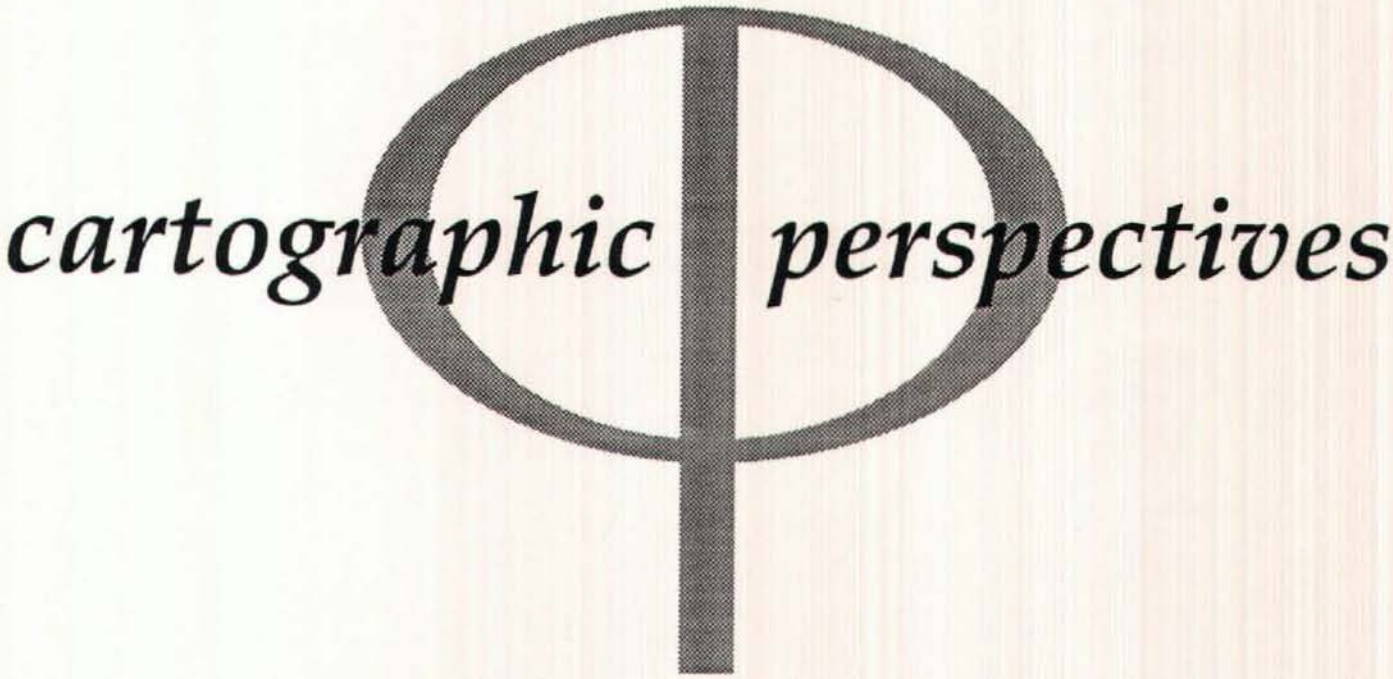

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in this issue

cartographic perspectives on the news

CITIZENS MAP POLITICAL DISTRICTS IN MICHIGAN

Common Cause in Michigan is sponsoring a contest to encourage public participation in the highly politicized decennial remapping of State House and Senate seats. For $25, citizens receive a kit containing 1980 district maps and 1990 census population data by county, city, township and selected census tracts. The Michigan State Chamber of Commerce has donated two $1,000 prizes for Senate and House redistricting plans that best satisfy Common Cause's reapportionment criteria.

Consistent with Common Cause's goal to "demonstrate how election lines can be redrawn without political interference," the contest kit does not include data on party affiliation or historical voting trends. In fact, contest participants are required to sign a statement affirming that they "have not used political data" to inform their maps.

The four-member Common Cause board of directors will serve as judges. Entries will be judged on five criteria: the contiguity of proposed districts, minimization of population disparity among

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districts, creation of districts in which historically disenfranchised minority groups form a majority (in compliance with 1982 amendments to the Voting Rights Act), concordance with existing county, municipal and township boundaries, and compactness of districts.

The redistricting process is based on the official results of the 1990 census, though that count is estimated to have missed as much as 2 percent of the population. Citizens of urban minority groups in southeastern Michigan are thought to be disproportionately undercounted. The Democratic Party will likely attempt to adopt the unofficial corrected census for redistricting purposes if a pending California court case provides an adequate precedent.

Michigan's bicameral state legislature is dominated by the Democratic Party in the House and the Republican Party in the Senate. As of August, both parties had released criteria for their redistricting proposals. Because traditionally Republican districts have generally gained population at the expense of Democratic districts, "politically neutral" criteria like Common Cause's tend to favor Republican candidates. So while the announced Republican criteria are very similar to those adopted by Common Cause, the Democratic Party's criteria allow for greater population disparity among districts (16.4 percent instead of 10 percent) and more frequent deviations from existing jurisdictional boundaries.

As of the August 27 contest closing date, Common Cause Executive Director Karen Merrill reports that 30 contest kits have been sold, with nine Senate plans and one House plan received. Considering the difficulty of the remapping puzzle, Merrill is pleased with the response. While neither political party has released its district map proposal, the Democrats have challenged the Republicans to agree on a compromise plan by January 2, 1992. "If," as Merrill expects, "the legislature is unable to agree on a plan and everything gets tied up in the courts, that might be the time" to introduce the winning contest maps to the public debate.

$14.6 MILLION GRANT FOR GRAPHICS AND VISUALIZATION

What have come to be known as the Gang of Five — Brown, Cal Tech, Cornell, University of Utah and University of North Carolina — have received funding of $14.6 million from the National Science Foundation and DARPA to establish the National Science and Technology Center for Computer Graphics and Scientific Visualization. No separate facility will be established. The Center is administered by the University of Utah. Each school receives $500,000 per year for the next five years, with the possibility of extension for five more years.

"It's really not very much money," says Andries van Dam of Brown University, "when you consider that it costs us $35,000 for a graduate student." John Hughes, also at Brown, points out, however, that as a result of the funding, several U.S. hardware manufacturers have granted equipment credits to the schools.

"This has allowed us to hire more research assistants and buy some peripheral equipment that until now we haven't been able to afford," says Hughes.

When the Center is fully operational, the five schools plan to have online access to one another's file systems through some kind of Andrew File System (AFS) network. How best to disseminate information about work going on at the Center to people outside the five schools has not yet been determined. "At the moment," according to Hughes, "we think it should be electronic."

Pixel 2:2, July/August 1991

UTAH FLIPS FOR FRENCH

An eight-page spread in the French magazine *LeFigaro* included glowing accounts, pictures of breathtaking scenery and a map that turned the Beehive State upside down [sic] and placed Idaho and Wyoming within its borders.

Depending on how you look at it, the map shows one Utah valley floating in the Great Salt Lake not far from the Arizona border. Wyoming is a stone's throw from Ogden, Utah, and Idaho appears to be the State's northernmost community.

The response from state tourism officials? C'est la vie.

The Associated Press, July 22, 1991

featured article

Ethics and Map Design

Six Strategies for Confronting the Traditional One-Map Solution

Mark Monmonier

Traditional, positivist approaches to map design usually yield a single map. These one-map solutions foster a highly selective, authored view reflecting consciously manipulative or ill-conceived design decisions about many factors, such as map scale, geographic scope, feature content, map title, classification of data, and the crispness or fuzziness of symbols representing uncertain features. As a result, the rightfully skeptical map viewer ought to question whether (a) an ulterior motive led to a biased view of reality favoring the author's philosophical or political biases or economic goals, or (b) a lazy map author failed to explore designs offering a more coherent or complete picture of reality. Technology has aggravated the problem of one-map solutions by placing powerful mapping software at the disposal of amateur cartographers who can generate convincing-looking graphics with little or no understanding of their data or the principles of mapping. And technology also allows devious map makers to perfect designs that support their points. But technology can also foster greater openness and more complete understanding of maps and their meaning, and thereby provide a more ethical approach to cartographic analysis and communication. After discussing the problem of single cartographic views, I present six strategies for a more open and overtly critical cartography in which one-map solutions are both rare and suspect.

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This essay is about maps, technology, and ethics. I bring technology into the discussion because it is largely as a result of electronic technology that the map maker's capacity both to discover **and** to confuse the truth has changed.

Discussions of ethics not uncommonly attack something: a group, a principle, or a lack of principle. Well, here I attack what I call the one-map solution. Were it not so widely pervasive and so historically entrenched, I could perhaps call it the one-map paradigm.

I think you know what I mean. Our traditional, positivist approach to map design usually yields a single map. At least that's what we pretend to optimize, and that's what we give the viewer in almost all cases. These one-map solutions foster a highly selective, authored view perhaps reflecting consciously manipulative or ill-conceived design decisions about map scale, geographic scope, feature content, map title, classification of data, and the crispness or fuzziness of symbols representing uncertain features. But even if we are conscientious, even if we know our data inside and out, and even if we both know the creed of Bertin and Robinson and are aware of our own biases, the decision to present a **single** cartographic viewpoint can be a decision fraught with important ethical overtones.

Until recently, a variety of economic considerations justified the one-map solution. Maps were expensive to make and space for maps was scarce. We needed to generalize and summarize, to make hard choices about content and symbolization, and to be precise and parsimonious. And because space for words was also scarce, we told the reader little if anything about what how we arrived at these decisions.

The situation is different now, or quickly becoming so. By encouraging rapid interactive graphic displays, the compact storage of massive amounts of information, and new approaches to scholarly publication, electronic technology can easily change the ground rules of map authorship and the use of graphics in scholarly discourse. Although we still

need parsimony and we still need to generalize and summarize, we will need to present our summaries as summaries **of something,** rather than as essential geographic truths or facts requiring no further exploration. In some cases, moreover, the cartographic summary might even be an index or menu designed to entice the viewer to a fuller understanding of the mapped phenomena.

Resolving the ethical problem of one-map solutions is not simple and calls for several remedies. Let's look at a few of them.

1

My first strategy is to give the viewer a dynamic sequence of different maps presenting a range of both plausible and extreme cartographic views. Fraser Taylor (1982) first called our attention to the value of graphic sequences in an essay on choropleth maps revealed to the viewer in steps. This was a serendipitous way of using to advantage the slow reconstruction of a classed choropleth map transmitted through the Telidon videotex network. More recently, Terry Slocum and his colleagues (Slocum, Robeson, and Egbert 1990) have explored and refined Taylor's notion of the sequenced choropleth map.

My strategy for dynamic cartography goes a step beyond that of Taylor and Slocum, and I call it Atlas Touring (Monmonier 1989). Atlas Touring might involve not one but several types of map, and not just maps but statistical diagrams and text blocks. The central concepts are the graphic phrase and the graphic script. A *graphic phrase* is a computer-generated sequence of focused graphics tailored to the data and intended to explore a distribution, a spatial trend, a spatial-temporal series, or a bivariate relationship. A *graphic script* is a longer, more comprehensive graphic sequence and might include several graphic phrases.

Citizen access to exploratory graphic analysis should be acknowledged in right-to-know and freedom-of-information legislation that includes electronic geographic databases.

Atlas Touring calls for a conceptual shift from single-map optimality to multiple-map complementarity. Because maps cannot tell the truth without some paradoxical lying, two or more complementary maps have the potential, at least, of lying less by telling more of the truth. And cartographic sequences have the added potential of placing the information in context and addressing its meaning.

