EDITORIAL

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Geographic information systems have evolved and grown over the past three decades, and now represent a major application area of computer technology. Their users solve problems, schedule activities, analyze data, and test hypotheses in settings that range from universities to government agencies and consulting companies. To the vast majority of them, the term "critical" suggests "due by close of business", and the constant pressure that conflicting needs place on the modern workplace. It might surprise them to learn that a small community of scholars is able to find the time to reflect on the broader implications of GIS by "theorizing GIS", and that the critiques they develop are thought by some to deserve serious attention. If they are, why are they hidden away on the shelves of research libraries, in little-read books and journals? Why are they constructed in language that is frequently inaccessible to a broad audience? Why are they not prominent at user conferences, in trade magazines, and in the training programs offered by GIS software vendors? As Lobley writes (Lobley, 1999), "It's all about money, stupid...(academic research and government) have made almost no contribution to the evolution of GIS...the mainspring of everything important that has happened in GIS is business and the profit motive."

I suspect everyone would agree that the world would be a better place if people thought more deeply about what they did, and certainly the encouragement of that habit is a compelling objective of education. Nadine Schuurman has written a *tour de force* that demonstrates how it is possible to think deeply about the use of GIS, and in a way that is readily accessible not only to critical theorists but to GIS practitioners. Too often critique has started from naïve assumptions, and has sheltered itself within the arcane language of specialists. Here finally is a major work that avoids both of these obvious traps.

It is a measure of GIS's inherent neutrality that it is evidently useful in so many different paradigms. Scientists use it to perform precise manipulations on data, exposing anomalies and patterns that would not otherwise be apparent. Data are assumed to be compatible with the ideals of scientific measurement -- their accuracy is measured by comparing them to their real counterparts, through the use of more accurate instruments. The operations performed in a GIS are assumed to be transparent to the user, and the term "black box" is perjorative, implying that the investigator is not fully aware of the operations being performed. GIS software is programmed to perform hypothesis tests in the best traditions of rigorous statistical thinking.

But in the next building or across the street, the same GIS may be used by a non-governmental organization as a tool for public persuasion. Here the colors used in maps generated with the GIS are vitally important, whereas they were strictly neutral to the

scientist. It can make all the difference to the outcome of a court case that red was used to symbolize old growth forest, rather than green, or that topography was shown with a vertical exaggeration of 10, rather than 2. GIS is both a neutral tool of dispassionate analysis, and a tool of public persuasion. It can be both a repository of an objective, shared consensus, and a repository of subjective opinion, depending on the context and purposes of its use. As many people have argued, the outcome of GIS use is not defined by the technology, which is inherently neutral, but by social context.

Recently a third paradigm has muddied the waters even more thoroughly. Humans work and communicate in a vague world, in which terms attain meaning through context, gesture, and intonation. "Vancouver" has many meanings, depending on the word's setting in a sentence, on the way it is said, and on the location of the speaker and listener. The digital world on the other hand is deliberately precise, and successful in part because it is capable of copying, transmitting, storing, and retrieving information perfectly. Speech recorded in digital form loses the power of gesture, and scenes recorded as images in digital form lose context. The driving directions generated by a computer have none of the redundancy that is vital in resolving ambiguities when humans give each other directions -- for example, "if you get to the church you'll know you've missed the turn." In short, computers are poor at many everyday tasks that humans execute in their customary vague world.

Some of the unintended consequences of the new digital world stem from this favoring of the precise over the vague. Undoubtedly there are occasions when every GIS user wishes the real world were as precise and straightforward as the virtual world, as easily manipulated, and readily stored away out of sight -- motivations that also drive interest in electronic games. GIS vendors have clearly been unwilling to implement functions that deal with uncertainty and vagueness, citing lack of interest on the part of their customers. Impatient demands for a single answer often drive GIS users to ignore subtleties and ambiguities.

For all of these reasons it is important that we theorize about GIS, by reflecting on the implications of its use, and by understanding the importance of its social context. But theorizing that is not communicated is idle theorizing, whether because it is buried in obscure publications, or stated in inaccessible language, or just plain dull. Nadine Schuurman's work is accessible and exciting, and I hope that this publication will as a result not lapse into obscurity, but be widely read and cited.