Theory, Practice, and History in Critical GIS: Reports on an AAG Panel Session

Abstract

Extending a special session held at the 2008 annual meeting of the Association of American Geographers in Boston, this commentary collection highlights elements of the critical GIS research agenda that are particularly pressing. Responding to a *Progress* report on critical GIS written by David O'Sullivan in 2006, these six commentaries discuss how different interpretations of 'critical' are traced through critical GIS research. Participants in the panel session discussed the need for a continued discussion of a code of ethics in GIS use in the context of ongoing efforts to alter or remake the software and its associated practices, of neo-geographies and volunteered geographies. There were continued calls for hope and practical ways to actualize this hope, and a recognition that critical GIS needs to remain relevant to the technology. This 'relevance' can be variously defined, and in doing so, researchers should consider their positioning *vis-à-vis* the technology. Throughout the commentaries collected here, a question remains as to what kind of work disciplinary sub-fields such as critical GIS and GIScience perform. This is a question about language, specifically the distance that language can create among practitioners and theoreticians, both in the case of critical GIS and more broadly throughout GIScience.

Keywords: critical GIS, PPGIS, GIScience, GIS, human geography

Résumé

Pour faire suite à une séance spéciale qui s'est tenue à Boston, en 2008, dans le cadre de la réunion annuelle de l'*Association of American Geographers*, notre collection de commentaires met en évidence les éléments du programme de recherche sur les principaux points du courant critique dirigé à l'encontre des SIG. En réponse à un rapport provisoire sur ce courant critique, rédigé par David O'Sullivan en 2006, les six commentaires expliquent comment on a retrouvé différentes interprétations de ce courant critique dans les documents de recherche. Les participants aux réunions d'experts ont signalé qu'il fallait poursuivre les discussions dans le but de proposer un code d'éthique sur l'emploi des SIG, dans le cadre des efforts déployés visant à modifier ou à adapter le logiciel et les pratiques associées, dans le domaine de la néo-géographie et de la géographie volontaire. On a lancé de nombreux appels d'espoir, on a proposé des moyens pratiques de satisfaire les attentes et on a reconnu que le courant critique doit garder une pertinence sur le plan technologique. Comme cette « pertinence » peut se définir de différentes façons, les chercheurs doivent envisager leur position sur le plan de la technologie. Parmi les commentaires recueillis, il reste à déterminer quelle sorte de travail on effectue dans les sous-domaines disciplinaires comme le courant critique sur le SIG et la science de l'information géographique. Cette question touche le langage, plus particulièrement la distance que le langage peut créer entre les spécialistes et les théoriciens, à la fois dans le cas du courant critique et, plus généralement, dans celui de la science de l'information géographique.

Mots clés : courant critique sur les SIG, SIG participatifs, science de l'information géographique, SIG, géographie humaine

Repositioning Critical GIS

Matthew W. Wilson and Barbara S. Poore

Although GIS is used for many practical applications, the theories and rhetoric that underpin the technologies are not exclusively pragmatic and, indeed, have been described as utopian (Warren 2004). Visions of the potential of GIS are frequently couched in future terms – recent examples are Digital Earth (Goodchild 2008) and volunteered geographic information (Goodchild 2007).

While this utopianism may be unconscious, it is not uncommon; indeed, a ''proximate future'' – a future that never arrives – may be necessary to the development of many computing technologies (Wigley 2001; Flichy 2005; Turner 2006). But such a focus also seems to absolve practitioners of responsibility for the present, placing achievements just out of reach, while blinding them to current practices (Bell and Dourish 2007, 162). Human geographers' perception that these blind spots existed in the practice of GIS resulted in the GIS wars of the early 1990s (Schuurman 1999a), the publication of an influential book on the social implications of GIS (Pickles 1995), the launch of an initiative on the geographies of the information society by mainstream GIScience (NCGIA 1996), the integration of some aspects of the social critique into practice via the public participation GIS (PPGIS) movement (Sieber 2006), and the inauguration of a self-consciously ''critical'' GIS by younger researchers (Harvey, Kwan, and Pavlovskaya 2005). It is not our intention to rehash the debates that constituted ''critical GIS,'' nor to hamper the development of critical GIS by a restrictive definition. Our concern is to discuss the ways in which critical thinking – broadly, a responsibility for the practices of the present – is alive and well in GIScience today.

One indication that the idea of critical GIS is taken seriously was a recent review of the field of critical GIS by David O'Sullivan, a mainstream GIScientist. O'Sullivan (2006, 783), via Nadine Schuurman (1999b), quoted Michael Goodchild's statement that success in present-day geography can be achieved by ''straddling the fence'' between human geography and GIScience. To explore the status of and prospects for research that straddles this ideological fence, we organized a paper and panel session at the annual meeting of the Association of American Geographers in Boston in April 2008. This essay describes the paper session, introduces essays by the panellists, and gives a flavour of the debates. We are motivated by the dialogue at the conclusion of the panel session, during which one audience member asked of critical GIS, What about the war effort and the broader ethics of situating this technology's multiple engagements? We recognize that these questions have been asked before. Rather than being frustrated by their unresolved insistence, however, we are reminded that critical GIS and its inherited research agendas are ever more pressing, that the conditions and contexts of critique have expanded and intensified, as demonstrated by recent special issues of *ACME* (Harris and Harrower 2005) and *Cartographica* (Harvey and others 2005). We believe the paper sessions and the panel commentaries frame an emerging critical GIS that is reflective of the varied strands of GIScience and diffractive of its futures. It is this kind of diffraction, what Donna Haraway (1997) advocates as a responsible, conscience-bearing approach in knowledge-making endeavours, that draws these histories and futures to present practice, to recognize how we – as theorizing practitioners of critical GIS – constitute knowledge differently.