However beneficial, powerful tools invite dangerous abuse. For instance, a computer-generated sequence of graphics can be a good way of selecting the one map that best proves the unscrupulous map author's point. And a carefully orchestrated sequence of persuasive graphics might easily assist cartographic propagandists seduce the uncritical minds of passive souls like Chauncey Gardiner, the simpleton hero who "liked to watch" in the classic Peter Sellers movie "Being There" (Kosinski 1971).

2

A useful antidote then is a second, essentially complementary strategy, namely, *experiential maps* available on inexpensive graphics workstations that allow readers, users, or viewers to explore the data freely. After all, a revealing sequence of maps and related graphics should whet the viewer's intellectual appetite for a more involved exploration of the data. Indeed, a graphic script could be useful as an animated introduction to a cartographic database, and graphic phrases are natural elements in a so-called toolbox for exploratory cartographic analysis. Thus the potential of electronic technology to encourage experiential cartography might usefully counter the possibly mind-numbing effects of cartographic videos. Of course, citizen access to exploratory graphic analysis should be acknowledged in right-to-know and freedom-of-information legislation that includes electronic geographic databases.

3

Third, cartography, geography, and other fields that employ maps might benefit from professional standards that call for providing alternative views and exploring the consequences of various design decisions. Although this recommendation might smack of self-serving professional-

ism, a code of cartographic ethics should at least make map authors more mindful of responsibilities to careful scholarship.

4

A fourth need is for a fuller disclosure of experiments with trial designs, including cartographic views that deny or fail to support the map author's position. This information can provide a useful understanding of the map author's thoroughness and conscious avoidance of bias. Although the more popular media will continue to eschew such academic baggage, our scholarly geographic journals could set an example and encourage their writers to share their map-analysis strategies with readers. Even though centrally printed journals might remain the prime mode of scholarly communication, the map author's cartographic footnotes (or even a transcript of his or her exploratory graphic analysis) might be appraised by an editorial panel and deposited with an electronic file server for distribution on demand over an electronic-mail network such as Bitnet (Lewis 1989).

5

A fifth need is for a conscious effort by map authors and cartographic educators to promote informed skepticism among map viewers. Maps must lie, but they can lie in different ways (Monmonier 1991). Map viewers ought to condition themselves to questioning whether an ulterior motive might have led to a biased view of reality favoring the map author's philosophical, political or economic goals, or whether a lazy map author simply failed to explore designs offering a more coherent or complete picture of reality. Indeed, an interesting exercise in geography and cartography courses is to see how many ways a map might portray the same data, or to deconstruct a map by considering the data, biases, and constraints that influenced its design.

6

A sixth strategy is institutional structures such as public forums, a journal of cartographic criticism, or courses promoting systematic critiques of maps, especially potentially persuasive maps. Several years ago David Woodward suggested that scholars should examine the map as a graphic text and award it the scrutiny that literary critics give poems, plays, and narrative fiction. The insightful deconstruction of North Carolina's state highway map by Denis Wood and John Fels (1986) is a widely referenced cartographic variant of the critical literary essay, and David's own critique of typography selected by the U.S. Geological Survey for its 1:25,000 provisional and 1:100,000 topographic maps is another good illustration of what might be done (Woodward 1982). To be sure, reviews of atlases and mapping software do a little of this, but rarely with the thoroughness, say, of a literary critic dissecting Chaucer, Hemingway or John Irving. Reviews in cartographic journals tend to be back-of-the-book stuff. In five hundred words, for instance, a critic can scarcely describe a complex map's goal, much less examine motives and alternatives. And reviews seldom tackle the big fellas — Geological Survey topographic maps, the Rand McNally Road Atlas, or AAA Trip-Tiks, as examples. Yet literary critics have no such aversion to best sellers and acknowledged classics. David's right: there is a real need for a journal of cartographic criticism. Perhaps a special issue of one of our cartographic journals will serve as the vehicle for demonstrating and promoting the critical analysis of the map as a text.

Perhaps a special issue of one of our cartographic journals will serve as the vehicle for demonstrating and promoting the critical analysis of the map as a text.

A promising strategy for cartographic criticism would seem to lie in what philosophers call the *coherentist ontology of truth*, as developed by Foucault, Gadamer, and others (Alcoff 1988; Rescher 1979). This theory, which addresses being and meaning, rejects the notion of absolute truth. Rather, truth must refer to a specific system of knowledge or belief, and there can be different degrees or levels of truth.

Michel Foucault has had a major impact on literary criticism and

historical interpretation (Shumway 1989). He demonstrated the need to treat literature, art, and other artifacts as text, that is, as rhetorical works with different levels or layers of interpretation and meaning (Foucault 1972). Foucault (1980, 1988) also noted that these various forms of discourse, including maps, can be used to obscure fact and exercise power over others. A good place to begin is with the perceptive writings of Brian Harley (1989, 1990) and Denis Wood (Wood and Fels 1986). Clearly the ethical map author must attempt to understand his or her sources, be they sixteenth century atlases or two-hour-old downloaded datasets.

A 'new cartography' based on dynamic displays and the experiential map is making the traditional one-map solution less and less defensible.

Hans-Georg Gadamer, a German philosopher who examined onto logical and methodological inquiry, supports a dialectic approach based on an interactive "questioning" between a text and the interpreter (DiCenso 1990). Among his contributions to hermeneutics, an approach to understanding literary and other texts, is the belief that truth is likely to emerge from "listening to" the text rather than by imposing a structure on it (Gadamer 1989). By extension, the modern geographer surely needs to "listen" to maps and other information by looking carefully at them from different viewpoints.

To conclude, technology is changing the nature of the map as well as how people use maps. Most significantly, a 'new cartography' based on dynamic displays and the experiential map is making the traditional one-map solution less and less defensible, and a theory of cartographic complementarity could evolve in the current decade. But because traditional channels for cartographic education cannot reach the expanding armada of neophyte cartographers newly enfranchised by mapping software and unprecedented in its ignorance of cartographic principles, new strategies are needed to help geographic educators and professional cartographers meet their ethical obligations. The six strategies suggested here should help theoreticians, designers, and educators meet the demands of the emerging multiple-view ethic. ⚲

Six strategies for moving beyond one-map solutions

1. **Dynamic sequence of different cartographic views**
2. **Experiential maps, based on**
   - High-interaction computer graphics
   - Rich geographic databases
   - Intelligent databases
   - Helpful, disciplined software
3. **Professional standards, with a Code of Cartographic Ethics calling for presenting alternative views**
   - Exploring consequences of design decisions
4. **Disclosure of experiments, including**
   - Footnotes on trial designs
   - Transcript of exploratory graphic analysis
5. **Promote informed skepticism among map viewers**
6. **Institutional structures**
   - Forums, lectures, exhibits
   - Courses and workshops
   - Journal of cartographic criticism

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Eticos y el Diseño Cartográfico
Seis Estrategias para Confrontar Las Tradiciones de Producir Un Mapa

Extracto

Tradicionalmente, el curso inherente de un diseño cartográfico es la produción de un mapa. Esta tradición es creada por una perspectiva selectiva reflejando una manipulación consiente o la mal formulazíon de ideas y decisíones que afectan un diseño cartográfico como la escala, el objeto geográfico, el contento de el mapa, el titulo, la clasificacíon de la data, y el nivel de detalle de esos símbolos que representan facciones que dirigen a una interpelaciíon. Como resultado, el excéptico y recto veedor cartográfico debe poner en cuestión si (a.) el motivo ulterior talla a un aspecto que tuerce la realidad favoraciendo las opiniones filosóficas o politacas, o motivos económicos de el autor, o (b.) si un disidioso cartógrafo fallo de examinar diseños ofreciendos un retrato mas coherente o completo de la realidad. Hoy en dia la tecnología ha agravado el problema de delinear un mapa por que el cartófrafo aficionado, sin tener entendimiento de la data o de los fundamentos de cartografía, tiene a su desposición software que puede producir gráficos convincentes. La tecnología tambien permite que los cartógrafos errados perfecciónen sus diseños para atestiguar sus casos. Pero la technología tambien puede nutrir mas ingenuidad y mas comprensión completa de los mapas y sus intenciónes, y por este medio proporcionar un accesso etico a la comunicación y el análisis cartográfico.

Translation by Juan José Valdés
National Geographic Society

Despues de examinar el problema de un concepto cartográfico, este escrito presenta seis estrategias para críticamente examinar los fundamentos cartográficos donde los objectivos y las produciónes de mapas que a la misma vez son cuestionable y poco común.

commentary

Can There Be a Cartographic Ethics?

J.B. Harley

> In time you may discover all there is to discover — but your progress will only be progress away from mankind. The gulf between you and the people will become so great that one day you will cry out in jubilation over a new achievement — and be greeted by a cry of universal horror.
>
> **Bertholt Brecht,** *The Life of Galileo*[1]

In an event little reported in the media during the recent Iraq war, a demonstration was held outside the U.S. Defense Mapping Agency in St. Louis. It concerned the crucial role of maps in our ability to wage modern warfare: official estimates stated that by 2nd January 1991 some 35 million maps had been shipped to some 300,000 U.S. troops stationed in the Persian Gulf area.[2] Whatever our views about the morality of war, the incident serves to remind us that the making of maps can raise profound ethical issues. In my case, it led me to reflect on the apparent lack of ethical discussion in the professional literature of cartography. Search long among the key words of periodical articles or books and "ethics" is usually missing. This means that in its failure to engage in a full and frank debate about ethics, cartography is out-of-step with other academic disciplines and professions. On the contrary, the discipline could be accused of complacency. Cartography seems to be uncritical of its own practices, and both their intentional and unintentional consequences. It certainly lacks a substantial literature in applied ethics comparable to that generated by many of its peer professions in science and technology. There is no group in cartography comparable to, for example, "Computer Professionals for Social Responsibility" founded in 1984. And there are no, or few features such as the "Legal and Ethical" case notes, now published in the *ACSM Bulletin*, in cartographic journals. In short, for many map-makers ethics remains a gray area, lost somewhere in the abyss that separates logic from the swamp of subjective opinion.

All this surely has to change in the next few years. I am writing this essay in response to a pioneering "roundtable commentary" on "Ethical Problems in Cartography" — the first of its kind — published in the Fall 1990 issue of *Cartographic Perspectives*.[3] Ethics was defined there as the "principles of conduct guiding the practices of an individual or professional group." Among the varied issues raised at the roundtable were some which may not immediately have struck all readers as obviously ethical problems. For instance, while the so-called "ethic" of being "precise, accurate, and exact" was plain enough, the moral aspects of the perennial copyright problem or the impact of new technology on the ability to maintain traditional standards and values raise finer points of definition. What, for a start, **are** the "traditional standards and values" and have they ever existed except as a social construction of cartographers? Or why should commercial cartographers feel threatened by copyright violations other than for reasons of profit which may or may not be an ethical question? Other issues considered are the claim that some aspects of cartographic practice — such as the design and choice of symbols — are ethically neutral, and that "the false impression" that is sometimes given "that cartography is a science, based on objective principles and criteria," is also ultimately a matter of ethics.

I did not find myself in agreement with all of the contributors and here I take issue with certain stated viewpoints. For example, the emphasis on the copyright question as a major ethical issue seems to be misplaced.

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The old English rhyme tells us

> The law locks up both man and woman
> Who steals the goose from off the common
> But lets the greater felon loose
> Who steals the common from the goose [4]

I suggest that the individual who "steals" the information on a copy righted map may be stealing the goose, but the greater moral dilemma is that the map, when it fails to be anything less than a socially responsible representation of the world, is being stolen from everyone. This is to put the issue rather starkly but I feel **strongly** that some different questions should be squarely posed. Can there be an ethically informed cartography and what should be its agenda? How can we go about formulating principles and rules that would allow us to arbitrate moral judgments in particular cartographic circumstances? Can we debate cartographic ethics in the narrow arena of internal practice, looking for a pragmatic code of professional conduct, or should we be concerned with transcendental values that go to the heart of social justice in the world at large? Rather than engage in generalities at this stage, I confine myself here to addressing these three questions, taking the last first.

