

AFTERWORD: AND NOW TO BED

Michael F. Goodchild, University of California, Santa Barbara

Scholarly writing is notorious for its pedantry, for using words of five syllables like *methodology* or *terminology* when shorter words like *method* or *term* would do, and for devoting entire volumes to abstract questions not far removed from “How many angels could dance on the head of a pin?” It is said that the typical academic paper, published after long and exhaustive review in the pages of an expensive journal, is eventually read by no more than a handful of people, including the editor and reviewers. Academic writing has evolved its own dry style that is stripped of the kinds of devices used by lecturers to keep students awake – wit, hyperbole, graphics – resulting in what may well be the ultimate soporific.

Occasionally, however, academics allow themselves the luxury of writing – and reading – work that is brief, sparkling, and entertaining. We often think of such luxuries as associated with particular locations, such as the beach, the armchair, or the bed. We may well learn more from the wide range of ideas in a good, well edited *New Yorker* article than from an entire volume of our favorite learned journal, and may find the entertaining style of Eric Newby, Paul Theroux, or Bruce Chatwin far more insightful in what it reveals about the geography of remote parts of the world than any amount of more scholarly writing. What geographer has not enjoyed Dava Sobel’s account of the measurement of longitude, or Simon Winchester’s books on geologic mapping, Krakatoa, or the Yangtse? My own current light reading includes *Mapping Hacks: Tips and Tools for Electronic Cartography*, a book that contains not a single reference to the academic cartographic literature.

How interesting, then, to be asked to write an afterword to an entire book of short, entertaining pieces on matters of fundamental significance to anyone interested in geography or geographic information systems. All of them are stimulating, raising important questions in a style that is designed to invite rather than close off further thinking. Some reflect our deepest, darkest concerns: “Have I picked a field of interest that is fashionable today, but destined for the intellectual wastebasket in a few years; or will I be feted twenty years from now as the leader who saw the potential of a new kind of science?” Others catch the excitement of the day over such new developments as Digital Earth or location-based services.

Academics write such things at their peril, of course, and the articles that have been assembled in this volume are beyond the academic pale – unrefereed, short, and without the credentials necessary to count for tenure, promotion, or honors. It is only a few years since a certain popularizer of science whose name is known to millions was rejected for membership by a floor vote of the National Academy of Sciences, despite having a sterling academic reputation. We live in an academic world in which terms like useful and popular are sometimes so unusual as to seem at times perjorative. So we should recognize that the pieces in this book were not written in the interests of career

advancement, financial reward, or academic reputation but because the authors felt that their subjects needed airing before a wide audience that shared their interest. We forget how much of intellectual life is driven by such altruism – why else would an academic abandon home and family to spend tens of hours crammed into the economy section of an airplane in order to attend a conference half a world away?

The pieces in the book are written by North Americans, and they make most sense to a North American audience. In other parts of the world geography is a very different discipline – in the UK, for example, it is one of the most popular high-school subjects, although no longer compulsory, and a strong geography program such as that at the University of Leeds can expect six or more applicants for every one of the 200 places it offers annually in its undergraduate program. Geography in the US is a comparatively small, anxious discipline that must continually fight for students, most of whom will have arrived on campus with almost no awareness that the discipline even exists. No wonder, then, that North American academics can write about GIS saving geography.

But why, at the end of the day, should anyone write about the relationship between a software package and a discipline? It must seem very odd to historians or ecologists that geographers write so much about GIS, and odd that anyone would devote an entire book to “geospatial matters”, or think that a fairly straightforward computer application could spawn an entire new discipline of geographic information science. I can’t imagine anyone writing about Microsoft Word saving the Modern Language Association, or asking whether Microsoft Excel can prevent war, though some fairly profound things have been said about Microsoft PowerPoint by the likes of Edward Tufte. GIS and geospatial tools are certainly complex, and building them is a challenge, but weren’t the problems essentially solved many years ago, in the early days of GIS and remote sensing? Before you put the book back on the bedside table and turn out the light let me make two suggestions.

First, geography in the US is a small, weak discipline, yet one with a clear view of its potential significance as a field that straddles and links the social and environmental sciences, and as a field with a claim to know more than any other discipline about the nature and importance of space. But this is a vast territory, and a very significant slice of the intellectual pie. Covering it would require, as Richard Atkinson once pointed out when he was President of the University of California, a department far larger than departments are expected to be, and a share of the university’s resources far larger than any department is allowed to have – it would require a victory in the interdepartmental wars that would be more overwhelming than Henry V’s at Agincourt or Washington’s at Yorktown. In this context GIS provides a way of extending and enlarging geography’s role, of delivering spatial perspectives and tools across the academic landscape to an extent that far exceeds the capacity of geography itself. GIS is the academic mouse that roared.

Second, spatial really is special, and far more significant than the conceptual basis of Word or Excel. Luc Anselin was perhaps the first to point out that spatial is special in two distinct and significant ways. What he called spatial heterogeneity, or the fact that the

Earth's surface exhibits what a statistician would call non-stationarity, flies in the face of a scientific tradition that insists that no result is useful unless it applies everywhere at all times. Geographers have struggled to find laws of geography that could rank with Newton's Laws of Motion, and have largely abandoned the search. But does this mean that geography can never rank with physics as a respected discipline, because it cannot find anything to say about the Earth's surface that is similarly general? No, in this context the recent growth of interest in GIS reflects a fundamental departure, towards a new kind of scientific thinking in which the variation of things from place to place is of primary importance, and in which computers operating on massive amounts of data provide the only way to extract useful results. An entire artillery of new methods of spatial analysis has been developed in the past decade or so under such headings as *place-based* or *local* analysis, and these methods are inseparable from the GISs that make them practical.

Anselin's second characteristic was spatial dependence, and here again we find that trying to apply traditional scientific thinking to space is fraught. The methods of inferential statistics developed by R.A. Fisher and others were based on controlled experiments, such as fields planted with different crops, where it is reasonable to assume that each sample in the experiment is essentially independent of each other sample. But Tobler's First Law states that exactly the opposite is normally the case in space; that the assumption of independence is untenable. Again what appears to be no more than a simple tool for analyzing maps turns out to represent a profound departure from the traditional ways we humans have approached scientific questions.

So GIS really is transformative, in the sense that that term is used in discussions of science policy, and the pieces in this book are a brief but illuminating set of variations on that basic theme. Whether this point will leave you contentedly reassured that you made the right choice in pursuing geography and GIS, and send you blissfully to sleep, or whether it will keep you awake, tossing and turning and cursing the hand that wrote it, only time will tell.