For the paper session, we were fortunate to have four excellent papers that responded to points O'Sullivan raised in his review article to explore the origins and identities of GIS and to engage the technology directly. Patrick McHaffie (2008) of DePaul University, in a talk titled ''The Technology War, the Magical Aeroplane, and the Shift to Photogrammetry in American Public Sector Mapmaking,'' described how the shift from field-based topographic mapping to photogrammetry in the decades following World War I was simultaneously a shift in modes of vision and in the reordering of the cartographic workforce from a craft-based apprenticeship to an industrialized process with narrow specialization of jobs and university-trained managers. Miriam Cope (2008) of the University of Illinois at Urbana-Champaign, in a talk entitled ''Theory and Identities of Participatory GIS,'' looked critically at the field of PPGIS, contending that the use of GIS for participatory decision support should be framed not just against the backdrop of criticisms of GIS but also in terms of participants' attitudes toward technology in general. Narrative was a topic of Dalia Varanka's US Geological Survey (USGS) talk ''Topographic Feature Inventories for National Mapping Ontology'' (2008). Discussing the development of an ontology for the USGS's National Map, Varanka highlighted the necessity of including alternative voices in the construction of ontologies rather than legislating ontologies from the top down. Jin-Kyu Jung (2008) described a research project that directly incorporates qualitative data into the GIS database, foreseeing a qualitative GIS that is responsible to the vernacular languages and imaginations of mapped subjects/objects.

Following the paper session, Eric Sheppard of the University of Minnesota introduced the five panellists assembled in this commentary, each of whom delivered a short statement responding to or extending the discussion initiated by O'Sullivan (2006). Their statements, reproduced below, reflect on the use of the term ''critical'' in the context of actually occurring GIS use, qualitative GIS, volunteered geographic information, and neogeographies.

That critical GIS is ''boxed off,'' David O'Sullivan notes, is both creative and useful for those engaged in this research tradition. However, he asks whether the renaming of GIScience has actually created another ''sealed world,'' a mutually exclusive research endeavour limited by its own terminologies of formation. O'Sullivan identifies three nascent areas in which to explore this question: (1) consideration of what is meant by ''critical,'' (2) historicization of GIS, and (3) research about the social implications of GIS, particularly its impact on policy. Marianna Pavlovskaya contends that critical GIS is about the critique of dominant practices and creating alternative futures through the use of GIS in ''progressive social research.'' This endeavour takes different forms, she argues, including Marxist, feminist, post-structuralist, and post-capitalist perspectives and an emphasis on changing power configuration through the use of GIS (e.g., PPGIS, feminist research using GIS). The position occupied by critical GIS is a precarious one, she continues, in that researchers identifying within this sub-field are ''outsiders of both communities'' – that is, of social theory and of mainstream GIScience.

Nadine Schuurman, in taking responsibility for the term ''critical GIS,'' considers the power of language in creating distances between us. The insistence that any theorizations must be critical, she argues, causes a faulty separation between ''critical'' scholars and scholars in practice. As an alternative, she proposes ''theoretical GIS,'' which would rethink both the role of ''critique'' and the operations and assumptions that underlie GIS. Mei-Po Kwan notes that ''we rethink this a lot.'' Her statement discusses ways in which the divides between critical GIS and the practice of GIS are being challenged: (1) in the mix and diversity of the methods section of the *Annals*, (2) in concerns about access, (3) through the emergence of a new generation of researchers who have not experienced conflict in mixed-methods work, and (4) through the appropriation of GIS concepts and practices by non-geographers. Francis Harvey adds that straddling the fence is often a dangerous act. Critical GIS, he argues, acts as a boundary object, marked by traces of interactions; as shifts in paradigm; and as an extension of the ''critical'' movement within geography.

Following the panellists' statements, the discussion in the room turned to different interpretations of ''critical,'' to the need for a continued discussion of a code of ethics in GIS use, to the efforts made in altering the software and the practices, to calls for hope and practical ways to move forward, and to the recognition that the (re-)demarcation of sub-fields actually serves to place faculty and graduate students in categorical boxes. In closing the panel session, Sheppard noted that he believes disagreement over the terms marking the sub-field of critical GIS is a healthy development, indicating the kind of reflective scholarship in which ''coming to an agreement would be coming to a dead end.''

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What's Critical about Critical GIS?

David O'Sullivan

Before discussing ''Critical GIS'' (CGIS), I must qualify my remarks by saying how ill equipped I feel to comment: my previous work in this area amounts to one review paper (O'Sullivan 2006). I am glad to have made even that contribution, but it is a flimsy basis for making pronouncements on the topic. One argument of my review is that most progress in CGIS has been made by communities that have fully engaged with GIS in a practical way. In that context, it seems at best ironic (and at worst hypocritical) for a mere sympathetic spectator to comment on the state of play.