Can we debate cartographic ethics in the narrow arena of internal practice, looking for a pragmatic code of professional conduct, or should we be concerned with transcendental values that go to the heart of social justice in the world at large?

The debate opened in *Cartographic Perspectives* is based, in my view, on a fundamental fallacy. This is the "cartographers know best" fallacy, the notion that over the years cartographic practice and experience has resulted in normative rules and principles that are, because a consensus exists about their value, in themselves ethical. If they are widely accepted, and so long as they are followed, the profession is "clean," and there will be no need to ask questions in an ethical context such as "What kind of map is good?" or "What sort of cartography is just?" Michael Dobson produces an argument that enshrines this fallacy. He writes

> . . . in my opinion . . . most of the substandard cartographic products [substandard here is equated with unethical] are the result of individuals who have not been properly trained and not the work of individuals who are consciously trying to mislead their audience. [5]

However, such a premise, far from addressing fundamental ethical questions, bypasses them entirely. Questions about the rightness of technical practice are being confused with questions about the rightness of the social consequences of map-making. While there may be moral aspects to both cases, I would argue that it is the ethics of the latter that should be addressed rather than value judgments concerning the permissibility or impermissibility of this or that technical practice. For instance, in every map made by a professional cartographer, some sort of judgment has to be made as to how to represent the world. Yet cartographers, though they are fully aware how maps **must** distort reality, often engage in double-speak when defending their subject. We are told about the "paradox" in which "an accurate map," to "present a useful and truthful picture," must "tell white lies."[6] Even leaving aside the element of special pleading in this statement (the map can be "truthful" and "accurate" even when it is lying), there is the corollary that cartographers instinctively attribute the worst forms of "ignorance," "blunders," and "distortions," and so on to non-cartographers. For instance, when they come to talk about propaganda maps or the cartographic distortions presented by the popular media, a quite different order of moral debate is entered into. The *cause célèbre* of the Peters projection led to an outburst of polemical righ-

teousness in defense of "professional standards." But ethics demand honesty. The real issue in the Peters case is power: there is no doubt that Peters' agenda was the empowerment of those nations of the world he felt had suffered an historic cartographic discrimination. But equally, for the cartographers, it was their power and "truth claims" that were at stake. We can see them, in a phenomenon well-known to sociologists of science, scrambling to close ranks to defend their established ways of representing the world. They are still closing ranks. I was invited to publish a version of this paper in the ACSM *Bulletin*. After submission, I was informed by the editor that my remarks about the Peters projection were at variance with an official ACSM pronouncement on the subject and that it had been decided not to publish my essay! Cartography will be unable to engage in an ethical debate while it continues to appeal only to its own internal standards yet is morally blind to issues in the world outside.

A similarly introspective technophilia is enshrined in the view that some aspects of cartography lie beyond the need for ethical consideration. In the roundtable discussion it is suggested in the context of cartographic education that

> The majority of information we impart to students . . . has little to do with ethics. Recommendations on what line widths or what lettering sizes are harmonious or discriminate from one another are perceptual and aesthetic issues, not ethical ones. Suggestions on title placement is a design issue, not an ethical one. Conventions on coloring a forested area green, or a water body blue are iconicity issues, not ethical ones. [7]

But is this really the case? It is well known — not the least in advertising — that every map represents a world view in miniature and its design is fraught with potential ethical consequences. Aesthetics is not a value-free science and it is as much a prisoner of ideology as the empirical content of the map.[8] The way a word is written, the choice of name size, the selection of a color to represent an area, or the type of point symbol employed, are all part of the persuasive rhetoric of map-making. They may wield considerable power over the way we understand the world. For example, the symbols designed to represent towns or villages on a map may privilege some settlements while discriminating against others. In a recent study of small-scale South African mapping we are told how policies of apartheid have "created dormitory Black townships adjacent to practically every White town in the country" and also a cartography that naturalizes this discrimination:

> With the prevalent design approach used by cartographers, many of these Black settlements have been made invisible. This process of subjective generalization has been achieved subtly in recent years by mapping a selection of Black settlements for which the style of symbolization used to mark them is downgraded. [9]

Here is a clear instance of where design and a moral judgment are inseparable. Though it is claimed that such maps were "more an act of negligence than a deliberate attempt to deceive,"[10] from an ideological standpoint the map *supports* the powerful against the disenfranchised and makes notions of white supremacy seem more legitimate.

It is the apparent ethical innocence of map design that can be so misleading. Mark Monmonier has reminded us about the "seductiveness of color" but he cannot blame it all on "misuse by cartographically illiterate commercial artists."[11] Thus, despite his assertion that "the blueness of the water might exist largely in the minds of wishful environmentalists, self-

serving tourist operators, and gullible map readers,"[12] it is also a perception traditionally perpetuated by cartographers more than anyone else. So too is the decidedly Eurocentric convention that brown is the best color for terrain, contours, and land representation. It is a dubious logic that brown is assumed to be "the fundamental color of soil . . . evident in fresh tilled soil in spring," a statement that might apply to middle latitude humid forest and steppe-land soils but is untrue for much of the rest of the world.[13] Once it is accepted that certain conventions are "natural" or "normal," the danger is that they acquire a coercive and manipulative authority. The simplistic belief that "graphical excellence" and "graphical integrity" can be achieved by the application of hard-and-fast design rules[14] similarly lessens cartographers' maneuverability to portray the world ethically, that is to say, in ways that are sensitive to social needs. I am not advocating a form of design anarchy here, but merely suggesting that cartography runs the risk of being reduced to a series of graphic formulas detached from the consequences of representation.

With the development of new institutionalized technologies such as Geographical Information Systems and automated cartography the likelihood increases that this will occur. The drive for standardization becomes ever more crucial to allow interchange between systems and to reduce confusion over technology. With this in mind, the U.S. Geological Survey is developing a national cartographic data standard.[15] Yet is this entirely a step forward? It could result in a further narrowing of the ways in which the diversity of local landscape is mapped and it is saying, in effect, that there is only one way of showing a particular geographic feature despite any potential insensitivity to social and environmental issues in that form of representation.

"Method" has thus become a main criterion for truth; moreover, it becomes in itself a specific category of truth, that of "cartographic truth." Invented by cartographers, map "truth" runs the danger of becoming a knowledge available **only** to the technical specialists and this (as Einstein once put it) "is almost as bad for art as for the artists, or religion for the priests."[16] It is thus clear that the debate must be moved beyond a narrow internalist formulation of what is ethical in cartography. If we are truly concerned with the social consequences of what happens when we make a map, then we might also decide that cartography is too important to be left entirely to cartographers.

How can we go about formulating principles and rules that would support moral judgments in particular cartographic circumstances?

I find two fundamental issues in the second question: how can we go about formulating principles and rules that would support moral judgments in particular cartographic circumstances? The first concerns the philosophy of cartography; the second the content of maps. The basic philosophy of many cartographers, as Sona Andrews points out in the roundtable discussion, would probably be that they are "doing a science" that is correct, accurate, and objective.[17] I agree that this is a key ethical issue and, indeed, it is this positivism, fueled by recent technological developments, that is beckoning cartographers away from the very ethical issues now espoused by other professions. Even as the twin themes of innovation and technological revolution are loudly proclaimed (the latter with almost Maoist fervor)[18], so the social implications of the cartographic Prometheus unbound — such as increased surveillance of the individual — are largely overlooked. The tendency is to shrug off alternative views of the nature of maps, especially those that open up humanistic perspectives. The result is the sort of tunnel vision that must have led Duane Marble to remark of map projections, which he sees merely as a mathematical transformation, that "It escapes me how

politics, etc, can enter into it."[19] With views like this, there will be no truly open debate until cartographers shed at least some of their notions of scientific essentialism. My argument is that this traditional philosophical foundation should be critically examined. Alternative views about the nature of maps need to be seriously evaluated. Could it be that what cartographers do, albeit unwittingly, is to transform by mapping the subject they seek to mirror so as to create not an image of reality, but a simulacrum that **redescribes** the world?[20] This alternative view of what a map is would allow us to embrace a much more open, self-critical, socially-sensitive, politically street-wise approach to the practice of map-making and the objectives of cartographic activity.

Thus even the apparently arcane ontological and epistemological questions must be part of the debate. They too raise issues of practical ethical concern. Our philosophy — our understanding of the nature of maps — is not merely a part of some abstract intellectual analysis but ultimately a major strand in the web of social relations by which cartographers project their values into the world.

Second, there is the content of maps. Not only how cartographers believe they represent the world, but even more what they emphasize and what they silence, and how features are classified and given hierarchy, adds up, in effect, to a moral statement. Each map is a manifesto for a set of beliefs about the world. In many unremarked instances a map may be an act of empowerment or of disenfranchisement in the construction of social relationships. Thus, the content of maps will increasingly become a moral dilemma for cartographers if they accept their responsibilities for reconstructing the world that the surveyor has deconstructed. Whether through choice or through the "advance" in technology we are increasingly witnessing the death of the map author, a situation in which the cartographer, in most cases, has ceased to be the initiator of the map.[21] This is largely related to what Patrick McHaffie defines as the organization of the cartographic labor process.[22] But it is also ironic that this loss of cartographic autonomy has been promoted by the cartographers' own narrowing of their field of operations, designed to enhance their image as an independent profession, but effectively confining their role to the design and generalization of **other** people's data. Apart from the fact that this undermines cartography's claim to be a science even in any normal understanding of that word, it embodies an ethical dimension. Maps, rather than resulting from primary observations of the world, are increasingly derived from secondary packages of predetermined information. Thus, when the data arrives in the cartographer's hands the map is already "pre-censored;" it is often too late to challenge its content from an ethical standpoint.

Such restrictions placed on what a map can show is a key ethical issue. If the moral contours of the shape of the world have already been drawn by others — usually those in positions of power — then the danger is that the cartographer is relegated to becoming a robotic arm of an institutional or commercial patron. Map-makers have to ask themselves how, if they so desire, they can recapture control over the morality of the map, so that the cartographic author is able to exercise ethical judgment. Otherwise we may create a design masterpiece but it will merely be a projection of an unethical landscape in whose making we have no part and for whose social consequences we have abrogated responsibility.

Finally, an answer to the first question, "Can there be an ethically informed cartography and, if so, what should be its agenda?" is more difficult to arrive at. As I hope I have made clear, from issues that are

Can there be an ethically informed cartography and, if so, what should be its agenda?

already surfacing, the answer to the first part is "yes." Where to go next is less clear. What cartographers most earnestly seek is probably not so much a theoretical as a practical ethics, a set of principles that can be used to clarify moral disagreements or conflicts with the goal of resolving them. It would certainly help, as a first step, to have more **documented** facts about ethical issues in cartography.[23] What are the motives and personal engagements of cartographers with the maps they make? What are the relationships between production and consumption in cartography and GIS? How do practices such as the limitation of access to official information (through the policies of secrecy or pricing it beyond the means of ordinary citizens),[24] the omission of toxic waste sites from USGS maps, the inclusion of pejorative ethnic names on maps,[25] or the Eurocentrism of many maps and atlases,[26] actually influence the way people think about and **act** upon social issues in a democracy? What are the moral benefits or deficits of particular ways of mapping the world? This should be the bottom line of the balance sheet of cartography, and the time may be overdue when such questions about the human consequences of making particular kinds of maps are researched in our graduate schools.

