



*cartographic perspectives*

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*note from the editor*

For each of the past three years, one issue of *Cartographic Perspectives* has been reserved for a guest editor. Trudy Suchan produced a special issue of *CP* in 1998. Pat Gilmartin served as guest editor for *CP* 33 in 1999. For this first issue of 2000, we are fortunate to have Mark Monmonier as guest editor for a retrospective on cartography in the 20<sup>th</sup> century. I would like to thank all three guest editors for their efforts in producing these special issues.

Guest editors can solicit articles that explore a particular topic in greater detail. As such, these issues focus attention on a particular area and provide an important outlet for research in cartography. The articles undergo a review process, like all featured articles submitted to *CP*. And, like all articles in *CP*, the articles are insightful, well-researched, thought-provoking and adhere to the *CP* policy of presenting meaningful information in an understandable way.

*Michael Peterson, editor*

**NOTE FROM THE ASSISTANT EDITOR:** Guest Editor Mark Monmonier has compiled four essays for this special issue of *Cartographic Perspectives*. Because of space limitations the other content areas that normally appear have been omitted and will be included in the next issue.

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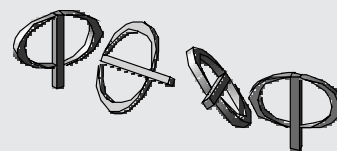
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*about the cover*



The cover was designed by Steven R Holloway and Chris Winne. Both are with the University of Montana in Missoula, Montana; Steven with the department of Geography and Chris with the Wildlife Spatial Analysis Lab ([www.wru.umt.edu](http://www.wru.umt.edu)).

The cover map/image is the last in a series of four reflecting on the Loma Montana area in north central Montana. The piece is a low oblique view looking east or downstream the Missouri River and uses Landsat 5, band 4 imagery draped over digital elevation models of the area. The photo at the bottom of the cover is taken from Observation Hill just to the south and west of Loma and along the Missouri River where the Marias River enters; the site of the "Corps of Discovery's" June 1805 debate on the correct channel to take; the Marias or Missouri.

## essay

## History of Mapping and Map Use in the Twentieth Century: An Invitation

When Mike Peterson asked me to serve as a guest editor for *Cartographic Perspectives*, I willingly agreed—what better way to recruit scholars for Volume Six of the *History of Cartography* than a special issue of the United States' premier journal for maps, mapping, and map use.

Volume Six will complete the multi-volume general history of cartography conceived in 1977 by David Woodward and the late Brian Harley, and published by the University of Chicago Press. Most readers will have seen the first two volumes, and many, I am sure, have their own copies. Volume Two is actually three large books, the last of which was published in 1998. David and Brian had hoped to complete the entire work in the mid 1990s. But the subject—cartography, maps, mapping, map use, and the social and intellectual roles of mapping—proved richer and more challenging than either they or the Press had realized. Volume Three is underway, and the complete manuscript is scheduled to go to the Press in Fall 2002. To assure a more timely completion of the remaining volumes, David has recruited co-editors for Volumes Four and Six. I'm the first, and David has recently announced the co-editors for Volume Four: Graham Burnett, Matthew Edney, and Mary Pedley.

As Table 1 indicates, the boundaries between the *History's* six volumes are either regional or chronological, and the scope of Volume Six is the Twentieth Century. That's an enormously rich time period for what's planned as a 1,500 page book. More daunting, though, is the relative dearth of published scholarship on the historical development of cartography in the twentieth century: a puzzlement insofar as the cartographic literature of the past quarter century is no doubt far larger in number of words, pages, or any other metric than all previously published cartographic writings combined. Despite generally conscientious attempts by contemporary researchers to relate their contributions to existing literature, most articles in cartographic journals are flagrantly ahistorical or, to borrow a historian's pejorative, 'presentist'.

*Table 1. The six volumes of the History of Cartography are organized by region and time period.*

Volume 1: *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean* (1987)

Volume 2, Book 1: *Cartography in the Traditional Islamic and Southeast Asian Societies* (1992)

Volume 2, Book 2: *Cartography in the East and Southeast Asian Societies* (1994)

Volume 2, Book 3: *Cartography in the Traditional African, American, Arctic, Australian, and Pacific Societies* (1998)

Volume 3: *Cartography in the European Renaissance* (forthcoming)

Volume 4: *Cartography in the European Enlightenment*

Volume 5: *Cartography in the Nineteenth Century*

Volume 6: *Cartography in the Twentieth Century*

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What's worse, historians of cartography as a group have shown little interest in the twentieth century. Although the history of cartography is a recognizable subdiscipline within cartography, there's little research, published or in progress, on the recent history of maps and mapping. Why that's so is a mystery—political historians, for instance, have no qualms about probing the very recent past, for which primary sources and living informants are comparatively abundant. Maybe it's a matter of collectability: few maps from the 1930s or the 1950s appear in dealers' catalogues—not yet anyway. Or perhaps the twentieth century's maps seem too common, too mundane, too aesthetically unattractive, or even too functional. Whatever the reason, the history of cartography in the twentieth century lacks the critical mass to attract substantial numbers of doctoral candidates or mature scholars in search of new challenges.

That's where this special issue of *Cartographic Perspectives* might help. Its individual essays, although few in number, reflect a diversity of intriguing questions awaiting curious scholars. In the first paper, for instance, historian Susan Schulten examines how Rand McNally courted consumers by reinforcing the public's sense of America's role in the world political economy. Following Susan's contribution, cartographic historian James Akerman provides an intriguing examination of how some consumers, not satisfied with the product offered, blurred the line between map maker and map user by annotating road and travel maps. In the third paper, geographer Jeremy Crampton applies his fascination with theory to the emergence of the Internet as a key vehicle for map dissemination and interactive mapping. And in the final essay, I look at the interaction among GIS and detailed census data, legislative and judicial efforts to promote minority voting rights, and public resistance to irregularly shaped voting districts.

To put these four essays in a wider context, I invite inspection of Table 2, the tentative outline for Volume Six. The third or fourth revision of an outline David, Brian, and I developed in the mid 1980s, the current plan focuses on the uses and societal impacts of maps and mapping as well as the development of new technology. In October 1997, the outline was critiqued at a conference held at the U.S. Library of Congress and sponsored by the National Endowment for the Humanities. The 34 scholars and practitioners who attended the conference reassured us that the general direction was appropriate and offered numerous suggestions for fleshing out the outline and carrying the work forward.

