitentiary mentioned by Michel Foucault in his book *Discipline and Punish* which I discussed in Chapter 9. I pop outside and take a picture of it, which I upload into the online photograph hosting site Flickr (owned by Yahoo).

Now using My Maps it is a matter of putting in a placemark over the penitentiary and editing the placemark to include a link to my Flickr photos (and choosing a nice photo to go in the placemark as well). I save the map and make it permanent so that I can share it. In fact, here it is. Type the following URL into your web browser (I've shortened the original google.com URL using a service known as tinyurl): http://tinyurl.com/2as5fu. Now my handmade map has been added to cyberspace! Enjoy.

## Maps of cyberspace

Maps *of* cyberspace more directly try to answer the question of what cyberspace actually looks like. Here again there is a startling range of visualizations, from the simple A-----B of the first two computers ever networked (in September 1969) on the ARPANET to the more complex topologies of later years (e.g., MILNET map). Figure 10.1 shows the early structure of USENET, the network that distributed newsgroups (discussion groups, otherwise known as Netnews).

Most of these maps are topological: they show the connections between various computers or computer networks. Sometimes these are mapped over geographical space and can show which areas of the world are well or poorly connected. This point helps us understand why cyberspace (or even the Internet and the Web) are not separate, abstract, and completely virtual systems somehow existing separately from the brute materiality of everyday life. Indeed, it is one of the striking points
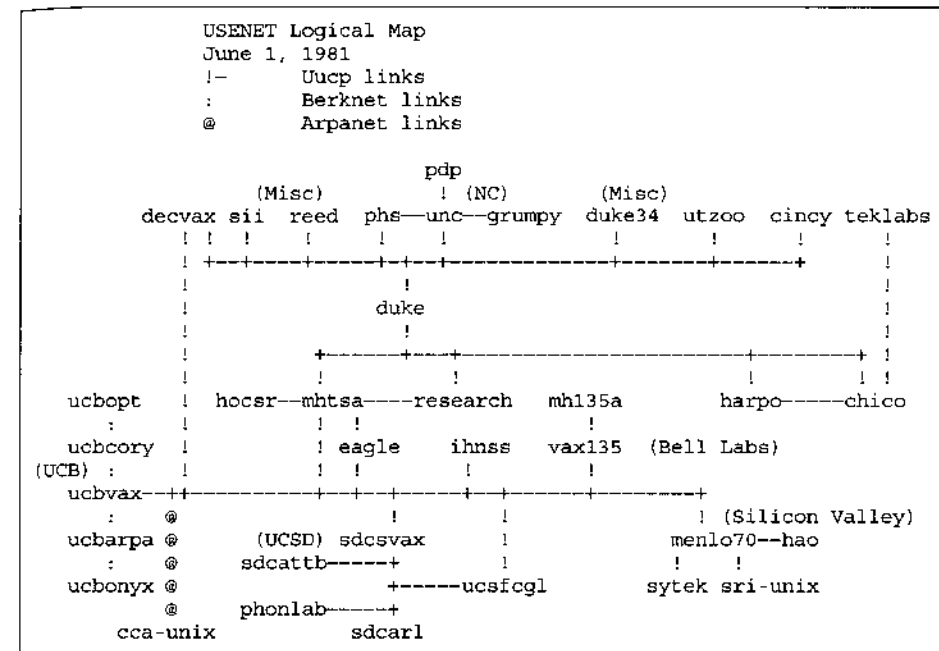
**Figure 10.1**    USENET Logical Map, June 1, 1981.

of cyberspace that it is so material and that this materiality has a distinct geography (Crampton 2004).

The use of the word "map" is often metaphorical – it is a topological diagram of a network. Many maps of cyberspace do employ the symbolization of standard maps. A comical rendering is offered by the "Map of Online Communities and Related Points of Interest" (Figure 10.2). Here the size of the feature on the map conveys the size of membership (as of Spring 2007): MySpace, YouTube and the "Blogipelago" are large and dominant, with the Wikipedia project spinning its network (but no Twitter yet) near the Noob Sea (Noob is part of the online slang for newbie or newcomer).

As one person's subjective view of the Internet it is both satirical and informative at the same time, not unlike some of the maps discussed in Chapter 12.