A second step would be to try to resolve underlying conceptual disagreements about the claims to truth of cartography. This would involve a reexamination of the nature of maps along the lines I have suggested. But, thirdly, there should be an effort to link cartographic ethics to wider social questions. What are the principles of social justice that ought to be endorsed by cartographers? Should maps merely be an inert mirror of majority values or can they play a wider role in the struggle for social improvement? Can there be a normative ethics or do we slide into a cozy relativism in which cartographic values vary with different societies, generations, social groups, or individuals? Can any of us have a privileged claim to ethical truth or must we accept the idea that what might be a good map for one society, culture, or group might be harmful for another? Where such conflicts occur is there a principled way of judging between them if there are no transcendental or absolute moral values?

Cartographers have yet to grapple with these difficult questions. Many are likely to be resolved only at the level of social policy. Indeed, the final ethical question may be one of just how far cartographers of all shades of opinion are prepared to be politically active in altering the conditions under which they make maps. How much do they care about the world they portray? Institutional rules, regulations, and laws (such as those that govern federal or corporate cartographers), all have an ethical dimension that may clash with the individual conscience. Those who believe that the map is impartial and value-neutral may argue that cartographers — as befits a "scientific" profession — must remain neutral at every cost. Yet this reminds me of a remark made by the video-cult personality Max Headroom, who says "I only invent the bomb, I don't drop it."[27] We could paraphrase this for those cartographers who say "I only draw the map, I'm not responsible for how it's used or what it does."

For others, however, there is a different moral position. It involves accepting the linkage between knowledge and power. Only then will we agree with those who have already pointed out that cartography **is** politicized and it always has been:

> We will only be able to **think** clearly about our situation once this is recognized. We will not be able to make intelligent choices until, having accepted our political instrumentality, we fully debate our situation with this in mind. There will materialize Cartographers for Peace and Cartographers for a Strong Defense, but at least we will be through pretending that we are not completely involved.[28]

Being involved on matters of conscience is an important aspect not only of social responsibility but also of true professionalism. At a moment when global technology is weaving an ever more impenetrable curtain between the makers and users of maps this has become urgent:

> . . . we have to learn new standards of responsible conduct in our use of information technology; we need to reformulate what's right and what's wrong, especially in a world in which human and social relations, increasingly, are endlessly reprogrammable, after the fashion of human/machine interfaces. Ethics is very much back on the agenda for intellectuals in a technocracy where efficiency and rationality are seen as presiding, without passion, over a regime of instrumental problem-solving.[29]

Can there be a cartographic ethics? It is doubtful if either more internal design "solutions," or the unfettered working of a free market in commercial cartography,[30] will result in the truly ethical map. Ethics cannot be divorced from questions of social justice. To do nothing would be to sanction a world closer to Bertholt Brecht's vision of the future than one in which morally responsible cartographers would choose to live. ℗

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NOTES

1. Bertholt Brecht, *The Life of Galileo*. Translated by Howard Brenton (London: Eyre Methuen, 1980), 84-85.
2. "Agency Shows Way for Gulf Forces," *The Washington Post*, Wednesday, January 2, 1991, A13.
3. Patrick McHaffie, Sona Andrews, Michael Dobson, and "Two anonymous employees of a federal mapping agency", "Ethical Problems in Cartography: a roundtable commentary," *Cartographic Perspectives* 7, (1990), 3-13.
4. Quoted in Martin Wachs, "Introduction," in *Ethics in Planning*, ed. Martin Wachs (Rutgers Center for Urban Policy Research Institute, 1985), xiii.
5. Dobson, "Ethical Problems," 4.
6. Mark Monmonier, *How to Lie with Maps* (Chicago: The University of Chicago Press, 1991), 1.
7. Sona Andrews, "Ethical Problems," 8.
8. For ways in which aesthetics in general is a socially constructed and historically contingent set of values see Terry Eagleton, *The Ideology of the Aesthetic* (Oxford: Basil Blackwell, 1990).
9. P.J. Stickler, "Invisible Towns: A Case Study in the Cartography of South Africa," *Geojournal* 22, 3 (1990), 329-33.
10. *Ibid*, 333.
11. Monmonier, *How to Lie With Maps*, 147.
12. *Ibid*, 154.
13. Arthur H. Robinson, *The Look of Maps: An Examination of Cartographic Design* (Madison: The University of Wisconsin Press, 1952), 12.

14. Edward R. Tufte, *The Visual Display of Quantitative Information* (Cheshire, Connecticut: Graphics Press, 1983), *passim*, epitomizes the positivist belief — adhered to by many cartographers — in the power of graphic representation to "tell the truth" with "clarity, precision, and efficiency," and with violations of the rules being measured in such meaningless statistical abstractions (from an ethical point of view) as the "Lie Factor." (pp 57-8).

15. Michael F. Goodchild, "Geographic Information Systems," *Progress in Human Geography* 15, 2 (1991), 194-20.

16. Quoted without citation in Gerald Holton, *The Advancement of Science and its Burdens. The Jefferson Lecture and Other Essays* (Cambridge: Cambridge University Press, 1986), 294.

17. Sona Andrews, "Ethical Problems," 8.

18. The International Cartographic Association, for example, often seems to view the history of map-making in these terms: a recent example is Joel Morrison, "The Revolution in Cartography in the 1980s," in *Cartography Past, Present, and Future. A Festschrift for F. J. Ormeling*, ed. D.W. Rhind and D.R.F. Taylor (London: Elsevier for the International Cartographic Association, 1989), 169-185.

19. Duane Marble. (Computer Network Conference *Geography*, January 31, 1991).

20. I have explored this question more fully in a number of recent essays: J.B. Harley, "Silences and Secrecy: The Hidden Agenda of Cartography in Early Modern Europe," *Imago Mundi* 40 (1988), 57-76; J.B. Harley, "Maps, Knowledge, and Power," in *The Iconography of Landscape*, ed. Denis Cosgrove and Stephen Daniels (Cambridge: Cambridge University Pres, 1988), 277-312; and J. B. Harley, "Deconstructing the Map," *Cartographica* 26, no. 2 (1989), 1-20.

21. For a discussion of this point, critical of the assumption that the cartographer — as in the traditional communication model — controls the selection of "reality" to be included in the map, see J.S. Keates, *Understanding Maps* (London and New York: Longman, 1982), 101-106.

22. Patrick McHaffie, "The Creation of Public Cartographic Information: 'Penciling in' the Nexus," Paper presented at the Miami meeting of the Association of American Geographers, April, 1991.

23. As a subject, cartographic ethics appears to be in a very early stage of what philosophers call "descriptive ethics": for relevant questions see D. T. Goldberg, *Ethical Theory and Social Issues: Historical Texts and Contemporary Readings* (New York, Holt, Rinehard, Winston, 1988).

24. On the problems of the increasing commodification of computer-based geographic and land-information systems see Earl F. Epstein and John D. Mc Laughlin, "A Discussion on Public Information. Who owns it? Who uses it? Should we limit access?," ACSM *Bulletin*, October 1990, 33-38.

25. For some examples, see J. B. Harley, "Cartography, Ethics, and Social Theory," *Cartographica* 27, 2 (1990), 1-23.

26. The implicit discrimination in maps has now become an ethical issue for educators: see Keith Hodgkinson, "Standing the World on its Head: A Review of Eurocentrism in Humanities Maps and Atlases," *Teaching History*, 62, (1991), 19-23.

27. Quoted in Andrew Ross, *Techno-Ethics and Tele-Ethics: Three Lives in the Day of Max Headroom* (Milwaukee, The University of Wisconsin-Milwaukee, Center for Twentieth Century Studies, Working Paper No. 8, 1988), 4.

28. Denis Wood, "Responses" to "Cartography, Ethics and Social Theory," *Cartographica*, 26, 3 & 4 (1989), 117-119.

29. Ross, "Techno-Ethics", 3.

30. The latter is implied by Dobson, "Ethical Problems," 4.

cartographic techniques

SOFTWARE REVIEW

Software reviews will normally be solicited by the editors, but unsolicited reviews are invited for consideration. If you are using a piece of software useful in working with map information, and are interested in contributing a review, please communicate this interest to the editors.

TWO MAPPING SOFTWARE PACKAGES FOR MACINTOSH COMPUTERS

Reviewed by Gene Turner, California State University at Northridge

MacChoro II with Map Animation. Image Mapping Systems, 516 S. 51 Street, Omaha, NE 68106.
List $295.

Atlas*MapMaker 4.53.
Strategic Mapping, 4030 Moorpark Ave., San Jose, CA 95117.
List $495.

Anyone interested in looking at the distribution of data collected by statistical units such as counties, tracts, zip codes, or police reporting districts is likely to resort to the creation of a choropleth map. Its creation is straightforward and, once the boundaries for the statistical units are set, new maps are generated by changing the shading patterns according to the classes derived for new data variables. The process can be readily adapted to a computer and over the years a number of programs have been developed to generate choropleth maps.

Macintosh computer users basically have two statistical mapping programs from which to choose. One, *MacChoro II*, is a relatively simple choropleth mapping program with the capability of limited animation, while the other, *MapMaker 4.53*, is more complex with many more options. Both take considerable memory (1Mb minimum) and have slightly different approaches and features for creating a choropleth map. For this review I tried both programs on a Macintosh IIci with color monitor, 8 Mb random access memory, 80 Mb hard disk, and *Virtual 2.04* from Connetix Corp. which increased available memory to about 12 Mb. This may seem like a lot of power to run a mapping program, but for applications such as generating a map of the United States by county, it's not enough. Indeed files of such maps can grow to 4 or 5 Mb in size after conversion to a PostScript format in one of the drawing programs. Dealing with very large map files almost becomes an art since they tax your hardware, your software, and your patience.

MacChoro II

MacChoro II comes with a single disk containing the program and some sample maps of the "lower 48" states. A 114 page manual introduces the program step by step, reviews each of the eight major menu headings, and provides several appendices for separate topics such as using *MacChoro* with other programs. A second disk containing county boundaries for each state may be purchased separately.

Loading the program simply involves copying the files to the hard disk. The creation of a map may begin by selecting an existing map file such as "US48.Data" which was provided with the program. After starting, two windows appear along with eight menu items — File, Edit, Window, Data, Animate, Map, Legend, and Text — across the top of the screen. One window contains a spreadsheet which can hold up to 50 variables for up to 600 areas. Users who want a tract map of a Metropolitan Statistical Area (MSA) or a county map of the United States (almost 3150 counties) will find the 600 area limit too few. The other window contains an outline map. To cause a choropleth map to appear one must select a desired data column from the spreadsheet and then click on the Draw Map button in the upper left part of the spreadsheet. In addition, two other windows can be opened, a reduced view window of the entire graphic display and a window for text editing. Any of these may be brought forward by selecting one from the Window menu.

The classification of the data for the map is controlled by the Data menu and the Classification option. Two to sixteen classes may be selected and six different methods are available. The "Unclassed" method defaults to the maximum sixteen classes. Other methods include a standard deviation and a natural-breaks method as well as the usual equal interval, quantile, and user-defined methods. Under the Classification option is a Classification Stats suboption which gives various descriptive statistics about the distribution of data within the classing method. In addition, a classification accuracy index gives a relative indication of how well the data fit different classing methods.

Data (no values greater than or equal to one billion) may be brought into the program in several ways. It may be converted from an earlier version of *MacChoro* using the Read Old Data option under the File menu, it can be typed into the spreadsheet from the keyboard, and it can be pasted into the spreadsheet from any tab-delimited spreadsheet. However, the user must be careful when entering data to ensure that the order of the data values exactly matches the order of the polygon boundaries. The program does not check a data ID against a polygon ID to match data to areas. This places an extra burden on the user to always check the order of data

since unexpected changes may occur. For example, census tract lists from different sources often have frequent mismatches.