*Table 2. The tentative outline of Volume Six consists of introductory material and five major sections, unequal in length.*

## Introduction and Historiography

### I—Major Technical Developments in Cartography and GIS

- Geodetic triangulation; figure of the earth
- Surveying instrumentation and techniques; training, apprenticeship, and textbooks
- Scales and metrication
- Navigation (including longitude determination)
- Changing theory, practice, and training
- Map transformations, coordinate systems
- Cartographic instrumentation
- Map production
- Storage media: paper, film, electronic media, etc.
- New formats

Division of labor and mass production in cartography

Cartographic signs:

- New specialized techniques and symbolism
- The third dimension in cartography
- Animation

Cartographic algorithms

The interactive map and hypertext

GIS

## **II—Maps and the Military; Defense and Surveillance Technologies**

World War I

Geopolitical use of maps in the interwar period

World War II

The Cold War

Civilian applications of military technology

## **III—Maps and the Arts, Sciences, and Humanities**

Maps and the Sciences

- Earth Sciences: geological mapping and geology, geomorphology, climatology, meteorology, soil science, hydrology, geophysics (including volcanology, seismology, and geomagnetism), and oceanography.
- The Life Sciences
- Engineering
- Medicine and Public Health

Maps and the Social Sciences

- Geography
- Psychology
- History
- Anthropology
- Archaeology
- Sociology
- Economics and Management

Maps and the Arts and Humanities

- Maps and Literature
- Maps and Linguistics
- Maps and Philosophy and Aesthetics
- Maps and Design

## **IV—Maps and Public Life**

Legal and Public Policy

- copyright
- privacy
- data standards, accuracy, and uncertainty (and its representation)
- access
- pricing strategies, marketing
- liability
- land-use legislation
- boundary issues
- political redistricting
- hierarchies of mapping agencies
- international cooperation

Public Information and Communications

- media
- commercial mapping

- wayfinding
- advertising
- growth of map collections and map librarianship and cartobibliography
- education
- the Internet/World Wide Web

#### Maps and Public Administration

- basic mapping — a world survey
- cadastral mapping
- real property assessment
- land use and land cover mapping — a world survey
- statistical mapping — a world survey
- the national atlas
- environmental management
- growth control
- planning
- environmental protection and remediation
- risk management (hazard maps)
- emergency management
- demographic analysis

#### **V—Maps in Everyday Life**

Aesthetics

Recreation

Humor

Folk cartography

With the help the National Science Foundation we are, ever so deliberately, carrying the work forward with the “Exploratory Essays Initiative.” Our three-year grant provides small research stipends for a minimum of ten scholars who agree to conduct original research on a topic within the scope of the outline in Table 2 and prepare an essay, which we will publish in a special double-issue of a cartographic journal. A seven-member international board of advisors is helping us select candidates, and all of us (participating authors, board members, and project staff) will meet in June to discuss sources, approaches, and conceptual issues. And two years later the authors will present their results at a symposium on the history of cartography in the twentieth century. Between the two meetings David and I will work closely with the participants, many of whom, we hope, will eventually join us as chapter or section authors for Volume Six.

If you’re intrigued and qualified, write me at once for details. At this writing, we can still accommodate a few more participants.

## The Limits of Possibility: Rand McNally in American Culture, 1898-1929

In the early twentieth century, Rand McNally held a large share of the commercial market for maps and atlases in the United States. How the company built its reputation as an American cartographic authority—by both accepting and resisting change—is the subject of this essay. Critical to the company's success was its ability to design materials that reinforced American notions of how the world ought to appear, an indication that the history of cartography is governed not just by technological and scientific advances, but also by a complex interplay between map-makers and consumers.

For millions of Americans, the name Rand McNally is synonymous with maps. For over a century the company has held a disproportionate share of the educational and general market for atlases and maps, and has enjoyed a reputation of cartographic authority in America rivaled only by the National Geographic Society. In the wake of the Civil War, Rand McNally introduced new, less expensive techniques into the historically costly and time-consuming craft of mapmaking, and in the process brought maps and atlases within reach of an entirely new segment of the American population. By the late 1890s, the nation's activist politics abroad sparked in Americans a keen interest in world geography; thus the Spanish American War proved a boon to Rand McNally as well as Hearst and Pulitzer. This widened audience—boosted by technological change, the nation's expansionist posture abroad, and a growing leisure market at home after World War One—encouraged Rand McNally to adopt more aggressive and sophisticated strategies in the hope of controlling its increasingly national market. More specifically, the company strengthened its reputation in these years by designing maps and atlases that balanced its own cartographic imperatives against the public's expectations of what a map and an atlas *ought* to be. How the company negotiated its success in the early twentieth century—by both accepting and resisting change—is the subject of this essay.

At the turn of the century, American mapmaking had only recently become a truly mass phenomenon. This dramatic change was largely attributable to the introduction of a new process known as wax engraving, exploited most successfully by Rand McNally. A small printing firm founded in the 1870s, Rand McNally initially produced railroad tickets and timetables, and soon noticed a demand for railway maps as well. The decision to adopt the new technique of wax engraving brought an entirely new style of map into circulation. Technically, the process allowed the inclusion of as much type as desired on a map, while earlier hand lettering techniques had naturally circumscribed the amount of information possible. In this regard, the advent of wax engraving coincided nicely with the expansion of railroads, as the former could easily detail the individual routes of an expanding national transportation network. Soon American

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### INTRODUCTION

*“. . . the Spanish American War proved a boon to Rand McNally as well as Hearst and Pulitzer.”*

### THE ENTRENCHMENT OF AN AMERICAN STYLE

mapmaking firms were living by the credo that “more is better,” loading the maps with as much information as possible rather than limiting the number of place names to emphasize the largest or most important (Figure 1). Ironically, it was the apparently democratic practice of including as many towns as possible on the map—facilitated by wax engraving—that transformed the nature and character of American mapping. By identifying as many locations as possible, regardless of size, the maps offered little indication of relative population density. In addition to suggesting that all areas were equally settled, these maps encouraged readers to identify discrete locations rather than to explore relationships, a fact confirmed by the ever more comprehensive indexes at the end of the atlas that listed virtually every town or village. This reference quality was perhaps the atlases’ strongest selling point, but in the process topographic contours and spot elevations were sacrificed. For this and other reasons contemporary cartographers and geographers often judged wax engraving an aesthetically inferior process that diminished the need and opportunity to learn map-making skills such as feature selection. Over time, this prevailing style began to entrench itself, transforming a historical practice into a cartographic ideal, an accidental aesthetic that transcended the circumstances of time and technology.<sup>1</sup>



Figure 1. Detail of a wax engraved map from Rand McNally's Premier Atlas of the World (1924). Notice the emphasis on place names at the expense of the terrain itself, particularly suitable for an age of rail travel and national expansion westward.



Despite the stylistic inflexibility of the wax-engraved maps, the early twentieth century represents a turning point for the world atlases that contained them. In the 1880s and early 1890s, from 75 to 80 percent of atlas maps were devoted to the United States. The *New Household Atlas of the World* (1885) gave two pages to a map of Alabama but covered the African continent in a single page. Though designated as “world” atlases, the vast majority of the atlas maps were dedicated to the United States, which the format of the atlas separated from the rest of the world. The atlases organized the world according to levels of progress—savage, enlightened, civilized—achieved by the different races, nations, and continents, categories that were themselves conflated through prominent illustrations of the “four quarters of the globe.” Generally, the atlases brought the world home to Americans largely as a spectacle, a distant reality that conformed to existing notions of racial and cultural hierarchy.