Reservations aside (!), perhaps distance from the heart of CGIS grants me the freedom to ask the obvious question: What is critical GIS? An academic cliché, certainly, but also the most – yes – critical task. Taking the second ''word'' first, I assume that it is uncontroversial to argue that critically engaged GIS scholarship must encompass technologies such as mobile phones, sensor networks, Google Maps (and other online maps), digital earths, and virtual worlds.

However, the same might as easily be said of GIS in general, so that what we mean by ''critical'' remains central. I am no social theorist. I understand only that the usage originates in Western Marxist thought but has more recently come to signify something rather general, even vague: an intellectual stance, rather than anything very specific in terms of a theoretical perspective. Theoretical agnosticism has its uses, and a technology as diverse as GIS has become surely demands a wide range of approaches, but the term ''critical'' also suggests a politics reflecting those Marxist origins, and aligned with progressivism. If ''critical'' is to mean anything at all, then it is important to be clear and unapologetic about this. A broader version of this point has been made by Andrew Sayer (2007). In developing the argument more fully, Sayer suggests that ''[t]o say why anything warrants

critique we need some conception of well-being and ill-being'' (2008). This places ''critical'' social science in an awkward relationship with ''objective'' science, but it is surely correct, if being ''critical'' is not to become merely a synonym for being sceptical. This perspective has implications for those professing a ''critical'' position on GIS. CGIS is not only about analysing GIS technology and its effects in the world; it is also about changing the technologies and their effects for the better, in some sense beyond the technical. I have space only to briefly consider what this perspective means for the role of CGIS in geographical information science (GISci) and human geography (HG), in GIS education, and in the development of a professional ethics for GIS.

In spite of the success of CGIS as an academic niche somewhere at the intersection of HG and GISci, it would be a brave observer who claimed that CGIS has had much impact on either. CGIS may even let both larger enterprises off the hook. The labelling of GISci as ''science'' may be partly to blame, but CGIS bears some responsibility also. To label certain work ''critical'' is to imply that other work is ''uncritical,'' a dichotomy not conducive to productive exchanges. Yet all is not lost; the focus of much contemporary GISci on foundational issues such as ontology and semantics is surely fertile ground for renewed and enhanced engagement between CGIS and GISci. The relationship of CGIS with HG is more tenuous. Various ''digital geographies'' remain oddly divorced from CGIS (see, e.g., Graham 2003). Meanwhile, within CGIS there have been repeated calls for more work on the political economy of GIS (O'Sullivan 2006; Sheppard 2005; Chrisman 2005), but progress has been limited. There is also a paucity of work on the effects of GIS on society, particularly on social policy, where constructs such as ''spatial concentrations of poverty'' depend on GIS for their very existence. In short, there has been little work on how the adoption of GIS by corporations and governments concretely affects their actions.

These concerns bring me, finally, to two aspects of how CGIS might be expected to make a difference beyond the academy. Both relate to our role as educators. First, how can the insights of CGIS research be conveyed in the classroom? GIS courses are often perceived by both students and teachers as being primarily about developing marketable skills rather than critical insights, an attitude that may become more firmly embedded over time as GIS continues its advances in the workplace. In this setting there may be limited patience for nuanced understandings of the implications of GIS for society. The risk is that CGIS becomes just another week of lectures in an already crowded syllabus – just another perspective, when in fact its insights should inform the whole curriculum. At least one textbook points to an alternative approach (Schuurman 2004), and the commendably visible placement of ''GIS&T and Society'' in the UCGIS's ''body of knowledge'' (DiBiase and others 2007) is another encouraging sign. However, it is clear that sustained engagement with curriculum development in our own and other disciplines, and also with broader agenda-setting exercises, is necessary if CGIS is to really make a difference.

A second and closely related point is highlighted by the appearance in the ''body of knowledge'' of ''Ethical Aspects'' (DiBiase and others 2007). GIS is currently evolving into a profession, and university educators are central to that evolution. It is easy, from a ''critical'' perspective, to be dismissive of professional codes of ethics as merely instrumental – necessary garb for admission to the privileges of the professional world. However, that position is a dangerous and negligent one. Again, I return to the argument that the most progress has been made in CGIS by those who have engaged fully with the technology and its associated practices. With that lesson in mind, the development of educational curricula and professional codes of ethics is a task whose urgency equals or exceeds that of the development of inward-looking academic research agendas and ever more sophisticated critiques.

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Critical GIS and Its Positionality

Marianna Pavlovskaya

While there are different narratives and definitions of critical GIS, ''critical'' clearly implies questioning the status quo, whether dominant practices of knowledge production or dominant configurations of social power. It also implies going beyond critique by thinking about possibilities, creating new social imaginations, and producing hope in and desire for those imaginations. Critical GIS, then, is a field that conceives of how geospatial technologies can be used to counter scientific and social conservatism. It involves three often interrelated and overlapping strands of research.