Names or other character data are converted to 0's when imported into the *MacChoro II* spreadsheet. Data can be exported from the spreadsheet in *MacChoro II* to another spreadsheet such as *Excel* by the same copy and paste procedure. Limited data handling options are available for the spreadsheet under the Data menu. Two columns may be added, subtracted, multiplied, or divided. Data also may be multiplied by a constant, converted to log form, and listed in sorted order.

Some other data handling options in the program such as Search For and Tabs-to-Spaces under the Edit menu will only work with certain windows such as the Edit window. Which commands are for which window is not always made clear by the program or the instruction manual.

A second major set of information for a statistical mapping program is the description of the geographical units to which the data values must be matched. *MacChoro II* does not provide any routines for directly creating boundaries, but it does provide connections to other programs so that boundaries can be created and assigned identifying codes. Polygons can be imported from an earlier version of *MacChoro II*, from *MapMaker*, from a scanned image input into a drawing program such as *MacDraw* or *SuperPaint*, and from a custom file of counties for all US states. A series of conversion routines are buried in a submenu, Convert, under the submenu, Map File, under the main menu, File. Boundary files may also be exported to drawing programs via these options, modified, and then re-imported into *MacChoro II*. If ID's for the polygons are being entered into an imported map through the Edit-ID option, care is needed since it is not possible to undo an error. One must start over.

MacChoro II provides several graphic utilities to enhance the map. Probably one of the most useful is the ability to generate a bar scale in miles or kilometers and drag it to a desired position. One may create a box of the desired length and then choose Scale from the Legend menu. A bar scale of a convenient length will be fitted in the drawn box. Other options include the capability of computing the map scale, changing the choropleth shading patterns (from a fixed set of 24 patterns) placing a frame line, and placing several pieces of text (title, date, source, classing method, and the accuracy index value). These items may be drawn in different colors although the actual map can only be displayed in one color in order to save memory. A legend may be easily created by creating a box and then selecting the Legend option under the Legend menu. Minor adjustments to the type size and legend boxes can be performed under the same menu. There is no zoom command on the map. Changes in size can be made in several somewhat awkward ways by erasing the map, clicking and dragging a map box, and then selecting Display in Frame from the File menu. The look of the map may be improved by drawing it over several pages and then specifying a reduction of 25 percent in the Page Setup option under the File menu. This action results in finer, sharper lines on a LaserWriter printer.

A special feature of *MacChoro II* is its animation capability. Essentially this entails the generation of a sequence of maps and then flipping through them rather than making the map move around the screen. Two basic approaches can be taken. One is to generate a series of map classes for a single variable noting how the patterns change with the type of classification or the number of classes. The second is to select a given number of classes of one type for a set of different variables. Setting up an animation sequence is fairly easy and the process does give an interesting look at multiple variables. One can make changes to the speed of animation or pause by clicking anywhere on the screen to call up a pop-up menu. A Copy-mode option appears to affect the way different patterns appear when plotted over one another, but there is no explanation of this function in the manual. One can generate up to 255 maps for an animated sequence, but a 300 by 400 pixel display requires about 15Kb per map.

MapMaker 4.53

This program provides a number of features (with the obvious exception of animation) beyond those of *MacChoro II*. In addition to choropleth maps, one also may create graduated symbol, dot, and value-by-area cartogram map forms and these may be displayed simultaneously. The program provides a number of ways of importing and exporting data and graphics to other programs (such as *MacChoro II*) and can provide the basic maps for generation of high-quality color printing. It can generate a map of all counties in the United States although one must have sufficient computing power and memory to attempt this. Enough features are available in *MapMaker 4.53* that it almost can serve as a stand-alone mapping program with considerable design capability.

MapMaker 4.53 comes on four disks. One contains the program and the three others contain outlines and some data for 150 world countries, all 50 states, and all counties for all states. A large number of other geographical files such as census tracts, zip codes,

and major roads in the US may be purchased from Strategic Mapping. After copying the program to a hard disk and starting it, a blank window appears with eight items across the top menu: File, Edit, Assign, Layers, Categories, Display, Fonts, and Style. Generating the first map requires reading the manual since the process is not intuitive. By selecting New under the File menu a sequence of windows begins which requests the number of boundary files to be assembled (usually each state is a separate file), the size of the map on the page, and whether any other geographic features are to be added. This step is important since the map can not be moved (unlike *MacChoro II*) on the page after the user establishes a window for it. A map of the selected area will then appear within the user-defined window.

The next step is to select the Import Data option under the File menu. Data is expected in the form of a tab-delimited text file with a maximum of 30 variables. Usually the first record in the file is a tab-delimited list of category headings. *MapMaker* will then read the data file matching an ID number in the first field of the data file to a corresponding number in the geographical boundaries. These two numbers must match exactly or the data will not be linked to the geographical units. Usually geographical units such as counties or census tracts are identified by some standard code such as FIPS codes since such values are commonly part of large census files extracted from tapes. An advantage of this linking method is that the data file can be of any size or order and it does not have to be processed to create a map of fewer areas. Once all data values have been read a map of the first variable is displayed. The actual data values for each geographical unit may be checked by selecting the Data Values option under the Assign menu. A list of areas then appears and one may be chosen for the display of its values. Checking data values by moving through the list of geographical units is rather slow compared to the spreadsheet display of *MacChoro II*. Data can be exported in the form of a text file to other programs by selecting the Export Data option under the File menu.

If a choropleth map is being produced, one of the first cosmetic changes to the map is to remove a set of point symbols from the legend which are assigned to each class along with a shading pattern. These are removed by selecting the Select Point Types option under the Display menu. Selecting the No Points Displayed on Map or Legend option removes this feature from the legend.

The data classification options available in *MapMaker 4.53* are fewer than in *MacChoro II*. Only equal interval, quantile, and user-specified classification methods are offered. These are changed by selecting the Data Divisions option under the Assign menu. Also available under this menu is View Data Statistics which gives a descriptive list of the data distribution.

Unlike *MacChoro II*, the default shading patterns in *MapMaker* are not very suitable for a map since they are coarse and possess little value difference. These can be changed with the Area Fill Patterns option under the Assign menu. Any of 35 patterns can be selected although only a few possess suitable, non-textured value differences. Each may be specified in one of 8 colors against a background in one of 8 colors.

Completion of this step usually results in a suitable choropleth map. Maps of other variables may be generated by selecting the desired one from under the Category menu. If manual classification has been selected, then new classes will have to be specified.

Geographical data can be processed in a number of ways in *MapMaker*. It can be converted from latitude and longitude to a map in one of six projections, it can be scanned and converted to a PICT file and then assigned ID numbers, or it can be digitized on the screen. Since the necessary format is provided in an appendix of the manual, it is possible to write programs to reformat data from other programs to a form compatible with *MapMaker*.

Boundary data is used for the dot, choropleth, and cartogram displays. To change between the choropleth, dot, and cartogram map forms one need only select the Select Area Types option under the Display menu. A window appears with buttons to change the map form as well as spaces to set the dot value and unit area for the cartogram. Graduated symbols, however, require a special point file. Each point is located by a single x,y coordinate with an appropriate identifier. Features controlling this map form are found under the Select Point Types option under the Display menu.

MapMaker provides a number of graphic utilities for enhancing the display. Along the left margin are a series of line and object drawing and shading tools common to many drawing programs. Under the Assign menu are options to change the color of parts of the map and the legend as well as the background. These options enable one to easily generate colorful displays which are suitable for photography directly from the screen. Under the Assign menu are options to add a shadow around the edge of the map and to draw a grid of latitude and longitude over the display. Text of a desired font can be placed anywhere on the display. Titles, labels, and notes can be generated and dragged to a desired position. If the background is cluttered the type can be framed with a

masking rectangle.

A Layers menu provides other interesting possibilities. One option, Layer Options, makes it possible to copy different displays to separate layers for manipulation and display. Several maps can be presented at once and selectively edited. The other option, Base Map Options, enables one to turn off the base map or the map distribution. By turning these off selectively, one can save a base map as a PICT file and separate dot patterns or polygon shading as additional files. These can be imported and recombined in a drawing program. For example, individual dot patterns might be created this way and then combined into a single map in a drawing program. The Layer Option did seem to present some problems with large files and would occasionally cause the program to crash although smaller files did not present a problem.

Perhaps one of the strongest criticisms of *MapMaker* is the lack of a good legend for the graduated symbol and cartogram map forms. Currently no reference symbols comparable to the map are displayed in the legend and this should be corrected.

Both *MacChoro II* and *MapMaker 4.53* perform acceptably well. *MacChoro* generates a more appropriate default map than *MapMaker* and has some useful options such as bar scale generation, animation, and classification methods not available in *MapMaker 4.53*. *MacChoro II*, however, generates only choropleth maps and does not seem to function in quite the same way as many Macintosh programs do. Often several steps are necessary to perform a function that should be possible with a single command. For example, the importing and exporting of data require several steps. The limitation of 600 polygons in *MacChoro* and lack of a color display tend to make it less desirable for maps of entire MSA's or all counties of the United States. Certainly one disadvantage of *MacChoro II* is that the US County outlines must be purchased as a separate file while the same file is included in the price of *MapMaker*.

MAPPING THE YANOMAMO

Anthropologist Napoleon Chagnon and the Stone-age Yanomamo — The native people of the Amazon River Basin — have a new way of defining home. Chagnon and Venezuelan anthropologist Charles Brewer-Carias are using global positioning system technology to map the locations of native villages in the Siapa River Valley.

In the first stage of a 10-year research project, Chagnon recently located eight villages, made contact with three previously undiscovered villages, and recorded more than 250 position fixes. A Trimble TransPak receiver (Trimble Navigation, Sunnyvale, California) was used to help navigate the unexplored regions of the basin.

An estimated 14,000 tribespeople live on the Venezuelan side of the Amazon Basin; 9,000 live on the Brazilian side. Although mistreatment of the Yanomamo continues on the Brazilian side, the success of this survey may offer protection for the Venezuelan peoples. The president of Venezuela, Carlos Perez, has pledged to protect the Yanomamo from the encroachment of modern civilization by creating a Siapa Valley Biosphere reserve.

Geo Info Systems, June 1991

LANDSAT NEWS

Landsats 4 and 5 continue to function nominally. Landsat 6 is on schedule for launch in mid-1992.

Rep. George Brown (D-CA) introduced the Landsat Continuity Act on May 23. The goal of the legislation is to secure government funds to begin development of Landsat 7 through the authorization of $20 million for long-lead satellite hardware items. Brown said he felt the Landsat 7 funding question had been delayed too long, putting the continuity of the program in jeopardy. Landsat 6 will be due for replacement in 1997, giving contractors barely enough time to develop Landsat 7 even if funds are appropriated in the Fiscal Year 1992 budget.

The first round of hearings relating to the Landsat Continuity Act were held on June 26 at a joint meeting of the Science, Space and Technology Committee and the Permanent Select Committee on Intelligence. The Committee heard testimony from eight members of the remote sensing community, representing three areas of data applications: military, scientific/global change and civilian/commercial.

Landsat World Update 4:5, June 1991

SPOT NEWS

Sales of SPOT imagemaps are rising rapidly: 150 in 1989, 500 in 1990, and a target figure of 1,000 in 1991. A SPOT imagemap resembles a map, except that the conventional planimetric content is replaced by a satellite image. If suitable ground control points are available for level 2B preprocessing, the absolute location accuracy is 30m.