The flurry of American activity abroad in the 1890s, however, recast many of the conventions in the world atlas. Territorial acquisitions as well as the “rediscovery” of Alaska after the Yukon gold strike encouraged Rand McNally to design cheap, mass-produced “war atlases” for the public in 1898 and 1899. These brief atlases—the first of their kind in America—as well as the peacetime world atlases that followed began to narrate their geographical subjects in terms of resources and commerce rather than race. This reconceptualization of the world around resources and commerce dominated the atlases both as a motive for acquiring territory and as an evaluative framework. The reorientation of foreign policy at the turn of the century accelerated this shift from a world of racial hierarchy in which the United States stood apart to an economic world in which the nation was actively involved. This unconditional support for American economic and territorial expansionism is reflected in new maps and descriptions of Cuba, the Philippines, and other areas under American jurisdiction. Maps of these acquisitions were prominently and proudly featured in war atlases, indicating that the goal was not just to chronicle the conflict but also to defend the territorial spoils of war. In Rand McNally’s 1898 *War Atlas*, for instance, “vital information” printed about the Philippines, Cuba, and Puerto Rico focused on exports and resources rather than culture or race. In the same year Rand McNally introduced and evaluated the new territories according to their actual and potential commercial value. These profiles were typified by frequent histories of the Philippines that emphasized the islands’ economic wealth but made only cursory mention of social or political life. Commercial profiles were also used to introduce America’s emerging relationship to Hawaii, Cuba, and Puerto Rico, as well as the newly discovered riches of Alaska (Rand McNally 1898a, 8-9, 12-13). War atlases, like the wartime issues of the *National Geographic*, were graphic arguments for the American mission abroad. Both media visually introduced the public to the new possessions and celebrated their potential contribution to American wealth. In both cases, the “science” of geography had translated controversial events and policies into matters of fact for middlebrow consumption.

After the turn of the century the number of United States maps declined to about 50 percent, making twentieth-century atlases significantly more cosmopolitan than their predecessors.<sup>2</sup> And while late-century atlases began with maps of the world and the hemispheres, those designed in the wake of the Spanish American War rushed to narrate the nation’s past and future gain by first featuring the new territories of the Pacific and the Caribbean. As late as World War I, Rand McNally’s *Imperial Atlas*—the name itself significant—opened with a map of America’s epic growth across the west and around the world (Figure 2). The *Imperial Atlas* had reinvented the United States by extending its borders beyond the continent.

## MAPPING EXPANSION

*“Generally, the atlases brought the world home to Americans largely as a spectacle, a distant reality that conformed to existing notions of racial and cultural hierarchy.”*

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As one reviewer commented,

It does look a little bit odd to see Puerto Rico, Hawaii, and the distant Philippine islands on the United States map. But they are there and printed as carefully and described as carefully as if they had been for a whole generation in their present honored company.<sup>3</sup>

The nation had arrived on the world stage, a claim conveyed by Rand McNally's decision to separate maps of the European powers from those of their colonies rather than to group them according to the principle of imperial unity applied to the United States.<sup>4</sup>

These atlases disproportionately covered the nation's new territories, a trend mirrored in the contemporary issues of the *National Geographic*. Rand McNally's *Imperial Atlas* of 1904 boasted four maps of Manila Bay but only three for all of Africa. A 1912 atlas introduced an elaborate map of the Philippines, and one marketed in 1915 devoted two full pages to the West Indies. The detail of these maps, like American interest, peaked



Figure 2. Rand McNally's map of expansion, 1900. Rather than convincing readers to support the Spanish-American War, the map simply framed the territories as the latest installments in a progressive, unfolding national history. Through cartography—which gave these changes a kind of authority and permanence—the divisive war had been transformed from controversial politics into immutable history.

prior to World War One.<sup>5</sup> As one company employee candidly remarked, the degree of attention given to any region was a function of, among other things, its “relative commercial or industrial importance.”<sup>6</sup> Hammond’s *Pictorial Atlas* of 1912 used a thematic map to organize the world not according to language spoken—a common practice in the nineteenth century—but according to language used to conduct commerce.

The changing narrative text of the atlas over time also indicates the fluid nature of the atlas. The 1887 edition of the *Pocket Atlas*, Rand McNally’s most popular series, described Japan as a social hierarchy with an absolute monarchy and compulsory school attendance, and then briefly enumerated its chief agricultural products (Rand McNally 1887, 38). Yet by 1900 the atlas focused on Japan’s rising manufacturing, trade, and mineral wealth, and described its principal cities in terms of the commercial infrastructures such as the extent of rail connections, ports, and industry. The Philippines, briefly passed over in the 1887 edition, were lovingly described by 1900 as having both “undeveloped” and “unsurpassed” resources (Rand McNally 1900, 331, 334, 339). In a similar vein, the profiles of Cuba changed radically between 1887 and 1900. In 1887 the colony was profiled briefly in a larger section on the West Indies through statistics on population, ethnic breakdown, geographical features, mineral wealth, and education (Rand McNally 1887, 179). Not surprisingly, in 1900 the American protectorate was given its own section apart from the West Indies, with a more comprehensive history of the island, including dates of discovery and exploration, wars, emancipation, and the details of the American occupation after the war with Spain. Following the island’s history, extensive descriptions of Cuba’s climate, forests, and mineral wealth accompanied a substantially more hopeful profile of its resources.

Forests [are] among [the] most valuable resources of the island. . . . Soil of almost inexhaustible fertility and highly favorable climatic conditions entitle Cuba to rank among the foremost agricultural countries of the world. Resources, however, are largely undeveloped, but possibilities of the island are almost incalculable. . . . Minerals abundant and valuable. (Rand McNally 1900, 219, 222-223)

With “innumerable varieties” of fruit trees that grew “luxuriantly,” the atlas enthusiastically advertised the island’s potential for trade. All these qualities gave Cuba tremendous commercial promise, a far cry from the description of 1887. Yet while the 1900 edition of the atlas pronounced Cuba’s mineral wealth “abundant and valuable . . . in some, deposits are inexhaustible” (Rand McNally 1900, 222, 228), by 1936 enthusiasm had died and the minerals were simply noted as “not of great commercial importance” (Rand McNally 1936, 246).<sup>7</sup> In these and other instances, characterizations of the natural world were themselves negotiable, as subject to change as political boundaries or foreign policy.

In the wake of the Spanish American War, newspapers and mass-circulation monthlies were full of cartoons using cartographic imagery to persuade readers of the nation’s urgent mission abroad. Illustrations of Uncle Sam extending his reach around the globe or of Spain’s pathetic retreat across the Atlantic translated the distant geography of the war into a comprehensible spatial narrative that implicitly endorsed American expansion. Similarly, while nineteenth-century atlases had underscored the gulf that lay between the United States and the rest of the world, those of the early twentieth century began to imagine an international community centered on a more activist, interventionist home country.