Zook and Dodge point out that few of these maps of cyberspace are made by cartographers or geographers (although Zook created some good ones in his book [Zook 2005]). Most are made by systems analysts because they have access to the data or it is part of their job to predict traffic. This point connects with the claim made in Chapter 1 that a characteristic of modern critical cartography is that it is falling out of the hands of trained cartographers and opening up to other people. This does not mean that everyone is equally able to make maps. If the data remain confidential or held by private companies it is not always so much an infinite widening of mapmaking, but a radical shift.
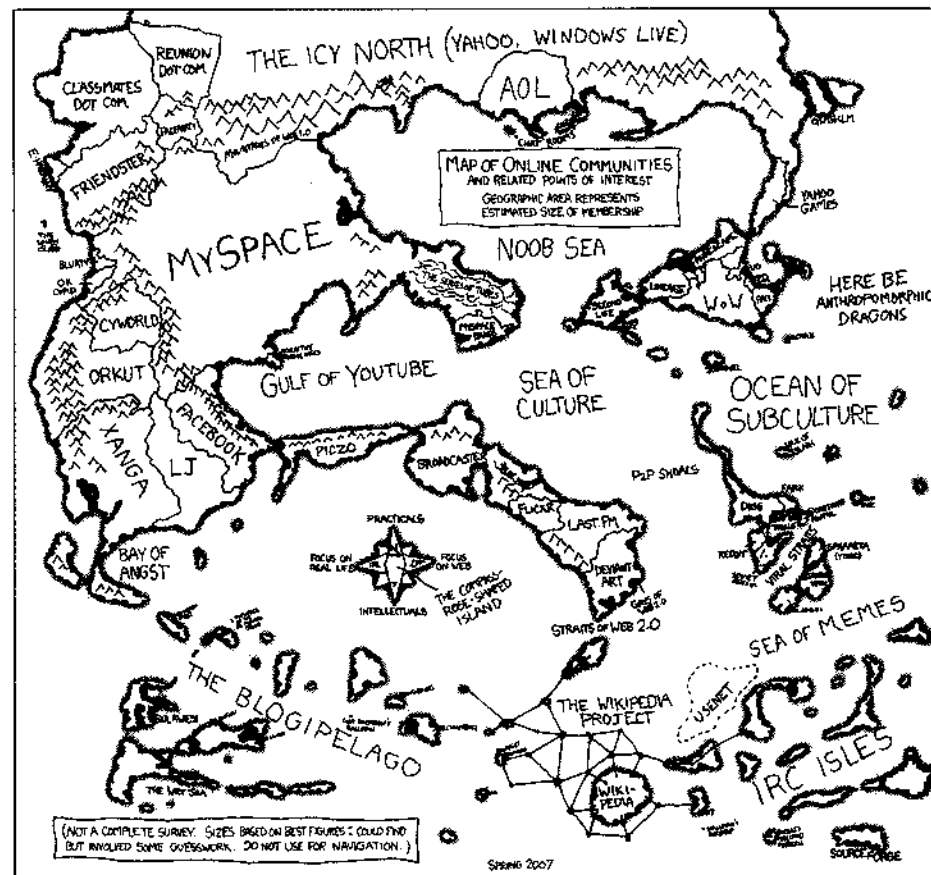
**Figure 10.2** A humorous take on the geography of the web. Source: xkcd.com

## Maps for cyberspace

Zook and Dodge's final category is maps for cyberspace, which they describe as aids for getting around in cyberspace: "maps become interfaces of exploration 'inside the wires', rather than representations of how the 'wires' themselves are arranged and produced" (Zook and Dodge 2009). By virtue of the fact that these maps provide a visual depiction of abstract relationships, it enables otherwise hidden relationships to be discovered. For example, a blog can contain thousands and even millions of words, but a so-called "tag cloud" can show the most common themes of the blog. Often these might be surprising even to the author of the blog. A tag cloud works by proportionally sizing the word to the number of times it is mentioned. In this example a tag cloud has been generated for the photo hosting website Flickr.com. What are people worldwide taking pictures of? Probably you can predict "friends," "party," and "wedding," but what about "Canada," "rock," and "Japan"? Here we have the mundane, everyday geographies revealed!



**Figure 10.3** All time most popular tags as recorded at the photographic site flickr.com. Reproduced with permission of Yahoo! Inc. © 2009 Yahoo! Inc. Flickr and the Flickr logo are registered trademarks of Yahoo! Inc.

A more analytical capability is offered by amazon.com and their new capability to map all the places mentioned in a book. Strictly speaking this is a not a map for cyberspace, but it's a map only available because of cyberspace (specifically, Amazon). For instance, a map of all places mentioned in the *Dictionary of Human Geography* (2000 edition) has an almost exclusively Anglo-American geographical orientation.

Why does the book have this specific pattern? No doubt there are good reasons for many of the places mentioned (or not mentioned: it's hard to believe the book almost entirely ignores Africa for instance). Perhaps the technology is imperfect. Perhaps the people who agreed to contribute predominantly came from Europe or North America. Perhaps today human geography is practiced mostly in the West. Perhaps the editors were unaware of many contributors from outside these areas. The point is that the map raises these questions about the inequalities of knowledge distribution. In the last section of the chapter, I will look at this question in more detail, and discuss the role of "net neutrality."