In late 1990, SPOT IMAGE decided to launch a new family of products under the general tradename GEOSPOT. Physically, a GEOSPOT product is a map-type document on a SPOT satellite image underlay. It is geo-referenced to a given cartographic projection, geo-coded to a specific geographic grid, and cut to match a specified system of map sheet lines or a geographic grid. They

are available in a range of scales from 1:25,000 to 1:100,000. Other scales between 1:10,000 and 1:250,000 are available on request. *SPOT Flash 1, February 1991*

DIRECTORY OF COMPUTER AND HIGH TECHNOLOGY GRANTS

The *Directory of Computer and High Technology Grants* lists 640 funding sources for computers, software and high-tech related grants. The Directory provides profiles on foundations, corporations and federal programs.

Three essays on grantsmanship will guide you through the intricate process of securing a grant. *Getting Grants with Computers/ Getting Computers with Grants* makes suggestions on where to look for funding for computers. Another essay provides an enlightening debate between Apple and IBM computer experts. The third essay lists methods available to secure discounted and free software.

The cost of the First Edition is $44.50 per copy (add $4.00 for handling). The *Directory of Computer and High Technology Grants* can be ordered from the publisher, Research Grants Guides, Dept. 4B, P.O. Box 1214, Loxahatchee, FL 33470.

cart lab bulletin board

This forum is offered to encourage communication among practitioners at a time of rapid technological transition. Questions, comments, and announcements are invited.

A New HyperCard Stack for Digital Cartography

Jeremy Crampton
Penn State

The Temple University Cartography Lab has developed a handy new HyperCard stack for Apple Macintosh computers for editing text on digital maps and other graphics that involve textual elements. The stack, called *Textmaker*, allows users to create a separate document containing their text and then to import it into Adobe *Illustrator* 3.0. From there it can be converted into other formats, such as Aldus *FreeHand* 3.0.

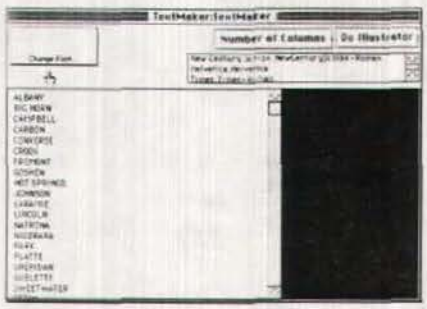

Figure 1

Textmaker (see Figure 1) was developed primarily for positioning place names, rather than blocks of text. The user types the list of names into a word processing document and imports it into *Textmaker*. A HyperCard button can then be used to save it in a form that *Illustrator* can open.

As digital cartography continues to replace manual production at cartography labs, cartographers are finding that in some applications it is often still useful to think of the digital mapmaking process in terms of traditional cartography. Name placement is one of those areas. In manual traditional cartography it is common to produce an alphabetically ordered proofing sheet of place names and other map labels that afford easy editing and revision. These labels are then individually removed and placed on the map. *Textmaker* was developed to emulate this process.

I played with *Textmaker* in our lab using a Mac II. Although the HyperCard stack itself is fairly easy to use, experience with, or at least knowledge of, the HyperCard environment would be a bonus. Once in *Textmaker* there is little need or scope for text formatting, this being best done in *Illustrator* (do your editing in the word processing program). There is a button labeled "change font" but it did not seem to do anything. *Textmaker* will be most useful to cartographers if they think of it as a conversion program rather than an editor or formatting environment. However, a useful addition for the future would be some kind of alphabetizing scheme, so that the list of names could be ordered for export to *Illustrator*.

I began by typing lists of place names in several word processing packages, such as *WriteNow*, *WordPerfect* and *Word*. In order to test whether *Textmaker* could retain formatting done at this stage, I varied the fonts and typesize of the names. However, since *Textmaker* can only accept ASCII format (such as the "text only" option in *WriteNow*, or the "text only with line breaks" option in *Word*, these formats were nullified, with the text coming into (and going out of) *Textmaker* only as Helvetica 10 point. Since the flow of operations goes from a word processing program through *Textmaker* into *Illustrator*, it is best to do your editing before you import the text into *Textmaker*. And if, as expected, you are using *Textmaker* for place names, a spell-checker will not be of much utility — old fashioned copy editing will be needed.

To import the text into *Textmaker* I used *Sigma Edit*, a utility that can be accessed under the Apple menu. (If you have System 6.xx, you can install a DA using the Font/DA Mover; if you use System 7, just place the *Sigma Edit* application in the Apple Menu items folder in the system folder.) To bring the text in, open *Textmaker* and then open *Sigma Edit*, which will allow you to open your word processed file. Choose your text with the cursor or with

"select all" and copy it to the clipboard with Command-C (⌘ C). You can now exit *Sigma Edit*, and, using paste, dump the text into *Textmaker* using Command-V (⌘ V).

When in *Textmaker* click on the Do Illustrator button and save your file (perhaps with a unique extension such as "xxx.Ill" to mark it as an *Illustrator* file). You can now open it from within *Illustrator* as you would an ordinary *Illustrator* document. (If you prefer to work in *FreeHand*, save the *Illustrator* document as an Adobe 1.1 file, quit *Illustrator* and open your 1.1 file from *FreeHand*.) The Temple Cart Lab recommends keeping the names off to one side of your map and grabbing them as needed for placement on the map.

In summary, *Textmaker* is an easy to use and straightforward way of converting text done in a word processing package into something that *Illustrator* or *Freehand* can handle. While it cannot handle formatting or editing at this time, these operations can be performed in your word processor or in *Illustrator/FreeHand* without too much trouble.

Cartographers who wish to obtain Textmaker can download it from the publicly available Macintosh archives maintained at Stanford. You will need to "anonymous" **FTP** to **sumex-aim.stanford.edu** and change directories to the info-mac/card directory and download it using "get." The file will be in binhex format and must be converted before use.

cartographic artifacts

BOOK REVIEW

Tufte, E. R. (1990) *Envisioning Information.* Graphics Press, Cheshire, CT 126 pp. (Hardcover $48)
Reviewed by Mark C. Detweiler
Department of Psychology
Penn State University

With the publication of his 1983 book, *The Visual Display of Quantitative Information*, Edward Tufte established himself as a sharp critic of poorly designed quantitative information graphics and a champion of graphical excellence. By assembling and displaying an impressive range of representational artifacts — maps, tables, graphs, diagrams, and illustrations — Tufte gave his readers/viewers numerous opportunities to visually experience how graphics can show data clearly, as well as how they can obscure and distort. This book broke new ground; it was neither another how-to book on charts and graphs, or a mere collection of graphic examples. Rather, it was an attempt to help readers acquire principles to grapple with the task of portraying complexity effectively.

In *Envisioning Information*, Tufte takes an approach similar to his earlier book; graphics spill off nearly every page and delight the eye with invitations to view, interpret, and consider a broad range of ways to present graphic information. This is a gorgeous book to view and to hold. The printing and typography are extraordinary. Works by some of the great masters of graphic design have been sampled and served up in page after page of graphical excellence. And, Tufte has even daringly ventured into territories seldom considered by information designers, such as architectural design and music and dance notation. Simply put, this is a "must-have" book for anyone interested in developing better skills at communicating information graphically.

The book is divided into six chapters. In the first chapter, "Escaping Flatland", Tufte argues that the essential task of envisioning information is to recognize that all of the interesting physical, biological, imaginary, and human worlds we wish to represent are multivariate in nature, and that the real challenge is to escape two-dimensionality in favor of greater dimensionality and data density. Drawing upon examples as diverse as a 3-D model of our solar system, an Indonesian railroad plan, and a plot of pollutants emitted over southern California, Tufte argues against cosmetic decoration and chartjunk, and for taking the audience seriously while demonstrating the value of multivariate representations.

In the second chapter, "Micro/Macro Readings", Tufte showcases numerous examples of graphic design in which viewers are invited to read/interpret graphics on multiple levels — with the aid of vast detail that helps to organize complexity in multi-layered displays. The emphasis here is on demonstrating the value of high information displays, and showing how they can help viewers see visual contrasts and comparisons, and make choices. Tufte argues that such displays "allow viewers to select, to narrate, to recast and personalize data for their own uses. Thus control of information is given over to viewers, not to editors, designers, or decorators" (p. 50)

In the third chapter, "Layering and Separation", Tufte demonstrates how by visually stratifying aspects of data one can reduce noise and enrich the context of displays. Rather than expressing graphic elements at the same visual level, for example, with the

same values, textures, colors and shapes, elements can be differentiated in layered surfaces that provide structure and order.

In the fourth chapter, "Small Multiples", Tufte shows how quantitative reasoning can be facilitated by using series of gradually changing small designs that are both multivariate and data rich. By presenting the small multiples within a restricted eyespan, Tufte argues that the viewer is able to make comparisons at a glance that would be difficult to apprehend otherwise.

In the fifth chapter, "Color and Information", Tufte raises a number of important issues related to how color can be used effectively (for example, to label, measure, represent, and decorate) without doing harm. Here he casts a wide net, and finds color at work in maps, diagrams, and computer displays, and seeks to sensitize the reader to its power and potential abuses.

And finally, in the last chapter, "Narratives of Space and Time", Tufte presents a fascinating collection of display strategies that tell a number of different multivariate stories, for example, as timetables and route maps.

Despite its many virtues, I did have a few problems with this book. First, as in his earlier book, Tufte often seems to take the act of representing the world of interest for granted. On this view, the process of constructing a graphic reality appears to be largely unproblematic, and Tufte seems to suggest that the real action is in the production/execution of the data graphic itself — rather than in the decision processes about what to represent, and the rationale behind those processes. For while a viewer may indeed be invited to make comparisons and find patterns in a graphic, it is a truism that those patterns are only as good as the data used — especially if one has no recourse to discovering when, where, and how the data represented were gathered. These are non-trivial issues for designers and interpreters of data graphics and deserve greater attention. For example, Tufte himself routinely fails to provide readers with information about: 1) the relative scales (original sizes) of the graphics he so beautifully depicts; 2) their real contexts of use; and 3) characteristics of their users.

Simply put, graphics are situated in a cultural/social context, and that context plays an enormous role in determining not only the kinds of devices we encounter, but our attitudes toward and skills at using them. It is these conventions and rules that allow us to make inferences from the marks on paper. Put differently, graphic meaning is not inherent in the representational device itself, but emerges only in a social context of use. Unfortunately little is known about how people develop flexibility in interpreting and molding such rules and conventions to communicate graphically. Tufte's style tends to encourage the belief that graphics can be portrayed, unproblematically, as disembodied artifacts, and that agreement about excellence in information graphics can be judged largely apart from the characteristics of prospective users and the kinds of tasks they want to perform.

Thus despite its admonition to take the audience seriously, I was often left wondering whether Tufte hadn't trailed Robert Venturi (author of *Complexity and Contradiction in Architecture*, New York, 1966) too closely in the latter's search for richness of meaning rather than clarity of meaning. In effect, this book takes a *graphic-centered* rather than a *user-centered* approach to information graphics. For while Tufte indeed recognizes the importance of perceptual issues in drawing a viewer's/interpreter's attention in making comparisons and avoiding non-informative noise and clutter, I believe he often underplays the extent of learning involved in knowing the rules and conventions of information graphics and the motivation required to engage them.

Although I believe nearly anyone motivated to improve his/her knowledge of information graphics will learn something useful from *Envisioning Information*, I believe one should be clear about Tufte's implicit instructional message. First, this is not a book well suited to apprenticeship learning. One never gets a chance to view an information graphic in the process of being constructed, or to witness the many critical points where a work could have branched off into any one of several different directions. Rather, one is served up polished presentation graphics that only occasionally make reference to the characteristics of potential users or the purposes they are designed to serve. Thus, the implicit pedagogic message is that one should be able to see good exemplars of graphic design and incorporate them. Unfortunately this isn't how experts acquire their expertise. Rather, they must practice making compromises between a client's needs and preferences, and realistic constraints on time, money, and technical feasibility. It is one thing to aspire to excellence; it is quite another to understand excellence without the hands-on tinkering that must be experienced and molded into personalized rules of thumb about what works and doesn't work for particular clients, projects, and contexts.