*“The changing narrative text of the atlas over time also indicates the fluid nature of the atlas.”*

*“. . . while nineteenth-century atlases had underscored the gulf that lay between the United States and the rest of the world, those of the early twentieth century began to imagine an international community centered on a more activist, interventionist home country.”*

## WORLD WAR ONE

Europe's descent into war generated a slew of popular war atlases in America, almost all of which were produced by private map companies. In many cases, though, the firms had little incentive to design maps specifically for the conflict, and simply repackaged existing maps of Europe. Symbolic was Rand McNally's *Atlas of the European Conflict* (1914a), which opened with a map of the world centered on the United States, one that necessarily divided Europe itself.<sup>8</sup> In the *Graphic Representation of the Battle Fields of Today*, Rand McNally used an existing commercial map of Germany that featured towns, sea routes, and shipping schedules. The map was difficult to read, overlettered, and strewn with details appropriate to an interest in peacetime commerce rather than wartime strategy.<sup>9</sup> Much of the difference between the European and American war maps was one of scale: generally the maps made in Europe depicted areas on a larger scale, which allowed for clearer relational descriptions. But because the American maps were taken from existing collections, their scales were qualitatively smaller and unsuitable for more than a cursory overview of the battlefields.<sup>10</sup>

Even the National Geographic Society, highly sensitive to public taste, replicated existing cartographic styles. The Society had long issued maps with its magazines, the earliest of which were designed to chronicle political conflicts such as the Sino-Japanese War, the Spanish-American War, the Boer War, and the Russo-Japanese War. But it was not until World War One that any of these maps were drawn by the Society itself. The 1918 map of the western front—the first to be created by the Society's new Cartographic Division—looked much like those made by Rand McNally, dull in appearance and with the overall contours of battle lost in an infinite jumble of place names. Yet it was this apparent "flaw"—the inclusion of every conceivable place name regardless of its significance—that was eagerly welcomed by the Society's own members. One member, who kept the map on his office wall, was thrilled with its inclusion of "more towns and villages than any other"; it was this quality that allowed him to follow the battles with precision.<sup>11</sup> Albert Holt Bumstead, the Society's head cartographer from the 1910s until his death in 1940, confirmed this sentiment in a letter to the *Geographic's* editor Gilbert Grosvenor in 1915. Discussing possible improvements for the look of the Society's maps, Bumstead decided to erase the contour lines that marked elevation, explaining that

*"Americans made sense of maps through towns that were relevant to them, and relief markings simply competed with and detracted from that goal."*

*"... maps were useful and valuable to the extent that they allowed one to identify multiple, discrete locations, even though it was precisely this feature that many European and American cartographers found so maddening."*

Contours mean much to me, but I must admit with disappointment that to most map users they are nothing but a confusion. Elevation is probably the least important of the information given on the map, so lets [sic] not sacrifice the clearness of anything else for its emphasis.<sup>12</sup>

Caleb Hammond, head of the Hammond map company from 1948 to 1968, concurred: Americans made sense of maps through towns that were relevant to them, and relief markings simply competed with and detracted from that goal. Though surely a generalization, occasionally the public confirmed Hammond's assumption, such as this suggestion sent to the National Geographic Society during the war:

I would like to have an atlas showing every TOWN in EUROPE and ASIA big enough to have a POST OFFICE and every STREAM long enough to have a NAME.<sup>13</sup>

To this reader, maps were useful and valuable to the extent that they allowed one to identify multiple, discrete locations, even though it was precisely this feature that many European and American cartographers found so maddening.

Though the maps were slow to reflect change, the text of the war atlases quickly responded to changes in American foreign policy. From Archduke Ferdinand's assassination in 1914 to Woodrow Wilson's declaration of war three years later, the United States maintained formal, if not actual, neutrality in Europe. Ethnic divisions and the desire to continue trading with members of both the entente and the alliance delayed what might have been an earlier commitment to defend Britain, and these atlases—as perfectly aligned with the state as they had been in 1898—reflected the same. Rand McNally's 1914 *Atlas of the European Conflict* characterized the war as a result of "the thirst for aggrandizement of empire, political, military, and commercial, and the mutual fear and jealousy of kings." For years, the atlas claimed, the world lived in fear of the inevitable clash between the nations of Europe,

*"Though the maps were slow to reflect change, the text of the war atlases quickly responded to changes in American foreign policy."*

each shouldering immense burdens of armament, each straining to surpass the other in strength, and power to destroy. Engines of war have been perfected until man's ingenuity in the preparation of catastrophic elements has been exhausted. (Rand McNally 1914a, n.p.)

But after the nation's entrance into war in April 1917, the company placed blame squarely on America's new enemies. Prussia had "foisted itself upon the confederacy of German states as the dominant power, the seat of an hereditary autocracy, and the controller of the constitution and the armed forces of the newly created empire" (Rand McNally 1917, 6). The war could now be understood as a result of Prussia's expansionist drive, yet this by no means translated into a denunciation of imperialism. As the atlas explained,

The power and wealth of a nation may be measured to a certain extent by the amount of territory she controls at home and abroad. Every square mile of territory is a source of revenue and mineral, agricultural, or manufactured products, offers a field for export and commercial exploitation, and yields land and customs revenue for the state. (Rand McNally 1917, 10)

These atlases immediately integrated Wilson's decision to enter the war by vilifying the ideology of America's new enemies: it was world domination, not economic expansion, that the atlases judged unacceptable.<sup>14</sup>

World War I brought dramatic upheaval to the boundaries of Europe. As a result of Wilson's Fourteen Points, the Austro-Hungarian and Ottoman Empires were dismantled to make way for Czechoslovakia, Yugoslavia, and a newly independent Poland. States in the Middle East also gained independence from the breakup of empire, leaving Turkey a small state, while Palestine, Jordan, and what is today Iraq were taken by the British, and Lebanon and Syria by the French. Africa was similarly redistributed among the victors. In Europe and the Middle East the war had dramatized the flexible nature of geography and left many Americans confused. Cartographic companies were quick to capitalize on this sense of epic geographic change. The romantic adventures of Lindbergh's flight across the Atlantic and Byrd's explorations of the South Pole also contributed to this swell of interest in geography. International radio news broadcasts of the 1920s encouraged listeners to follow events with an atlas, and the immensely popular *American School of the Air* became required listening in 200,000 classrooms over the course of its eighteen-year life from 1930 to 1948. Educational and popular radio programs exposed young listeners

THE POLITICAL AS NATURAL

*"In Europe and the Middle East the war had dramatized the flexible nature of geography and left many Americans confused."*

*“... after World War One, Rand McNally embarked on an aggressive campaign to protect and enlarge its sales through advertising, public relations, and even tariffs.”*

*“Despite the upheavals in Europe and the expanding consumer market at home, the world atlas emerged from the war with much of its prewar form and content intact.”*

to world events, exotic locales, and the feats of American explorers in the interwar era. The American public also became increasingly accustomed to reading maps after the automobile revolution of the 1920s. Oil companies began to give away road atlases at service stations, a practice that brought countless Americans into contact with maps on a daily basis and prompted one comment that “Map reading is no longer the trying, difficult schoolroom task it used to be.” Within this responsive set of circumstances after World War One, Rand McNally embarked on an aggressive campaign to protect and enlarge its sales through advertising, public relations, and even tariffs. In the process, the company secured not just its dominance of the atlas market but also its reputation among Americans as a cartographic authority.<sup>15</sup>

Despite the upheavals in Europe and the expanding consumer market at home, the world atlas emerged from the war with much of its prewar form and content intact. Rand McNally’s revised *Ideal Atlas of the World* introduced even more focused information about the natural resources of the world presented through a candid discussion of America’s need for markets and the commercial gains it had made in the war. The continuing commercial focus of the postwar atlases accompanied an increasing interest in the world as a physical manifestation, which reflected a growing interest in the physical world brought by professional geographers under the leadership of William Morris Davis and the physical surveys of North America carried out by the United States Geological Survey and the Army Corps of Engineers. The same agencies had surveyed the American territories in the early twentieth century; in the 1920s and 1930s, private cartographers conducted surveys of the United States, Europe, Japan, and South America.