## The Digital Divide

Consider a map of Internet access created by digital artist Chris Harrison using data from a "crowdsource" effort known as the DIMES project (Figure 10.4). Harrison's

**Figure 10.4**   (*Continued*)

map shows the degree of connectivity around the world – the darker the symbol, the more connectivity. It quickly becomes apparent that the distribution of access ("on-ramps") to the Internet is very concentrated.

Although the map does not show any country outlines, it is fairly easy to discern that North America (particularly the USA) and Europe dominate. Even within these areas however, access is patchy (e.g., the American Midwest), probably because fewer people live there. South America and Africa barely appear, and even then mostly around the coastlines. Japan stands out strongly, as do the southeastern coastal areas of Australia.

As of 2005, there are just 18 countries in the world where more than half the country's population can access the Internet (United Nations Development Program 2007). High-income OECD countries average 52.5 percent access; developing countries average 8.6 percent as a whole, with the least developed countries averaging just 1.6 percent access to the Internet. These concentrations or divides occur at multiple scales: globally, regionally, and locally. Globally, Internet access rates are concentrated in a few countries you might expect (the USA, UK, and Western Europe), as well as some that you might not (the best connected country in the world? Iceland, with 87 percent online). Scandinavian countries all have better access rates than America or Britain. Conversely, there are many countries with extremely poor rates of access, such as almost the entire continent of Africa, but there are also surprisingly low access rates in highly technologically advanced countries such as Japan and France (8th and 10th in the world respectively).

When we consider the world-wide distribution of other resources, such as clean potable water, the geographical patterns are remarkably similar. Where people lack even basic necessities such as water, they lack Internet access. But Internet access provides a particularly sharp reminder of the structural obstacles to human development. Whereas many of the places suffering from lack of clean, inexpensive water have to some extent traditionally suffered from that problem, the

**Figure 10.4**   Global internet connectivity, by Chris Harrison (left). Detail of Europe (right). Source: Chris Harrison, Carnegie Mellon University. Used with Permission.

newness of the Internet – the fact that just a decade ago hardly any country had access to it – shows how inequalities are continually produced. In 1990 for example, the highest Internet access rate was just 8 percent (in the USA), only eight countries had Internet access rates above 1 percent, and only 14 had any measurable access *at all* (United Nations Development Program 2006: Table 13). Beginning as it were then from this common zero line, 15 years later the map shows stunning inequalities in access, with runaway connectivity in the West, while sub-Saharan Africa's best-connected nation (South Africa) clocks in at a mere 10.9 percent in 2005 – in other words, slightly higher than that of the USA in 1990, nearly two decades ago.

This concept of unequal access has been dubbed the "digital divide" which can be defined as "unequal access to the information economy." Note that this is not primarily a question of technology, as is commonly assumed, but one of knowledge: knowledge of how to use the technology, of education in the information economy, *plus* the sheer access to the technology. The result of this knowledge-based approach (sometimes called "access to knowledge" or A2K) is that it first becomes very evident that the digital divide is not something that can be overcome by improving access to technology itself (although that will help). The frequent announcement of the "end" of the digital divide following the development of some new technology is unwarranted. Not only is there no associated training to go with this new technology, but also little indication of how it will be helpful for populations living on a few dollars a day.

Over the past five years for example, the One Laptop Per Child (OLPC) initiative has developed a robust and inexpensive laptop that may sell for as little as $100 (at the time of writing, the BBC reports it costs $176). The first machines from this effort were scheduled for delivery in late 2007. The project is the initiative of Nicholas Negroponte of the Massachusetts Institute of Technology, and it represents a marvel in inexpensive computing. The first models of the laptop (called the XO) sport a color 7.5 inch screen, a 433 MHz processor, 1 gigabyte of flash memory, and wifi capabilities. The problem of the lack of electricity is addressed through the options of a basic rechargeable battery, a hand crank, and a pull-string recharger, which gives ten minutes of use for every minute of pulling. Whatever you think about it, the engineering behind this computer is impressive.

But the machine is not without its critics. Bill Gates criticized its "tiny screen." Intel's CEO accused OLPC of making a "gadget," when what people really want is a fully functioning modern PC, and implied that it was discriminatory to offer this computer to developing countries, while developed countries have so much better machines (Intel has since backed away from these criticisms and is now working with OLPC). The laptops are meant to be sold to governments and then distributed to children, but some NGOs argue that government money would be better spent on clean water and schools – a $2,000 library can serve 400 children at $5 each, argued John Wood of Room to Read, a nonprofit organization that promotes literacy in developing countries:

"These kids in rural Cambodia can't even read yet," Wood says. "*What are they going to do with a computer?*" A small rural library serving 400 kids costs $2,000 to set up. Five dollars a child. Computers are far more expensive. There are places and times when computer labs can be helpful, Wood says, and Room to Read will fund about 30 this year. But "we'll do 900 libraries. We'll do about 85 new school construction projects." (Thompson 2006: emphasis added)

If his figures are right then 900 libraries will potentially service 360,000 children at a cost of $1.8 million, or $1/20$ the cost of the OLPC.