Finally, I would argue that this book tends to regard data graphics as presentational devices only, ignoring a whole range of important exploratory uses. I would urge tolerance for "scruffy" exploration in addition to "neat"

presentation. For we still need considerable innovation in developing new ways to discover patterns and address questions of multi-perspective viewing. I believe we need not slavishly adhere to Tufte's principles and exhortations regarding presentation graphics if they impede progress at exploring such innovations.

Let me close by saying that the foregoing issues should not be regarded as diminishing Tufte's accomplishments in this book. This is a graphic tour de force, and a joy to read! By all means get a copy and read, experience, and think about it; *Envisioning Information* is a challenge to graphic excellence and a source of inspiration.

NIFTY MAP DISPLAYS

Barbara Fine, President of The Map Store in Washington, DC, recently sent photos and descriptions of map displays done in their display windows. Barbara's background in Art History and Studio Art have given her a different perspective on creating map displays, something from which we can all learn.

When constructing displays with maps, Barbara likes to add "props" to call attention to the main theme. For example, origami birds and toy airplanes suspended from nylon strings were used to compliment aeronautical charts. Dried flowers, moss and branches were used to compliment a display of antique maps. Other examples of props includes newspapers, colored tissue paper, toy trains, buses and cars.

The photos sent were of three separate displays. The first was a display of maps drawn by a local third grade class as a project related to Geography Awareness Week. This kind of display is great outreach for public libraries. Academic libraries could consider displaying "mental maps" drawn by students in social geography classes. The second photo was of a Christmas tree decorated with miniature globes and fan-folded maps. The last photo was a spectacular award winner. A likeness of Queen Elizabeth I was created using a mannequin dressed with sixty Ordnance Survey Landranger series maps. The tight-waisted hooped skirt and cape were very realistic.

Although not as fancy as Barbara's creations, I recently put together a display on bird's-eye views of the city of Philadelphia from its early years to today. Construction paper silhouettes of the city's taller buildings were glued on the sides of the display case.

If anyone would like to share display ideas with others, please write me, Andrew Johnson, in care of the Map Collection, Free Library of Philadelphia, Logan Square, Philadelphia, PA 19103.
base line 12:3, June 1991

NTIS CITATIONS

ARC Digitized Raster Graphics and Their Application. D. H. Foley, and J.R. Cadoret. Defense Mapping Agency Systems Center, Fairfax, VA. 20 November '90, 13pp.
AD-A231 370/8/WNR.
Price code: PC A03/MF A01.

ARC Digitized Raster Graphics (ADRG) are digitized replicas of hard copy source maps and charts that the Defense Mapping Agency produces on CD-ROM (compact Disc-Read Only Material) for distribution. The ADRG process converts the hard copy source, datum, and projection to WGS84 and the Equal ARC-Second Raster Chart/Map (ARC) projection which permits a worldwide seamless data base for map data of a given scale. Products currently available are: Operational Navigation Charts (ONC) at 1:1,000,000, Tactical Pilotage Charts (TPC) at 1:500,000, Joint Operations Graphics (JOG) at 1:250,000, Topographic Line Maps (TLM) at 1:50,000 and Jet Navigation Charts at 1:2,000,000. Many are available for public sale. ADRG data is best suited for use as raster background images for GIS applications. Within DOD, ADRG currently supports the Navy's AV8B program and the Army's Maneuver control System.

Digital Production of Landsat Image Maps in the Map Publishing Environment.
R. F. Seebald. Defense Mapping Agency Systems Center, Reston, VA. 9 November '90, 15 pp.
AD-A230 558/9/WNR.
Price code: PC A03/MF A01.

In support of counter narcotics activities the Defense Mapping Agency has begun production of a series of Landsat image maps. Produced at a scale of 1:100,000, these Landsat image maps are compiled from recent Landsat Thematic Mapper scenes. Bands 7, 4, and 2 are combined in a false color composite. Intensification of selected features provides improved topographic detail. The enhanced Landsat imagery is combined with a UTM grid and margin information and compiled and color separated in a digital environment. The Map Publishing Environment (MPE) output is film separates, printed via a large format laser filmwriter. In support of this new production system, a unique development/production environment was created to bring the Government cartographers into direct contact with the system developers in order to facilitate rapid modifications and changes to the application software as necessary.

Earth Data and New Weapons
J. L. Larson, and G. A. Pelletiere. National Defense University, Washington, DC 1989, 145 pp. Availability: Superintendent of Documents, GPO, Washington, DC 20402. PC $2.75. Microfiche furnished to DTIC and NTIS users. AD-A229 584/8/WNR. Price code: MF A01.

Many modern weapons require detailed information about the earth to guide them to target. This 'earth data' is also necessary for training those who will man the weapons. The authors believe inadequate data now mars the early, critical stages of weapons development and acquisition. In this study, they catalog a history of bureaucratic omissions, contradictions, and funding disputes that have hampered earth data programs. They recommended system improvements under the general aegis of the Department of Defense, with the Defense Mapping Agency taking a leading role. They suggest specific ways to clarify existing regulations, standardize earth data products, identify earth data requirements early in the weapons acquisition process, and adequately fund development. Keywords: Guidance/data bases.

GIS USE IN THE FEDERAL GOVERNMENT
In December 1990, the Federal Interagency Coordinating Committee on Digital Cartography (FICCDC) published an updated *Summary of GIS Use in the Federal Government*. The summary, expanded from the 1988 edition, includes responses from 110 Federal organizations about their use of geographic information systems. Of the 110 organizations responding to the survey, 95 reported that they now use GIS or planned to use GIS next year.

The summary contains information about the organization's GIS activities, including primary applications of GIS, GIS policies and guidelines, data categories used in GIS applications, data sources, data dissemination activities, cooperative activities, hardware and software used in GIS activities, and GIS funding and expenditures. For the purposes of the summary, a GIS was defined as a computer hardware and software system designed to collect, manage, analyze, and display spatially referenced data. Automated map and chart production systems were excluded from the summary.

In addition to the survey results, the summary contains a list of individuals who may be contacted for further information about GIS activities in their agencies. To obtain a free copy of the summary request an order form from FGDC Publications, U.S. Geological Survey, 590 National Center, Reston, VA 22092.
FGD Newsletter 1, Spring 1991

CARTOGRAPHY AND GIS CAREER GUIDE
The American Cartographic Association recently released its new Career Guide *Cartography and Geographic Information Systems*. It discusses cartography, GIS, types of maps, making of maps, where cartographers work, etc. To obtain a copy write to the American Congress on Surveying and Mapping, Suite 100, 5410 Grosvenor Lane, Bethesda, MD 20814 or call (301) 493-0200, fax (301) 493-8245. Costs: 1-5 are free; 5+ are $.75 each.
Wisconsin Mapping Bulletin 17:30, May 1991

map librarian bulletin board

Geographic Name Server
Tom Libert of the University of Michigan has implemented a TCP-based geographic name server. The server retrieves a variety of data from a database containing information on US cities. The geographic names database contains state, county, latitude and longitude information. It also contains 1980 census population, (an update based on the 1990 census is likely), elevation, area code, and ZIP code for a large subset of U.S. cities, as well as a small number of foreign cities. Information about other geographic features such as counties, states, rivers and lakes are also available. For more information, contact the author by email at libert@eecs.umich.edu; phone (313) 662-6520.

Top 10 Maps
OCLC provides its members with the world's largest bibliographic database. This database grows by some two million records a year, totalling since its inception in 1971 to over 23 million records in eight formats and some 375 million location listings for those records. Most bibliographic records in the database are held by several or many libraries. The ten top map titles, according to OCLC's location holdings data, are ranked as follows:

1. Magnetic anomaly map of North America
2. Southern Lebanon border area
3. Potential natural vegetation of the conterminous United States
4. Iraq
5. Distribution of religions
6. Middle East area oil fields and facilities
7. North Korea
8. Gravity anomaly map of North America

9. Seismicity map of North America, 1988
10. Central America and the Caribbean.

OCLC Newsletter, March/April 1991

A New Canadian Product

The National Atlas of Canada, 5th Edition is now available in a format which will be of great benefit to all educational institutions. Each map is available in fiche size transparencies suitable for overhead projection. Available in English and French. The set of 70 maps is contained in a binder with fiche in English and French. The set of 70 maps is contained in a binder with fiche holders allowing for an additional 45 maps. The set may be purchased for $560 or individual titles may be purchased at $8.00 each. For further information contact William F. Marsh Enterprises, P.O. Box 13291, Kanata, Ontario K2K 1X4.

Contours No. 2, June 1991

cartographic events

EVENTS CALENDAR

1991

October 1-4: **1991 Seybold Computer Publishing Conference + Exposition**, The Evolving Process of Communication, San Jose Convention Center, San Jose, CA. Contact: Seybold Seminars, c/o CompuSystems, PO Box 6430, Broadview, IL 60153-6430.

October 20-23: **North American Cartographic Information Society**, Eleventh Annual Meeting, Milwaukee, WI. Contact: Sona Andrews, Department of Geography, University of Wisconsin — Milwaukee, Milwaukee, WI 53201; (414) 229-4872.

October 22-25: **Visualization '91**, Visual Strategies for Knowledge, Marriott Mission Valley, San Diego, CA. Sponsored by IEEE Computer Society—Technical Committee on Computer Graphics. Contact: **GIS** IEEE Computer Society Conference Department, (202) 371-1013; Fax (202) 728-0884.

October 23-26: **1991 Annual Meeting of the National Council for Geographic Education,** "This Land is Our Land," Radisson St. Paul, St. Paul, MN. Contact: Constance McCardle, (412) 357-6290.

October-24-27: **GIS Higher Education Symposium**, University of South Florida, Tampa, FL. Contact: Robert Aangeenbrug, Department of Geography, SOC 107, University of South Florida, Tampa, FL 33620-8100.

October 27-30: **GIS/LIS 1991 Annual Conference and Exposition and ACSM/ASPRS Fall Convention**, Atlanta, GA. Contact: ACSM, 5410 Grosvenor Lane, Bethesda, MD 20814, (301) 493-0200; fax: (301) 493-8245.

November 14-15: **Geomatics III — A Present Bursting with Activities**, Montreal, Canada. Contact: Francois Dutil; (514) 342-9581.

December 1-4: **Geographic Information Systems (GIS) in Public Utilities Specialty Conference**, Hyatt Orlando Hotel and Convention Center in Orlando, Orlando, FL. Contact: WPCF Conference Department, (703) 684-2400.

1992

January 4-11: **Second International Geography Congress of the Americas**, Cusco, Peru. Contact: Sociedad Geografica de Lima, Apartodao 100-1176, Lima 100 Peru; Fax: 51-14-456399.

February 9-14: **GIS '92, 6th Annual Symposium**, Working Smarter, Geographic Information Systems in Forestry, Environment and Natural Resources Management, Vancouver, British Columbia, Canada. Contact: GIS '92 Symposium Office, 720-845 Cambie Street, Vancouver, British Columbia, Canada V6B 4Z9, (604) 688-0188; Fax (604) 688-1573.

March 22-28: **ACSM/ASPRS Annual Convention**, Albuquerque, NM. Contact: ACSM, 5410 Grosvenor Lane, Bethesda, MD 20814, (301) 493-0200.

Summer: **Fifth International Symposium on Spatial Data Handling**, USA. Contact: Prof. Duane F. Marble, Department of Geography, The Ohio State University, Columbus, OH 43210, (614) 292-2250, telex: (650) 218-4975 MCI.

August 2-14: **17th International Society for Photogrammetry and Remote Sensing Congress**, Washington, DC. Contact: 17th ISPRS Congress Secretariat, Box 7147, Reston, VA 22091.