These new surveys of the non-American world brought attention to the physical world, and new maps began to emphasize the physical layout of the land by charting climatic patterns, elevation, and sea currents. Yet the major American map companies generally excluded this information from their popular atlases after judging it appropriate for school students but not for the general population. This is nicely illustrated by the arrival of Rand McNally’s *Goode’s School Atlas* in 1923, introduced to fill the rising demand for physical atlases in the secondary schools. The atlas was conceived and executed by John Paul Goode, a professor of geography at the University of Chicago and since 1900 the chief cartographic advisor to Rand McNally. Overall, Goode’s atlas, like most others in the interwar years, continued to be dominated by economic and commercial maps and information. Even so, the atlas was innovative in its rejection of the Mercator projection and its focus on the physical nature of the earth.

Until this point, the world had consistently been depicted on the sixteenth-century Mercator projection. Widespread recognition of the limits of this projection did not develop until the 1930s and 1940s. (Woodrow Wilson was far ahead of his time when in 1913 he asked Americans to turn toward the globe in order to realize that nearly all of South America lay east of North America [Paterson 1989, 505].) The concept of projection was simply not yet part of American culture, and would not be until well after the First World War. By comparison, the 1882 edition of Stieler’s *Hand Atlas*, one of the most widely printed German atlases, displayed no less than nine different projections on its title page, implicitly suggesting the malleability of cartography (Scharfe 1997). Such a display would not have been culturally meaningful—and therefore possible—for the American public until the mid-twentieth century. This made the publication of *Goode’s School Atlas* in 1923 even more provocative, as it argued the irrelevance of the Mercator projection and emphasized the limits of any attempt to map the earth ac-

curately. Suddenly students were confronted with multiple “truths”—projections of all kinds that reconfigured the earth in startling ways—and then learned the distortions of each, the Mercator projection being only the most egregious case. As students turned the pages of the new atlas they found a strange new alternative based on Goode’s own homolosine projection (Figure 3), an attempt to correct for Mercator’s long-accepted flaws (Figure 4). With interruptions at the northern and southern latitudes, the new map challenged the cartographic sensibilities of both the general public and professional mapmakers. Andrew McNally recalled that although *Goode’s School Atlas* sold well in schools, the unfamiliar homolosine world map made it insufficiently “unified” to pass muster with the general public. One employee called it “a very confusing book” for its depiction of the world as “four irregular ovals connected at the North Pole, one a bit longer than the others and with a jagged tooth on its eastern side.” *National Geographic* editor Gilbert Grosvenor, writing to his new chief cartographer after the armistice, called attention to Goode’s new homolosine projection as clearly

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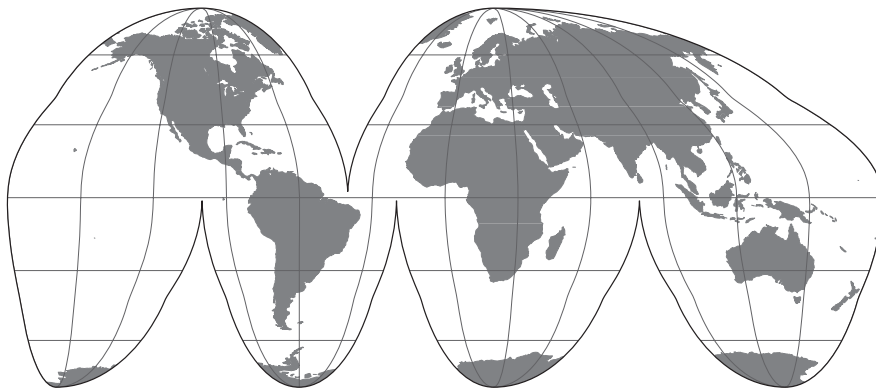


Figure 3. The twentieth-century homolosine projection.



Figure 4. The sixteenth-century Mercator projection.

*“The content of Goode’s maps were as disorienting as their shape.”*

*“Though Andrew McNally recognized the scientific superiority of the physical maps, he was wistful for the more romantic political maps that had become customary representations of the world.”*

*“The political map, dividing the world into empires and nations, had itself become normative, a kind of metageography.”*

*“One of Rand McNally’s reigning credos had been to create ‘a harmonious and pleasant looking world.’”*

superior to the “atrocious” Mercator projection, but like McNally found it lacking in intelligibility and visual appeal. Grosvenor offered \$2,000 for a new projection that combined the improved accuracy of the homolosine projection but with the graphic appeal of Mercator’s world.<sup>16</sup>

The orientation of the map was equally jarring. American students surveyed the world map to find Europe, rather than their own country, at its center. In this respect Goode challenged a long tradition that dated back to 1850, the publication of the first American-made map known to place the western hemisphere at the middle, rather than to the left.<sup>17</sup> With few exceptions later atlases continued to divide Eurasia rather than sacrifice the centrality of the United States, a practice encouraged by the growing importance of the Pacific to the nation in the twentieth century. In fact, the National Geographic Society mapped the world with the United States at the center almost without exception until 1975.<sup>18</sup> This made the appearance of Goode’s homolosine world map even more disruptive.

The content of *Goode’s* maps were as disorienting as their shape. The first edition of the atlas did not even include a political map that divided the world along national lines. Though the later editions introduced more traditional political maps, far more central were the extensive maps of ocean currents, climate, vegetation, and elevation (Figure 5). The physical maps were a clear departure for Rand McNally, rarely if ever included previously though a matter of course in European atlases. Though the company was assured a readership for the atlas within schools, many doubted the extent to which it would draw public interest. Andrew McNally II, then president of the company, was especially skeptical. Though he recognized the scientific superiority of the physical maps, he was wistful for the more romantic political maps that had become customary representations of the world. As one interviewer wrote,

a world made up of only slightly varying shades of green and brown hasn’t half the appeal (or the romance) of a world of pink and blue and yellow. And while it’s nice to know that the city of Manchester is situated (say) ninety feet above sea level, still it is more fun to be able to pick out all over the world the little pink spots of the British Empire. (Grant 1956, 20-21).

