Guest editorial

Doing qualitative research using GIS: an oxymoronic endeavor?

Geographical information systems (GIS) have been largely understood as a tool for the storage and analysis of quantitative data since the early days of their development. It seems 'natural' to consider a tool implemented through computing technology as a means for handling quantitative data—because what the computer can process is 'digital' by nature and digital is often taken to mean 'numerical'. This understanding of GIS has underpinned much of the critical discourse on GIS in the 1990s, in which both GIS critics and researchers considered GIS mainly as an apparatus for positivist/ empiricist science or quantitative methods (for example, Openshaw, 1991). This debate led to an understanding of geographical methods that places GIS at one pole of a series of binaries—positivist/quantitative/GIS methods versus critical/qualitative methods, and GIS/spatial analysis versus social/critical geographies (Kwan, 2004).

There have been attempts in recent years to redress this particular understanding of GIS and to conceive other possibilities of using GIS in geographic research. For instance, Eric Sheppard (2001) argues that GIS practices are not necessarily quantitative, empiricist, or positivist because GIS can handle other types of information (photographs, videos, or narratives) and "can incorporate situated knowledge and ethnographic material" (page 547). Mei-Po Kwan (2002a; 2002b) extends these arguments to address issues raised specifically by feminist critiques of science and vision. Drawing upon diverse sources including feminist theories of the body, subjectivity, art, and visual methodologies, she suggests that GIS users or researchers can engage in reenvisioning GIS as a critical practice that is congenial to feminist epistemologies and politics. Both authors have conceived alternative GIS practices for understanding people's lived experiences in an interpretive manner rather than for conducting spatial analysis that relies largely on quantitative geographical information.

An important development in this direction is the emergence of studies that explore the possibility of using GIS in qualitative research (for example, Cieri, 2003; Ding and Kwan, 2004; Nightingale, 2003; Pavlovskaya, 2002; 2004). However, to date there has been no systematic treatment or collection of articles for researchers to draw upon as a resource on issues pertinent to the use of GIS in qualitative research. We hope to fill this gap through the papers in this theme issue. All of the contributors originally presented their papers in organized sessions on "Qualitative Research and GIS" at recent annual meetings of the Association of American Geographers, in which they were asked to address the broader epistemological and theoretical questions associated with the use of GIS in qualitative research, on the basis of their own experiences.

The first paper by Marianna Pavlovskaya (2006) provides an insightful discussion of theoretical issues related to the distinction between qualitative and quantitative methods. She explores the potential of using GIS in qualitative research through interrogating the conventional association of GIS with quantitative methods. Critically examining the construction of the opposition between quantitative and qualitative methods in geography and the process of delinking of epistemologies and methods that has occurred in the last decade, she argues that GIS are often not as quantitative as many geographers assume. Through revisiting the relationship between GIS and computer science, spatial analysis, data representation, visualization, database management, mathematical modeling, and statistics, Pavlovskaya suggests that there

are 'openings' in GIS that can enable qualitative researchers to engage with, and transform, GIS. She suggests that GIS has considerable potential to help theorize social phenomena by incorporating the spatiality of social processes.

The remaining three papers examine the use of GIS in community development and planning projects, with substantive foci on community gardens, children's perceptions of their communities, and community safety. LaDona Knigge and Meghan Cope (2006) propose a research strategy that integrates the analysis of qualitative and quantitative data through grounded theory and visualization. They argue that the key to this development lies in a recursive and iterative integration of different processes of data collection and analysis. They suggest that researchers can identify emerging themes, raise new questions, and build theories through these processes by using a variety of methods—such as collecting different forms of data, interviewing, participant observation, coding field notes and meeting transcripts, identifying themes, and mapping. They identify four similarities between grounded theory and visualization: both are exploratory, involve iterative processes, are attentive to the particular and the general, and can accommodate multiple views of the world. They illustrate the potential value of this strategy, dubbed grounded visualization, with a study of community gardens in Buffalo, NY. Their study shows that the researcher might have missed the existence of community gardens by using only quantitative data, whereas a wholly ethnographic study might have missed potential correlation and clusters that were best analyzed through GIS. Grounded visualization, as Knigge and Cope conclude, can help shed new light into the complexities of the social world.

Samuel Dennis (2006) uses mental mapping and photos as qualitative methods for studying the issues associated with the attempt to incorporate young people's qualitative appraisals of their environment into a community planning GIS. He focuses on a planning project in the South Allison Hill community of Harrisburg, PA, whose goal was to help youth develop a sense that the community values their contributions and considers them important members of the community through their participation in the planning process. Local youth collected qualitative data about their neighborhood using a variety of techniques: producing a poster using a collage of magazine pictures and their own drawings and words, completing journals recording perceptions and appraisals of their neighborhood, and taking photographs about specific places in their neighborhood. The study shows that capturing and incorporating such qualitative data into community GIS can provide important information that otherwise would be excluded from the planning process. The use of qualitative data often led to very different conclusions about how to improve communities for children's well-being than those suggested by quantitative measures alone. But the real challenge, as Dennis cautions, is to incorporate materials that are difficult to handle for a GIS (for example, nonspatial qualitative data) in a way that avoids decontextualization of qualitative data once incorporated into a GIS. This caveat resonates with a similar concern of many researchers in participatory GIS (for example, Harris et al, 1995; Rundstrom, 1995).

Rachel Pain, Robert MacFarlane, Keith Turner, and Sally Gill (2006) examine issues pertaining to the use of streetlighting as a means for improving community safety and reducing fear of crime. Their study explores the complex relationships among police-recorded crime data, streetlighting density, and people's perception and fear of crime in Northumberland, northeast England. Unlike studies that combine GIS and qualitative methods, their study separates the GIS phase from the qualitative phase of the research, in order to avoid influencing people's responses with a particular GIS representation of the area in advance. GIS was first used to map crime data hotspots and the location of street lights. Information about local residents'

perceptions of safety and crime was then collected through qualitative rapid appraisal techniques. These qualitative data were finally used to interpret the hotspot maps of crime created by GIS. Pain et al find that people's perceptions of high crime areas is often localized, and not reflected in official crime data or the crime maps created by GIS. They tend to place little weight on the effect of streetlighting on the problems of crime and on their fear of crime. This demonstrates the importance of qualifying the outputs of GIS mapping in critical policy research, through qualitative analysis of people's experiences. The use of this dual methodology, as Pain et al show, also has considerable potential to render the processes of research, planning, and policymaking more inclusive of local communities.

Several themes run through the papers in this theme issue. First, quantitative data or methods seldom suffice to reveal what people perceive or experience in their everyday lives. Collecting and using pertinent qualitative information is an essential component of any community development and planning projects seeking to include particularly the perspectives of children, young people, and other members of marginalized groups, who are too often excluded in the traditional planning process. Second, they show that GIS not only is suitable for quantitative analysis, but also has potential for use as a critical visual method for representing the spatiality of social processes, for facilitating critical thinking throughout the entire research process, and for building theory that is grounded in both quantitative and qualitative data. Using GIS as a qualitative method or incorporating qualitative information into GIS is fraught with difficulties, however. A primary challenge facing future research will be to determine how and to what extent these difficulties can be overcome.

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