The first of these strands is the critique of dominant practices of knowledge production aligned with GIS and other geospatial technologies, which includes an inquiry into the social history of GIS as well as thinking about its future (Pickles 1995; Kwan 2002; Sheppard 2005; St. Martin and Wing 2007). The second strand involves going beyond critique and using GIS and geospatial technologies in progressive social research that is often informed by critical human geography perspectives such

as social or environmental justice; gender, class, and race analysis; counter-mapping; and participatory action methodologies (Craig, Harris, and Weiner 2002; Elwood 2006a; Pavlovskaya 2002; Pavlovskaya and St. Martin 2007; Knigge and Cope 2006). It is this work that is turning GIS toward understanding and changing dominant configurations of social power and away from the corporate world, military interests, and applications designed to enhance surveillance and control. This work also makes GIS a practice invested with hope. Finally, critical GIS implies an approach to research that brings a post-positivist sensibility into the technical development of GIS itself (O'Sullivan 2004; Ahlqvist and others 2005). This work transforms the "box" itself, and, by doing so, it opens GIS to further interventions and uses within the many epistemological frameworks of human geography (e.g., ontology, semantics, interoperability, uncertainty, complexity theory, fuzzy logic, dynamic modelling, multimedia GIS, and visualization research). A GIS scholar working on problems of uncertainly told me 10 years ago that he was doing "postmodern GIS." It did not make much sense to me then, but it certainly does now.

Today, critical GIS is a unique combination of technology, knowledge, and social commitments. But until recently, few would have imagined critical geographers using GIS, or GIS scholars contributing to the post-structuralist rethinking of science and technology. Indeed, GIS and non-positivist discourses were long thought to be incompatible at all levels – ontological, epistemological, and methodological (see Table 1).

What developments have enabled these alternative understandings and deployments of GIS in the last decade? Academically, geography is now a theoretically plural discipline in which the partiality of knowledge has become an acceptable epistemological stance. In addition, there is an ongoing de-linking of epistemological positions from particular methodological approaches across the social sciences. In the past, "positivist" scientists argued that only quantitative methods (as a basis for measurement) were valid, while critical geographers argued that only qualitative reasoning and research methods could produce meaningful results. Yet today both quantitative and qualitative methods are practised across a variety of epistemological frameworks. This makes GIS, despite its initial association with quantitative and positivist traditions, of interest to researchers working within many different paradigms. Furthermore, and contrary to prevailing assumptions, mainstream GIS has relatively limited quantitative capabilities and is surprisingly compatible with non-quantitative analytical techniques, including ethnographies and other qualitative analytical methods common in critical geography (Pavlovskaya 2006).

The visual impact of GIS is arguably its most powerful non-quantitative functionality. While paper maps share this ability to persuade, the rhetorical power of GIS is significantly augmented by its association with science, technological progress, and an unprecedented problem-solving capacity. The recent advances in geovisualization, too, expand the opportunities for GIS-based qualitative reasoning. Perhaps most compelling to critical researchers is the ability of GIS to reveal and/or constitute alternative worlds by making them visible on the computer screen. GIS does not simply "visualize" data; it has an ontological power. It persuasively constitutes alternative ontological understandings of the world (not in a GIS sense, in this case, but in a social theoretical sense; see Schuurman 2006).

Despite this new-found affinity between critical geography and GIS, critical GIS scholars are still in an ambiguous position with respect to these two bodies of knowledge. Nadine Schuurman (2000) has described the 1990s incompatibility between discourses of GIScientists as the insiders and those of critical geographers writing about GIS as the outsiders. Since then, we have successfully forged a community of critical GIS scholars who both write about and use GIS technology (Schuurman and Pratt 2002). But another problem of position that concerns this rapidly growing community remains.

While we, as critical GIS scholars, think we are in both camps, others may see us in neither. That is, GIS practitioners see us as "outsiders," part of the critical human geography camp that they believe dismisses GIS altogether, while social theorists and critical human geographers position us as essentially within the GIS

Table 1. Incompatibility of "traditional" GIS and non-positivist discourses

	"Traditional" GIS	Non-positivist Discourses
Ontology	Objective world directly observed	Critical realist (social structures and mechanisms are not directly observed) Post-structuralist (reality is not meaningful outside discourse)
Epistemology	Knowledge is value-free Researcher is objective Data, facts, spatial patterns and distributions Generalization, hypothesis testing Scientific method	Knowledge is value-laden and partial Researcher is situated, reflexivity Voice of the subject Understanding social mechanisms and eliciting experiences Explanation of causal mechanisms
Methodology	Quantitative, data driven	Qualitative

camp – we may examine women's lives, for example, but we do so using the same ''spatial science,'' albeit via a more powerful technological device. While our work strives to bridge the epistemological divide, the two communities that it bridges, or at least their most established cores, remain divided and fail to see the possibility of moving beyond their division.

I find this situation especially problematic for graduate students and beginning assistant professors, who are increasingly interested in doing both GIS and social theory but find themselves subject to the epistemological differences of their faculty advisors or of the departments where they seek employment. Clearly, we still need to work toward a position for critical GIS and its practitioners that benefits fully from both social theoretical and geo-technological realms. This is especially important given how fruitful their juxtaposition has been and will be further on. Obviously, GIS can never replace the critical explanatory narrative (and there is no need for that), but it may enable new narratives, and in new ways. In fact, GIS is increasingly integrated into non-positivist research, not only as a visualization device but as a part of interactive and iterative research and multimedia methodologies (e.g., Knigge and Cope 2006). In this capacity, GIS helps to construct narratives similar to those of paper maps, but now in even more powerful and engaging ways.