The political map, dividing the world into empires and nations, had itself become normative, a kind of metageography. Many of Goode’s revolutionary physical maps and projections were therefore only gradually introduced into the popular atlases. Not until 1937 did Rand McNally include world physical relief maps, maps of temperature provinces, and annual rainfall maps in its mass-marketed atlases. Even though it might have presented a more comprehensive picture, *Goode’s* world was disturbing to many at Rand McNally.<sup>19</sup> As one employee commented,

The total impression, once you get over the shock of a world so grievously sundered, is good; . . . political lines are so subordinated to physical features that one is brought up sharply in the realization that . . . France actually does run over into Germany, and Germany into Austria; that one isn’t permanently separated from the next by a line and a band of color. But again, the absence of all familiar color makes the book a purely utilitarian object, and not the glamorous gateway to romance that an atlas used to be.<sup>20</sup>

One of Rand McNally’s reigning credos had been to create “a harmonious and pleasant looking world.” This translated into one divided along





Figure 5. Detail from Goode's physical map of the American northwest.

political lines, as for many this had become the normative representation of the world on a map.<sup>21</sup> The rise of physical mapping challenged the familiarity of the political map that had dominated for decades, and highlighted the degree to which the latter had come to be understood not as a representation of the landscape, but as the landscape itself. In this regard maps are strongest and most persuasive—most scientific and powerful—when they tell consistent messages. More than a decade would pass before Goode's odd looking maps, though highly successful in American schools, were deemed acceptable for popular consumption and incorporated into the company's general atlases. In the meantime Rand McNally had made clear decisions about the kind of world the public would see.

Rand McNally cultivated its authoritative reputation in the interwar years in part through public relations, in part by producing custom maps, globes, and geographic displays for corporate clients and well-known individuals. American Airways, Texaco Oil, CBS Radio, the Bureau of Reclamation, International Harvester, National Cash Register, and the *Christian Science Monitor* were just a few of the organizations that contracted with

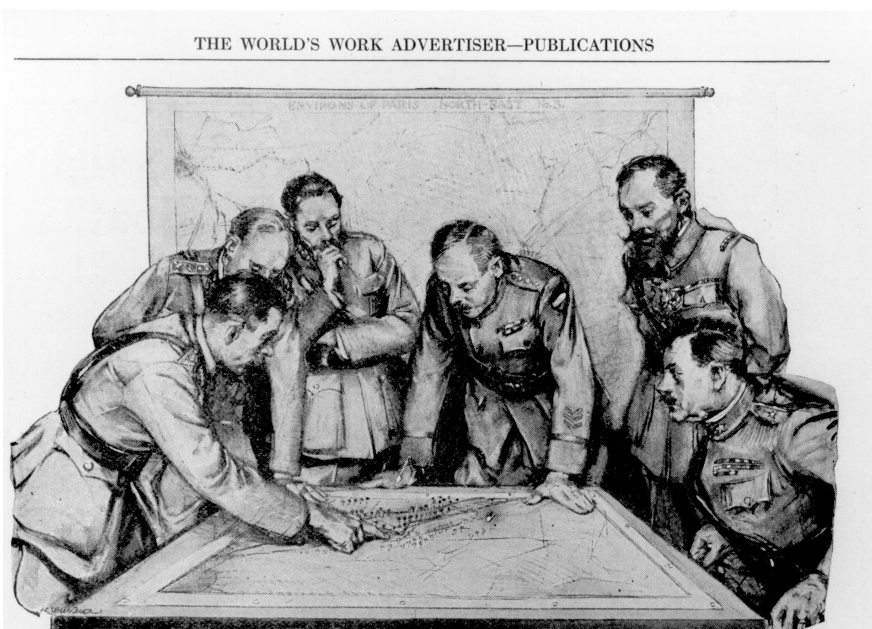
*"... Rand McNally had made clear decisions about the kind of world the public would see."*

PROTECTING A MASS MARKET

*“The company also initiated aggressive advertising campaigns to capitalize on the prosperity of the 1920s and the interest in geography brought by the war, an investment that also reflected the growing competition in the cartographic industry.”*

Rand McNally to build massive public maps and globes in company lobbies, expositions, store windows, and railway terminals. Dozens of these projects helped build the company’s name as a ubiquitous, reliable, and authoritative source of knowledge about the world between the wars.<sup>22</sup>

The company also initiated aggressive advertising campaigns to capitalize on the prosperity of the 1920s and the interest in geography brought by the war, an investment that also reflected the growing competition in the cartographic industry. Competition from Europe was a particularly sore subject among American mapmakers, a reminder of the long alleged inferiority of their own work. Max Mayer (1930, 976, 1663), an American cartographer, sarcastically commented in 1930 that Americans “have had nothing worth the name of an atlas. To claim there is such a publication is



## Where Accuracy Meant Victory



Accurate maps are part of the essential equipment in the enlightenment of the human family.

Accurate maps are the guide-posts of knowledge and the blazed trails of modern business enterprise.

RAND McNALLY Maps are accurate. They are the products of a highly skilled organization that has made map-making in all its branches a specialty for more than half a century.

RAND McNALLY Maps are helpful alike to the child in the school, to the student of civic and economic affairs, to the business man developing a market for his goods, to travelers everywhere.

RAND McNALLY Maps are made in various sizes to meet all needs. Besides their great educational value, they are an indispensable feature of every modern business establishment.

Generals gathered at Staff Headquarters planning a campaign. The fate of men and nations dependent on the accuracy of a map. Here, if ever, a sure test! The result is history.

RAND McNALLY maps have never rendered more valiant, more vital service than in The World War.

Pershing chose them because of their accuracy, simplicity and quick readability. For the same reasons, they were used by practically every other nation in the war.

There was nothing accidental about this success. It is unusual only in the gravity of the circumstances. Maps and Atlases made by RAND McNALLY are accurate because we make very definite and sincere efforts to keep them so.

You may never plan a battle or lead a company to the attack. Yet somewhere—*sometime*—you will have need of an accurate map.

Think, then, of RAND McNALLY and the tremendous scope of its business. Practically every conceivable kind of map for every conceivable purpose is made here at Map Headquarters.

Political maps, Biblical maps, physical maps, climatic maps, historical maps, classical maps, language maps, globes, atlases and Map Systems—these are just a few of the classifications of more than 6000 different *kinds* of RAND McNALLY maps and atlases.

All of them—each and every one of them—is as accurate and as up-to-the-minute as it is possible for a map to be. RAND McNALLY has thousands of correspondents in all parts of the world—checking up—seeing to it that not even the least of the world’s changes is overlooked.

When you buy a map, buy a good map—a map you can depend on—a RAND McNALLY!