Secondly however, the divide is really rather a series of gaps, not one big gap. Technological innovations occur in waves, and while it may be the case that eventually the majority of people will adopt a certain innovation, by the time they have done so a new wave of innovations is coming along which they do not have. Consider the modem. The earliest modems (in the 1960s) operated at 300 bits per second. By 1980 some modems were capable of 14.4 kilobits per second (kps). From there speeds increased to 56 kps and now cable modems and DSL ("broadband") operate at speeds of 3–8 megabits per second.

This might not constitute a problem if information was designed or even compatible with the lower end of the market, but the fact is that anybody who is connecting via dial-up today will be very frustrated by the large file sizes and operating requirements such as RAM that are needed simply to surf the Web. The same is true for running mapping or GIS software. ESRI's stated requirements for running ArcGIS 9.3, for example, call for a CPU of at least 1.6 GHz, 1 GB of RAM, 2.4 GB of disk space, as well as high-end add-ons from Microsoft such as .NET Framework 2.0 which carry their own burdensome requirements.

Thirdly, the digital divide is not just a technological issue because it is more importantly one of justice and equality. Jack Balkin, a professor of law at Yale with interests in information access, has outlined the stakes as follows:

1. Human knowledge – education, know-how, and the creation of human capital through learning new skills.
2. Information – like news, medical information, data, and weather reports.
3. Knowledge-embedded goods (KEGs) – goods where the inputs to production involve significant amounts of scientific and technical knowledge. Examples include drugs, electronic hardware, and computer software.
4. Tools for the production of KEGs – examples include scientific and research tools, materials and compounds for experimentation, computer programs and computer hardware. (Balkin 2006)

These knowledges are much harder to map than Internet access. More than one measure of knowledge development likely would be needed. Many of Balkin's forms of knowledge would be delivered not only via the Internet, but also by radio, newspaper, parents, the community, or classroom.

Simple cyberspace maps of the topological connections then, are not the whole, or even the most important part of the story. A recent attempt to provide a better insight into the shape of the Internet was attempted by some Israeli researchers (Carmi et al. 2007). The DIMES project attempts to give a better picture of how knowledge may be distributed. One of their findings is that a significant proportion of the network is composed of fairly isolated nodes that can only reach the rest of the network through the central core. In urban terms, this is analogous to "edge cities"; those exurban areas outside the downtowns that are well connected and serviced with facilities for shopping and working. The isolated outer areas are like widely scattered small towns that can only connect with each other through an airline hub.

Finally, we should consider another sort of uneven access which goes by the name net neutrality. If the Internet is conceived as a hierarchy, as Carmi et al. argue, then this hierarchy is not solely produced by the differential physical connections between core and periphery. Rather, it can also be produced deliberately. Telecom companies have argued that such a hierarchy should be produced through differential pricing for websites. That is, websites should pay more for higher speed access, for having more computers connected, or for having certain types of content. Since the early 2000s advocates of net neutrality have campaigned against the telecoms, arguing that loss of net neutrality will result in highly differential access. Some of the very figures who originally developed the Internet are among these advocates. Vint Cerf, for example, has been quoted as saying that "the Internet was designed with no gatekeepers," and Tim Berners-Lee, who invented the Web itself, is also opposed to it, along with most of the major Internet companies such as Google, Amazon, Yahoo, and Microsoft. As I mentioned earlier in the book, blog activists have been a critical part of the opposition to telecoms, and their efforts (and a change in Congressional power in 2006) have so far stymied attempts to introduce anti-neutrality legislation.

We have seen in this chapter that the concept of "mapping cyberspace" is a complex one. Yet at the same time these very attempts to map cyberspace reflect our yearning to come to terms with it, to struggle with it and over it. From its origins in the 1960s as a research/military application, the Internet has become increasingly commoditized and at the same time a key development in globalization. If most of the world's countries still have poor access to the Internet, the lives of their citizens have nevertheless been touched by it. Whether it be because companies in developed countries are outsourcing business more flexibly (e.g., help centers in India) or because of ever-finer surveillance systems that can track and map human and environmental changes, there is less and less opportunity to escape the information economy. How these structures and processes are revealed, and how the relations of power and knowledge are produced, remains a question that critical cartographers and GIS users will need to continually address (see discussion in Chapter 7).

## Note

1　Jimmy Wales, the founder of Wikipedia, objects to the term crowdsource, arguing that it does not apply to Wikipedia because it demeans the work of the contributors. That is, it tricks people into working for free and exploits their labor. However, there is nothing inherent in crowdsourcing that means it could not reward labor, although whether this would occur at "fair" market rates is open to question.