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Is the Rubric ''Critical GIScience'' Effective? An Argument for Theoretical GIScience

Nadine Schuurman

I wish to issue an iconoclastic challenge to the term ''critical GIS'' and to those of us who fit under its rubric. The term implies (a) that there is something to be critical of (there is), and (b) that our raggedy band of critical GISers is somehow separate from the mainstream of GIS (which is also true). So far my argument is demonstrably weak, as everything the term implies appears to be true! But the question it raises is whether we wish to linger at the fringes of GIScience, cultivating epistemological critique, or whether we might be more effective – if less visible – as a more integrated cadre.

Perhaps an effective beginning to this train of thought would be to ask what critical GIS is – or, at least, what it is that critical GIS scholars do. A cursory examination of critical GIS papers from the past decade has helped to refine my understanding (Crampton 2003a; Elwood 2006b; Harvey and others 2005; Pavlovskaya 2006; Schuurman 2006; Sheppard 2005; Sui and Goodchild 2003). Critical GIScience constitutes theoretical assessments of geographic technology, information, and systems – and their intersection with society. It is an approach that draws on social theory, science and technology studies, and philosophy. Society is one linchpin that does differentiate critical GIS from theoretical GIS, as remarkably few papers outside the critical GIS realm engage with society at all. And in the beginning, we used the ''GIS and society'' rubric for these types of scholarly investigations (Harris and Weiner 1996, 1998; Sheppard 1995).

A few years ago, I conducted a detailed content analysis of GIScience papers in key journals and publications over an 11-year period (Schuurman 2006). One of the categories I used was ''GIS and society'', very broadly defined. GIS and society papers constituted 49 of 792 papers (6%) among the pre-eminent five journals in our discipline. Papers in this same specialized category in the Lecture Notes in Computer Science GIScience series numbered 2 of 222 (or less than 1%; Schuurman 2006). This remains a puzzle to me, because technology is useless outside of its social interactions (as Facebook, Twitter, and MySpace clearly demonstrate). GIScientists have almost completely ignored this facet of research. So really, there is a huge opening for critical GIS; but it may be that its label is wrong for the task.

For one thing, it is difficult to distinguish ''critical thinking'' from ''plain old thinking'' in academic life. There is a geography department in Canada that has prefixed the titles of many of its human geography courses with the term ''critical.'' On one hand, this is an effective signal that the department has taken up the epistemological gauntlet of postmodernism. On the other hand, it implies that the remaining ordinary courses in the department, and across the country, are not critical – which is plainly not the case. My informal poll also reveals that all academics consider themselves critical thinkers. In this instance, the prefix ''critical'' is self-cancelling, like an x on either side of a mathematical equation. My concern is that prefixing GIS with ''critical'' alienates us from those with whom we most wish to communicate.

If we went back to calling ourselves ''GIS and society,'' many problems would be solved – except that not all critical GIScience is about society. For instance, critical examinations of ontologies or algorithmic implications are not necessarily about society; they frequently concern the technology exclusively. An alternative is simply to label our scholarship ''theoretical GIScience.'' Biologists, mathematicians, and physicists have theoretical branches, and many important ideas have emerged from scientists who spent the majority of their time considering the issues and complications that arise as a result of current paradigms. Charles Darwin, for instance, while he

maintained a few collections after his return from the *Beagle*, spent much time sitting in his parlour and walking laps around his garden while thinking (Quammen 2006).

What would theoretical GIScience look like? Surprisingly like critical GIScience, though it has the potential to be a broader, more inclusive rubric. There are many among us who already work as theoretical thinkers in our discipline. Marianna Pavlovskaya has demonstrated, for instance, that there is a continuum between qualitative and quantitative research methods. The role of critical GIS in this analysis is to understand the technology as a product of dynamic social processes rather than as a static entity (Pavlovskaya 2006). Recently Rina Ghose (2007) has developed a sophisticated theorization of public participation GIS (PPGIS). She argues that while retrospective analyses of PPGIS report mixed and uneven outcomes, the reality is more complex. The very process of introducing PPGIS changes social and technological networks in ways that are difficult to measure and report. Jeremy Crampton (2003b) has thought critically (and theoretically) about cartography and its relationships to power. Gender is a much-ignored axis of power in GIScience; Mei-Po Kwan (1999, 2000, 2002) has a long record of trenchantly analysing the relationships of feminism and gender to GIScience. Francis Harvey was the first to posit the idea that boundary objects pervade our discussion of GIScience (Harvey and Chrisman 1998); certainly critical GIS is a classic boundary object. I do not argue that its ambivalent meanings would be stabilized if it were reconstituted as theoretical GIScience, only that it might then be a more widely recognized and acknowledged object.