**RAND McNALLY & COMPANY**  
Map Headquarters

536 S. CLARK STREET, CHICAGO

42 E. 22ND STREET, NEW YORK

**RAND McNALLY MAPS ARE AMERICAN MADE**

Figure 6. Rand McNally ad from 1920, touting the precision of its maps and their wartime utility.

to admit our poor aesthetic sense." American atlases, he continued, were simply lost in "a wilderness of meaningless names" (Mayer 1930, 1663).<sup>23</sup> This ongoing debate over the appeal and merit of American cartography erupted into a legal and economic question in 1929, when Rand McNally led a campaign to include European maps on the list of imports eligible for duties under the Smoot-Hawley Tariff. To critics like Mayer, the very question of protectionism indicated the superiority of European cartography. For Rand McNally, however, the question was more a reflection of its struggle to maintain dominance in America after having adopted new and more expensive physical maps for *Goode's School Atlas*. In fact, the threat came not from European atlases themselves but the increasingly common practice of American textbook and atlas publishers contracting with European cartographers for maps that were imported and then reproduced in the United States. Though European production methods were more time-consuming, the relative scale of wages in the two countries still favored imports. Companies importing these maps claimed that no comparable product existed in the United States. Faced with increasing losses in their share of the educational atlas market, Rand McNally and the Map Engravers and Publishers of America fought but failed to raise the tariff on all European maps.<sup>24</sup>

In the hopes of capitalizing on postwar interest in world events—and to protect the market it had previously dominated with relative ease—Rand McNally also embarked on an advertising campaign that paradoxically celebrated both the romance and the utility of its maps. The association of Rand McNally with accuracy was one of the primary goals of the interwar advertising campaign, and thus the geographic upheavals wrought by the armistice were frequently at the center of these advertisements. One 1921 ad featured a curious young boy asking his father to locate newly independent Czechoslovakia on the map. The ad suggested that such a question might easily embarrass any parent who had not kept up with the news, an error easily remedied through the purchase of a Rand McNally atlas, which could always be depended upon to print the latest boundary changes.<sup>25</sup> Like the legendary mouthwash ads that preyed on personal anxiety in the 1920s, these ads acknowledged the confusing nature of the postwar world and insisted that this knowledge be readily available to every American family. Hammond sold its 1920 *Modern Atlas* through a similar appeal:

**See If Your Atlas Shows**

The Seat of the League of Nations . . . The Status of the City of Danzig . . . The New Country of Poland . . . The Plebiscites of Silesia and Schleswig . . . The New Countries of Czechoslovakia and Jugoslavia . . . The Empire of Mongolia . . . The Mandatory Control of Former German Colonies in Africa . . . The Territory Awarded to France and Belgium . . . The Republic of Esthonia . . . The Roosevelt River in Brazil.

IF IT DOES NOT SHOW THESE, IT SHOWS

**A World That No Longer Exists**

Notice here that the focus is not geographical relationships but locations, and that an "accurate" map was one that identified every city, town, or village. The talisman of comprehensiveness was exemplified by a 1920 ad boasting that Rand McNally maps included villages found nowhere else, including "the little dot that stands for New Dongola." Though few people would ever visit this village, situated between the Sahara and Nubian deserts, they could rely on the company to map its precise location. Whether a reader was looking for New York or Nigeria, Rand McNally

*"The ongoing debate over the appeal and merit of American cartography erupted into a legal and economic question in 1929 . . ."*

*"In the hopes of capitalizing on postwar interest in world events—and to protect the market it had previously dominated with relative ease—Rand McNally also embarked on an advertising campaign that paradoxically celebrated both the romance and the utility of its maps."*



## The White-washed City Where Stalks Decay

High up, in the mountains of Tibet, is the forbidden city of Lhasa, where the Christian is excluded and where decay stalks in the streets, past the white-washed buildings. The past—with its mystery, its customs, its stand-still civilization, lifts its ugly head and leers at the modern and uplifting. Dogs and pigs roam at will. The rough lanes are rutted with the traffic of ages. Every house is shared by humans and yaks, the common beast of burden.

You'll find Lhasa on the map of Asia, page 225 of the RAND McNALLY INTERNATIONAL ATLAS. This forbidden city has lived for centuries in a little world of its own. In the sunlight it is a gorgeous spectacle which fades upon close approach into a sordid abode of the unwashed and crafty. It is a part of the great romance of Geography, made clear by maps.

No matter what or where the place, you'll find it on a RAND McNALLY MAP. The uttermost parts of the earth are included, as they are now and as they were in olden times. There is a RAND McNALLY MAP for every person and every purpose. People think of maps when they think of RAND McNALLY—which is a world-known name that stands for education and progress.



### The RAND McNALLY International Atlas of the World

contains 419 pages size 11 x 14 inches closed, bound in cloth and in full leather. For the general reader, student, business man. 128 pages of maps covering the entire world in detail. New countries, new boundaries, new groupings of islands.

The reverse side of each map contains information about that particular country or state.

24 pages of full color illustrations showing interesting and important sights and scenes in all parts of the world.

135 pages of indexes giving location on the maps and latest population figures of practically all cities, towns and important places throughout the world.

RAND McNALLY & CO.

## RAND McNALLY & COMPANY Map Headquarters

536 S. CLARK ST., CHICAGO

42 E. 22ND ST., NEW YORK

Figure 7. Many of Rand McNally's advertisements also included appeals to the adventurous and the exotic.

promised they would be mapped with equal accuracy, for "maps are worthless unless they are exact" (Figure 6).<sup>26</sup>

These ads also suggest that atlases—long considered reference tools—were now marketed as leisure commodities, the keys to unlocking the adventures of "Conrad's seas and Kipling's India." Rand McNally atlases would help both children and adults to imagine worlds they might never

see; exploring civilizations as old and distant as China, “without stirring from your easy chair.” As the advertisement concluded, “[e]very member of your family will profit in culture and knowledge from a Rand McNally Atlas.”<sup>27</sup> In previous decades, few if any advertisements or reviews had so directly suggested the cultural value of cartography, rather they stressed its utility as a reference source for businessmen and students. Central to this new strategy was an appeal to the romance, adventure, and even voyeurism of distant lands. In 1922, the company imagined the “Forbidden City of Lhasa” as simultaneously compelling and repulsive to western eyes (Figure 7), a city where

the Christian is excluded and where decay stalks in the streets. . . . The past—with its mystery, its customs, its stand-still civilization, lifts its ugly head and leers at the modern and uplifting. Dogs and pigs roam at will. . . . This forbidden city has lived for centuries in a little world of its own. In the sunlight it is a gorgeous spectacle which fades upon close approach into a sordid abode of the unwashed and crafty. It is a part of the great romance of Geography, made clear by maps.<sup>28</sup>

Rand McNally’s general turn towards “adventure” in the 1920s also reflects the explosive growth of the National Geographic Society. With a membership that reached one million by 1926, the Society had clearly tapped the public’s desire to learn about the world beyond its borders. With its richly illustrated monthly, the Society brought the distant reaches of exotic lands into American living rooms and libraries, thereby creating a kind of culture around geographic knowledge that could not have gone unnoticed at Rand McNally. In fact, the latter advertised regularly in the pages of the *Geographic* until the Society judged the company a direct competitor and ended the relationship in 1928. These ads suggested precisely the sophistication and cosmopolitanism sought by those guarding their membership in the Society.<sup>29</sup>