August 9-16: **27th International Geographical Congress**, Washington, DC. Contact: Anthony de Sousa, 27th IGC, 17th and M Sts. N.W., Washington, DC 20036, (202) 828-6688.

October: **North American Cartographic Information Society,** Twelfth Annual Meeting, Minneapolis, MN.

November 6-12: **GIS/LIS 1992 Annual Conference and Exposition and ACSM/ASPRS Fall Convention,** San Jose, CA. Contact: ACSM, 5410 Grosvenor Lane, Bethesda, MD 20814, (301) 493-0200.

1993
February 15-18: **ACSM/ASPRS Annual Convention**, New Orleans, Louisiana. Contact: ACSM, 5410 Grosvenor Lane, Bethesda, MD 20814, (301) 493-0200.

NACIS news

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BEGINNING ANOTHER DECADE

North American Cartographic Information Society Eleventh Annual Meeting — October 20-23, 1991

Preliminary Program

SUNDAY, OCTOBER 20

10:00 am - 7:00 pm	*Registration*
10:00 am	*NACIS Board Meeting*
1:00 - 4:30 pm	*Pre-conference Boat Trip*
7:30 pm	*Opening Session*

Keynote Speaker
Professor Brian Harley

9:00 - 11:00 pm	*Poster Session and Reception* *University Cartography Laboratories*

MONDAY, OCTOBER 21

8:00 am - 7:00 pm	*Registration*
9:00 am - Noon	*Exhibits Open*
8:30 am - 10:00 am	*Concurrent sessions*

SESSION A: WORKSHOP

Compasses That Haven't Been Built: Orienting Ourselves in the Real World
Henry W. Castner, Pittsboro, NC

SESSION B: MAP PRODUCTION

Microcomputer-Based Postscript Large Format Cartography
Brad Javenkoski, University of Wisconsin — Milwaukee

Preprocessing CAD Data: Large Areas From Small Digitizers on a Small Budget
Kathryn Ford Thorne, Aurora, IL

Cartographic Information on Film
Malcolm Duffek, Color Microimaging Corporation, Colorado Springs, CO

10:00 am - 10:30 am *Break*
10:30 am - Noon *Concurrent sessions*

SESSION C: WORKSHOP

Designing Symbols: Discovering Some Underlying Concepts
Henry W. Castner, Pittsboro, NC

SESSION D: ROUNDTABLE
Cartographic Information in the Government

12:00 - 1:30 pm *Luncheon and Annual Business Meeting*

Speaker
Dr. Christopher Baruth

2:00 - 4:00 pm *Concurrent sessions*

SESSION E: CARTOGRAPHIC EDUCATION AND ANIMATION

The Thematic Map as a Didactic Resource in the Process of Teaching Geography
Josefina Ostuni, Mendoza, Argentina

Grading the Graphics: A Critique of the Maps We Learn From
Donald J. Ziegler, Old Dominion University, Norfolk, VA

Teaching Map Projections Through Animation
Sona Andrews and David Tilton, University of Wisconsin—Milwaukee

SESSION F

Public Access to Geographic Information Systems: Your Federal Government at Work
Susan L. Nelson, Wheaton, MD

Global Positioning System: Status Update
Ron Bolton, NOAA, National Ocean Service

Magnetic Variation and its Role in Determining Direction
Ron Bolton, NOAA, National Ocean Service and
Norman W. Peddie, U.S. Geological Survey

5:00 - 9:00 pm *AGS Reception — transportation provided*

TUESDAY, OCTOBER 22

8:30 - 10:00 am *Concurrent sessions*

SESSION G: MICROCAM SOFTWARE

a. **The User-Friendly MicroCAM Interface Software for Inexpensive Production of Outline Maps and Cartographic Education**

b. Teaching Cartographic Fundamentals with MicroCAM Software

c. Introductory Cartography Exercises with MicroCAM Software
Paul S. Anderson, Illinois State University, Normal, IL

SESSION H: ROUNDTABLE
Ethics in Cartography

10:00 - 10:30 am	*Break*
10:30 am - Noon	*Field Trips* *Milwaukee's Lakefront Development Bus Tour* *Walking Tour of Downtown — Mapping Organizations* *Brewery Tour*

6:30 - 7:15 pm	*Reception and Cash Bar*
7:30 - 9:00 pm	*Annual Banquet*

Speaker
Professor William Huxhold

WEDNESDAY, OCTOBER 23

8:30 - 10:00 am

SESSION J: ROUNDTABLE
Cartography in the Private Sector

10:00 - 10:30 am	*Break*
10:30 am - Noon	*Concurrent sessions*

SESSION K: HISTORICAL CARTOGRAPHY

The Cartography of William Hack
Peter R. Galvin, St. Norbert College, DePere, WI

Some Factors of the Early English World Atlas
Dalia Varanka, University of Wisconsin — Milwaukee

Pearl Harbor Maps
Daniel K. Blewett, Loyola University of Chicago

SESSION L: CARTOGRAPHY

Trends in Cartographic Research: 1964-1989
Pat Gilmartin, University of South Carolina, Columbia, SC

Weighted Contours (A Surface Representation Strategy for Cartographic Visualization)
David DiBiase, Pennsylvania State University, University Park, PA

Interface in Cartography
Michael Peterson, University of Nebraska at Omaha, Omaha, NE

12:00 - 1:30 pm	*Lunch*
1:30 - 3:00 pm	*Business Meeting and Election of Officers*
3:15 - 5:00 pm	*NACIS Board Meeting*

EXCHANGE PUBLICATIONS

Cartographic Perspectives gratefully acknowledges the publications listed below, with which we enjoy exchange agreements. We continue to seek agreements with other publications.

Cartography Speciality Group Newsletter. Biannual publication of the Cartography Speciality Group of the Association of American Geographers. Features news, announcements and comics.
Contact: Ellen White, Editor, CSG Central Office, Department of Geography, Michigan State University, East Lansing, MI 48824; (517) 355-4658.

Cartomania. This quarterly newsletter of the Association of Map Memorabilia Collectors offers a unique mix of feature articles, news, puzzles, and announcements of interest to cartophiles. ISSN 0894-2595.
Contact: Siegfried Feller, publisher/editor, 8 Amherst Road, Pelham, MA 01002; (413) 253-3115.

Geotimes. Monthly publication of the American Geological Institute. Offers news feature articles, and regular departments including notices of new software, maps and books of interest to the geologic community. Articles frequently address mapping issues. ISSN 0016-8556.
Contact: Geotimes, 4220 King Street, Alexandria, VA 22302-1507.

GIS World. Published six times annually, this news magazine of Geographic Information Systems technology offers news, features, and coverage of events pertinent to GIS.
Contact: Julie Stutheit, Managing Editor, GIS World, Inc., P.O. Box 8090, Fort Collins, CO 80526; (303) 223-4848; fax: (303) 223-5700.

Information design journal. Triannual publication of the Information Design Unit. Features research articles reporting on a wide range of problems concerning the design and use of visual information.
Contact: Information design journal, P.O. Box 185, Milton Keynes MK7 6BL, England.

Perspective. This newsletter of the National Council for Geographic Education (NCGE) is published five times a year in October, December, February, April and June. News items related to NCGE activities and geographic education are featured.
Contact: NCGE, Leonard 16A, Indiana University of Pennsylvania, Indiana, PA 15705; bitnet: CLMCCARD@IUP.

instructions to contributors

FEATURED PAPERS

All featured papers will be *solicited* by the NACIS Publications Committee. The goals of the solicitation procedure will be to select high quality papers that provide a balanced representation of the diverse interests of the membership. The primary mechanism for soliciting featured papers will be a paper competition held in conjunction with the Annual Meeting. All papers prepared for the meeting and submitted in written and/or digital form will be considered. Three of these will be selected to appear in *Cartographic Perspectives* during the next year.

In addition to the competition winners, the Publications Committee (in consultation with the editors) will solicit one or more papers each year from other sources. The goal here is to ensure that all aspects of the membership are served and to attract some thought-provoking ideas from authors who may not be able to attend the annual meeting.

Authors of selected papers will be given an opportunity to respond to suggestions of the Publications Committee before submitting a final version. The writing quality must adhere to high professional standards. Due to the interdisciplinary nature of the organization, it is particularly important that papers are carefully structured with ideas presented succinctly. The editors reserve the right to make editorial changes to ensure clarity and consistency of style.

Papers ranging from the theoretical/philosophical to methodological/applied topics will be considered providing that ideas are presented in a manner that will interest more than a narrow spectrum of members.

To be considered for the paper competition, papers should be prepared exclusively for NACIS, with no major portion previously published elsewhere.

TECHNICAL GUIDELINES FOR SUBMISSION

Cartographic Perspectives is designed and produced in a microcomputer environment. Therefore, contributions to *CP* should be submitted in digital form on 3.5" or 5.25" diskettes. Please send paper copy along with the disk, in case it is damaged in transit.

Text documents processed with Macintosh software such as *WriteNow, WordPerfect, Word,* and *MacWrite* are preferred, as well as documents generated on IBM PCs and compatibles using WordPerfect or Word. ASCII text files are also acceptable.

PostScript graphics generated with Adobe *Illustrator* or Aldus *FreeHand* for the Macintosh or Corel Systems' *Corel Draw* for DOS computers are preferred, but generic PICT or TIFF format graphics files are usually compatible as well.

For those lacking access to microcomputers, typed submissions will be cheerfully accepted. Manually produced graphics should be no larger than 11 by 17 inches, designed for scanning at 600 dpi resolution (avoid fine-grained tint screens).

Submissions may be sent to: David DiBiase, Department of Geography, 302 Walker Building, Pennsylvania State University, University Park, PA 16802; (814) 863-4562; email: dibiase@essc.psu.edu.

COLOPHON

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NACIS membership form

North American Cartographic Information Society
Sociedad de Información Cartográfica Norte Americana

Name/Nombre: _____

Address/Dirección: _____

_____

_____

Organization/Afiliación profesional: _____

_____

Your position/Posición: _____

Cartographic interests/Intereses cartografico: _____

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Professional memberships/Socio de organización: _____

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Membership Fees for the Calendar Year*/
Valor de nomina de socios para el año:
Individual/Regular: $28.00 U.S./E.U.
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Institutional/Miembros institucionales:
$58.00 U.S./E.U.

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c/o Edward J. Hall, Treasurer
Map Library
410 McGilvrey Hall
Kent State University
Kent, OH 44242-0001

***Membership fees include subscription to *Cartographic Perspectives* and are due January 1.**

The North American Cartographic Information Society

(NACIS) was founded in 1980 in response to the need for a multidisciplinary organization to facilitate communication in the map information community. Principal objectives of NACIS are:

§ to promote communication, coordination, and cooperation among the producers, disseminators, curators, and users of cartographic information;

§ to support and coordinate activities with other professional organizations and institutions involved with cartographic information;

§ to improve the use of cartographic materials through education and to promote graphicacy;

§ to promote and coordinate the acquisition, preservation, and automated retrieval of all types of cartographic material;

§ to influence government policy on cartographic information.

NACIS is a professional society open to specialists from private, academic, and government organizations throughout North America. The society provides an opportunity for Map Makers, Map Keepers, Map Users, Map Educators, and Map Distributors to exchange ideas, coordinate activities, and improve map materials and map use. *Cartographic Perspectives*, the organization's Bulletin, provides a mechanism to facilitate timely dissemination of cartographic information to this diverse constituency. It includes solicited feature articles, synopses of articles appearing in obscure or non-cartographic publications, software reviews, news features, reports (conferences, map exhibits, new map series, government policy, new degree programs, etc.), and listings of published maps and atlases, new computer software, and software reviews.

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