Theoretical GIS – while certainly embracing critical GIS – might also encompass work that poses challenges to conventional spatial analysis, data organization, and ontologies in GIScience. I have a PhD student, Nathaniel Bell, who is working in health research, specifically injury and trauma. He was doing cluster analysis of injury events but suddenly realized that most cluster algorithms assume the possibility of a continuous distribution – injuries are binary; you either have a severe injury or you do not. He started to think about what type of representation and analysis would be more appropriate, and rediscovered the join-count statistic. He has since made an argument to bring back the join count in order to effectively measure the association of injuries with neighbourhoods (Bell, Schuurman, and Hameed 2008). This is critical thinking at the algorithmic level, but it also constitutes theoretical GIS.

I was privileged to be part of the wave of geographers who participated in making critical GIS a real presence. I pose this challenge to the mother ship at this time as an overture toward broadening the range and influence of our work.

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Three Recent Developments in Critical GIS

Mei-Po Kwan

Since the mid-1990s, critical GIS has witnessed considerable progress in several areas, especially public participation GIS (PPGIS). This work addresses issues such as the simultaneous empowering and marginalizing effect of GIS in local politics, and representations of multiple realities and local knowledge. By the early 2000s, the critical GIS research agenda had expanded to include new concerns. Among these recent developments, three have considerable potential to continue to make important contributions to the critical GIS research agenda. They pertain to the use of GIS in qualitative research, for articulating people's emotions and feelings, and as an artistic medium.

Traditionally, GIS has been understood by many as a tool for the storage and analysis of quantitative data. Attempts in recent years to redress this particular understanding of GIS, however, have opened up new possibilities for engaging GIS in qualitative geography. Many geographers have explored the role of GIS in qualitative research, through a wide variety of experimentations. In some studies, GIS-based data analysis, mapping, and visualization are used to complement or triangulate (i.e., verify using multiple data sources) the knowledge acquired through the qualitative component of the research. Attempts to go beyond the Cartesian framework of current GIS have led to the development of multimedia and Internet GIS, which seek to enhance the knowledge-production process in qualitative research by incorporating a wide variety of textual and non-textual (audio, photographic, video, and narrative) materials into GIS.

The latest developments in qualitative GIS are studies that develop distinct approaches to integrate GIS methods explicitly with particular qualitative approaches. LaDona Knigge and Meghan Cope (2006), for instance, describe a research strategy that integrates the analysis of qualitative and quantitative data through grounded theory and visualization – which they aptly call "grounded visualization." The approach developed by Stephen Matthews, James Detwiler, and Linda Burton (2005), which they call "geo-ethnography," seeks to integrate GIS and ethnography. Drawing upon the design and analytical capabilities of computer-aided qualitative data analysis software (CAQDAS), Mei-Po Kwan and Guoxiang Ding (2008) create qualitative data-analysis capabilities within current three-dimensional (3D) GIS for analysing narrative

materials, calling their approach ''geo-narrative.'' Explicit discussion of the qualitative approach adopted and the analytical process (including validation and verification procedures) used in these studies goes a long way toward establishing qualitative GIS as a distinct method in qualitative and mixed-methods research.

Inspired by the increasing attention to the importance of emotion in social life and knowledge production, another important recent development in critical GIS is the use of GIS as a medium for self-expression and for articulating people's emotional geographies. As I argue elsewhere (Kwan 2007), the emotional power of GIS images and visualizations can be used to tell stories about people's experiences and feelings. In a project that seeks to recover the post-9/11 experiences of Muslim women in the United States, I explore different ways of using 3D GIS images for articulating the subject's emotional geographies. One turns the subject's oral history into an expressive visual narrative based upon her personal movements, memories, and emotions (Kwan 2008). Another involves the creation of a collaborative 3D GIS video using moving images captured within an interactive 3D GIS environment. A central element in these articulations is a life path that traces the temporal sequence of events based on the subject's activities and trips in space-time. The path temporally organizes the subject's oral history and is colour-coded to reflect the level of fear and perceived danger she experienced. Both methods were created to tell stories about the subject's experience rather than to serve as an objective record of personal or social histories.

The third recent development in critical GIS is GIS art, which involves using GIS as a digital art medium to contest the objectifying vision in conventional GIS practices and to protest against social injustice and violence. Based on the notion of art as politics of resistance, I have explored GIS as an artistic medium for generating digital artwork using GIS software and data (Kwan 2007). Since GIS is not developed and designed for artistic work, my GIS art project is intended to challenge the understanding of GIS as scientific apparatus for producing objective knowledge or as instrument of domination. I seek to destabilize the fixed meanings of GIS that have precluded its use in novel and creative ways. Through my GIS art I also articulate my discontent with the use of GIS in wars and international conflicts that have resulted in large numbers of civilian casualties, and protest against the use of these technologies in applications that violate personal rights and privacy, including geo-demographic and surveillance applications.

These three recent developments in critical GIS suggest that the critical GIS movement has expanded considerably beyond its original focus since the mid-1990s. Recent publications by critical GIS researchers also appear in journals outside those targeted at the GIS and cartography community (e.g., *Gender, Place and Culture*; *Environment and Planning A*). Critical GIS work increasingly reaches wider audiences, and it is to be hoped that it will influence dominant understanding about GIS.

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CritGIS – A Paradigm for Fence Straddlers?

Francis Harvey

Allow me to start with a note about my intent in preparing these comments and thoughts for you readers as you read these lines. These summarized comments, revised after a lapse of time, may seem to stand more alone than they did in the dynamics and exchanges of the panellists and audience. Unavoidable as the differences in media make it, I still want these comments to continue in the vein of a critique that I took up at the panel. The spatial arrangement meant that I was the last speaker in a panel that proceeded from left to right. My comments accounted for being the ''tail'' of the panel, and I want to thank the moderator and other panellists for allowing me to take this position. The comments I contributed to the panel session were contextualized by other panellists' comments.

Many insightful comments and thoughtful interventions had been offered by the time my turn came to offer my contributions. As much as I would like to capture the resonances with my esteemed colleagues that I sought to develop, I believe these to lie in the performance of the panel. For this reason, my reflections here continue the theme I wished to take up then and now. These comments focus on speaking to a concern that in pursuing the ''opportunities'' of critical GIS, we actually may be undermining the character of the term, producing work that wears a patina of criticism but is utterly unproblematic and unengaged with substantial critical theoretical engagements of the twentieth century – the problems of fence straddling.

Part of the issue, as I see it, is that critical GIS is laden with meanings that allow a plurality of geography's sub-disciplines a place at the table. In this sense, critical GIS is a boundary object (Star and Ruhleder 1996; Harvey and Chrisman 1998). This boundary object is understood in many ways, even contradictory ways, by the people who invoke the term. Indeed, as with any boundary object, its great viability in the intellectual landscape of geography is that it allows people who differ in substantial ways to appeal to a common term and to be connected in a

Latourian actor-network, yet simultaneously retain differences. Journal submissions undergo trials of strength in the peer-review process, become boundary objects themselves after publication for different groups, and serve as key intellectual, immutable mobiles that support the human and non-human networks of critical GIS as well as of other endeavours (receiving tenure, merit evaluations, etc.).

Critical scholarship, broadly understood, has repeatedly drawn attention to the need to address erasures and silences in disciplinary practices. This is especially important for the boundary object ''critical GIS'': generational issues, disciplinary labels, other disciplinary objects, and disciplinary politics have great import for the development of critical GIS as it ranges from activism to criticism and to intellectual hybridism (Michael F. Goodchild, quoted in Schuurman 1999b). Goodchild's admonition to fence-straddle seems, practically, to mean multiple engagements, intellectual commitments, and, somehow, a connection to GIS. But the world is changing, and there has been surprising silence on newer developments, as well as on the increasing penetration of surveillance into our lives.

Take for example the many responses to the phenomena of neo-geography that point to interesting processes of disciplinary engagement. But where is neo-geography at an AAG meeting? Does the label ''palaeo-geography'' – somewhat snide, but used with tongue in cheek – mean that GIS is for dinosaurs? Intellectually, beyond volunteer geography (Goodchild 2007), industry seems to have realized the opportunities and found a productive amelioration of two approaches, thanks to the simple economic facts arising out of GIS's worldwide economic base. Do similar economic issues offer an explanation for the limited engagement with surveillance?

These issues are important. However, the main point I wish to make about ''critical'' GIS can be made with a question: If we make the claim to critical GIS, does that mean we also need to ask how Eurocentric habits and praxis, such as reading from left to right, affect the creation and use of geographic information and maps? I hold, further, that other proponents of this paradigm need to reflect and ask other questions. Should we ask why most neo-geographers seem to have no issues with adopting the word ''map'' in many of their products? Should we ask why we even call onscreen displays of geographic information ''maps,'' when the medium makes the display fundamentally transitory and liminal compared to the material and manifest character of the traditional paper map? If ''critical'' just means ''clever,'' as another panellist quipped, does not the label ''critical GIS,'' which could be branded with the marketer's neologism ''critGIS,'' designate fence straddlers, or safe zones between tribal disciplinary politics, ideological altruism, and careerism? Is critGIS merely a minor chord of what Nicholas Blomley (2006) has labelled ''uncritical critical Geography''? Although a growing body of critical scholarship is impressive, some key markers of sceptical engagement with critical theory, Frankfurter School work, post-colonialist scholarship, and science and technology studies literature still seem to be lacking, and fence straddling dominates (Goodchild, quoted in Schuurman 1999b) rather than intervention in and pursuit of an archaeology of geography and cartography. Indeed, as I reflect on the issue, I think a question we need to raise about critGIS is how critical geographers – Pyotr Alexeyevich Kropotkin and William Bunge come to mind – are relevant and substantive theoretical thinkers for this paradigm. Can fence-straddling critGIS take on these issues, or, maybe in addition to critical GIS, is an anarchist GIS needed to engage with the political praxis of GIS and come full circle (Chrisman 2005)? In this vein, I conclude, as I did during the panel, with the observation that in spite of the centrality of institutions for GIS, we have very few critical studies of how organizations develop and use GIS.

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Branding GIS: What's ''Critical''?

Eric Sheppard

Labelling intellectual (and other) communities is a process of naming that is both necessary and hazardous. Like place names or product branding, it functions to create a common identity that draws together affine members (e.g., ''England'') and to mark affinities with other communities (e.g., ''New England''). Yet labels have a habit of slipping the leash held by those who coin them, as a result of dynamics both within and between communities. As communities internally differentiate, debates and disagreements often entail discussions of what the label means, who gets to define it, and whom it excludes. Successful intellectual communities find that their labels gain value, and thus they may be challenged or appropriated by others. Beyond this, power matters. As discourse theorists remind us, the labels mobilized by powerful social groups seem to stabilize, whereas those mobilized by less powerful groups are continually subject to question. For example, the shifts between ''negro,'' ''African-American,'' and ''Black'' as labels for people of African heritage in the United States, and between ''underdeveloped,'' ''developing,'' ''Third World,'' and ''(global) South'' as labels for impoverished and formerly colonized parts of the world, reflect how any label, even

when chosen to empower a marginalized group, can take on pejorative connotations stemming from those in power.

In light of this, we can actually welcome the debates around what counts as ''critical'' GIS, as in the preceding essays, as a sign that the community it seeks to label is vibrant. For example, the community labelling itself as ''critical'' human geography has been so influential within Anglophone geography that its appropriation of this label has been challenged. Such critiques of ''critical'' have stemmed both from within, from those who would prefer the blunter adjective ''radical,'' and from without, along the very lines sketched above by David O'Sullivan and Nadine Schuurman (Blomley 2006, 2007, 2008; Castree 2000; Moss, Berg, and Desbiens 2001). For the intellectual community formerly known as ''GIS and society,'' the term ''critical'' was chosen by certain individuals (*mea culpa*) as a re-branding strategy that would shape this community in ways that connect it with critical human geography and with the German Frankfurt School tradition of (post-)Marxist ''critical'' social theory from which critical human geographers had themselves appropriated the label (Sheppard 2005).

Yet these debates are simultaneously a sign of weakness. There is little debate, for example, about what ''science'' means in the GIScience community (Goodchild 1992). ''Science'' stabilizes its meaning as identical with ''natural'' (i.e., ''positivist'') science, a taken-for-granted project of knowledge production that has assumed the highest status in contemporary society. To invoke GIScience is to seek to equate oneself with this status-laden project – notwithstanding both very different possible meanings of ''science'' (consider, for example, the German term *Wissenschaften*) and trenchant philosophical critiques of the adequacy of positivism as a method for objectively knowing the world. In light of such stabilization, critiques of this particular meaning of science within GIScience (e.g., Pickles 1997) gain little traction. By contrast, we continue to be insecure about what ''critical'' means and whether is it the right label.

And rightly so! As I have discussed elsewhere (Sheppard 2005), being critical (in any of its meanings) must always include being *self*-critical (reflexive). Powerful intellectual communities run the danger of complacency, inculcating themselves with stabilized identities that both prevent thinking that ranges outside their particular epistemological box and also undermine their capacity or inclination for critical reflexivity. This has been the case for rigorous scholarship that lies outside the demesne claimed by ''critical'' social science (e.g., positivist social and environmental research), but it may also be the case for ''critical'' human geography – whose quasi-hegemonic status within the Anglophone discipline can easily lead to complacency. On the one hand, this means revisiting the labels we have chosen, altering their meaning, and the label itself, as necessary. On the other hand, it means being willing to engage in the kind of mutual critical engagement across different communities advocated by, for example, Helen Longino (2002). As Longino argues, there are no foolproof methods of knowledge production. All epistemologies are local, developed to work in particular contexts, from which it follows that our best defence against error and narrow-mindedness is being willing to make room for all approaches and being open to external as well as internal critique. This is why I wrote that ''for critical GIS to maintain its critical edge, it will be necessary for its practitioners to challenge their own emergent shared presuppositions'' (Sheppard 2005, 17).

Thus, I welcome debates about critical GIS, such as those here, that seem far from any resolution: I see them as symptomatic of a vibrancy and reflexivity that is essential to rigorous knowledge production. They help keep at bay the ''boxing off'' that David O'Sullivan and Marianna Pavlovskaya point to as a potential problem, and they help keep us open to connecting with fascinating related scholarship in ''non-critical'' GIS, such as that interrogating ethnographic spatial ontologies and neo-geography.

Yet, while it is vital that we remain reflexive and that we practice engaged pluralism with the broader GIS community, we should neither expect nor hope that such engagement will result in consensus through which distinctions no longer matter. Mutual critical engagement rarely should devolve to a consensus (nor should it be a relativist prescription for letting a thousand flowers bloom). Consensus is too often achieved at the cost of less powerful voices' acceding to being silenced, and ''critical'' GIS is hardly a force to be reckoned with in the GIS community. (Thus I worry that its relabelling as ''theoretical GIS,'' advocated by Schuurman, may backfire, because the already extant, stabilized meaning of ''theoretical'' GIS outside the ''critical GIS'' community will be immune to the attractive reframing that she proposes.) Whatever we call ourselves, we should remain true to the varied post-positivist epistemological commitments and emancipatory ethical/political commitments that have characterized ''GIS and society'' and ''critical GIS'' (commitments identified by the various authors above). Since geographic information technologies, whose development is tendentiously biased toward powerful vested interests and places, too often underwrite violence and surveillance directed at others, these commitments will be central to activist scholarship promoting equality of possibility in an increasingly geo-technological world.

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