The early twentieth century brought a slow and steady stream of Americans into contact with maps and atlases. Geography was gradually becoming not just a school subject or a reference tool, but a cultural commodity as well. Rand McNally translated this interest into a broadened audience for cartography, aided particularly by the booming demand for domestic road maps in the 1920s. This ability to strengthen their reputation as a cartographic authority would prove central to their success in the 1940s. Like the National Geographic Society, Rand McNally strove to create a world that made sense to its public. Though it capitalized on the upheavals brought by World War One and the Treaty of Versailles, the company designed a world that fit American notions of how the world ought to appear. In fact, what is most striking about these atlases is the degree to which they maintained a tradition begun years earlier. Rand McNally kept new maps out of mass-market atlases in the 1920s because the company was wary of directly challenging a public whose visual sense of the world had been cultivated by years of exposure to political maps and the Mercator projection. However appropriate Goode’s maps were for “educational” purposes, Rand McNally was cautious about their acceptability as products for mass consumption. This suggests that the history of cartography is governed not just by technological and scientific advances, but also by a complex interplay of expectations between mapmakers and consumers. While the atlas remained relatively stable through the interwar years, by the late 1930s news of conflict in Europe and East Asia once again drew

*“Rand McNally’s general turn towards ‘adventure’ in the 1920s also reflects the explosive growth of the National Geographic Society.”*

#### CONCLUDING REMARKS

*“The history of cartography is governed not just by technological and scientific advances, but also by a complex interplay of expectations between mapmakers and consumers.”*

American eyes abroad, and the World War that followed, together with the revolution in air transportation, challenged the representations as well as the realities of world geography.

## NOTES

1. See Adams (1912, 198-201 and *passim*) and Raisz (1938, 50), quoted in Woodward (1977, 124-125).
2. Dörflinger's (1997, 244-246) study of Austrian atlases indicates that this trend was mirrored in Europe. The number of non-European regional maps in these atlases rose from about 20% in the 1870s to 30% by World War I, corresponding to a decrease in the number of Austro-Hungarian and European maps. In these atlases, the United States was the first non-European area to be mapped with more detail, followed by east Asia, particularly China and Japan.
3. Quote is from the *Chicago Inter Ocean* review of Rand McNally's *Business Atlas*, March 6, 1899, found in II Cartographic Publishing, Box 1, Rand McNally Collection, Newberry Library, Chicago.
4. The Cram atlases of the early twentieth century also emphasized the growth of American territory; their *Ideal Reference Atlas* (1902) opened with full-page maps of the new territories and of the proposed Nicaraguan and Panama Canals, while all of South America was divided into two maps.
5. Interestingly, none of the African maps covered either the West African coast or the Congo region. Rand McNally's *New Family Atlas of the World* (1914b) also devoted a large map just to Luzon, though by 1916 the Philippines were no longer mapped together with the United States, but rather with the other Pacific Islands in the *Imperial Atlas*.
6. Quote is from Alfred Sidney Johnson (1922, 1166), an employee in the Map Department of Rand McNally.
7. Another example was the changing description of the soil in Cuba. In 1900 the atlas enthusiastically characterized the soil as having inexhaustible fertility, while twelve years later it was considered only "highly favorable."
8. Rand McNally produced eight atlases geared to the war.
9. Rand McNally, *Graphic Representation of the Battle Fields of Today* (1915); Rand McNally's *Atlas of the World War* (1918); rival companies produced similar atlases, such as Hammond's *New Map of Europe, Showing Seat of Austro-Servian War* (1914), and Cram's *Atlas of the War in Europe* (1915).
10. An exception of an American atlas that used small scale maps was C.S. Hammond's (1918) *Brentano's Record Atlas* (New York: CS Hammond, 1918). With maps of the western front drawn on a scale of 1-10 (1 inch to 10 miles), they were able to illustrate political boundaries, railways, altitudes, wireless stations, fortresses, fortified towns, arsenals, aircraft depots, forests and woods, and canals.
11. Letter of J.R. Purser, Charlotte, North Carolina, to National Geographic Society, dated September 14, 1918, in "Suggestions—Film 1915-1923," Records Division, National Geographic Society.

12. Albert Holt Bumstead, memo to Gilbert Grosvenor dated December 24, 1915; item 11-10015.837, Records Division, National Geographic Society.
13. Letter of A.F. Henning, Dallas, Texas, to National Geographic Society, dated February 5, 1917, in "Suggestions—Film 1915-1923," Records Division, National Geographic Society. Caleb D. Hammond, interview with the author, March 3, 1995, Maplewood, New Jersey.
14. See also Rand McNally (1918; 1921).
15. On radio broadcasts, see Dunning (1976, 28-29) and Buxton (1972, 12). On the relationship between commercial mapping and automobile culture, see Akerman (1993a; 1993b). Quote is from Ruth Leigh, "Selling Globes and Atlases," reprinted from *Publishers' Weekly* (Chicago: Rand McNally & Co., 1929), in "History" Box, Rand McNally Collection, Newberry Library, Chicago.
16. Quote is from Bruce Grant (1956, 21), quoting W.G. North in interview with Andrew McNally III. Gilbert H. Grosvenor, letter to Albert Holt Bumstead dated November 14, 1918, in National Geographic Society, Records Division, GHG 11-10015.837. Though Bumstead devised numerous projections of his own, the Society relied on the Van der Grinten projection for all its world maps from 1922 - 1988, a projection that—as Jeremy Black (1997, 31) has noted—continued to exaggerate the temperate latitudes, a flaw appropriate to Cold War mapmakers' tendency to emphasize the Soviet Union's power and size.
17. See Henrikson (1980, 95 fn 9). Even earlier, in 1811, a nationalistic Congress had contested the prime meridian of Greenwich, and replaced it with their own *national* meridian which ran first through Philadelphia, and then the District of Columbia. Only with the international recognition of Greenwich as the sole prime meridian in 1884 did the United States relinquish its own. See Edney (1994).
18. Exceptions occurred in National Geographic maps of 1935 and 1941, where the world was mapped as two separate circular hemispheres, necessarily placing the Western Hemisphere on the left side of the map. Generally the widest circulating atlases of the late nineteenth and early twentieth century—Century, Rand McNally, Hammond, Colton, and Mitchell, to name a few—also placed the United States at the center of their Mercator-based world maps.
19. This is not to say that *Goode's* atlases were not successful: among high schools it has been the atlas of choice, and was extensively used in Army War Colleges during the Second World War.
20. Grant (1956, 21), quoting W.G. North in interview with Andrew McNally III.
21. See *Rand McNally World Atlas: Premier Edition* (1932, 1937). Rand McNally's other contemporary series—*World Atlas: Commonwealth Edition*—also did not include physical maps of any kind. C.S. Hammond delayed introducing physical maps into its best-selling atlases; as late as 1937, its *Modern Illustrated Atlas of the World*, and *Unabridged Atlas and Gazetteer of the World* still included no physical maps.

22. Other institutional clients included The Pure Oil Company, Rock Island Lines, American Surety Company, Chicago North and Western Lines, the Bureau of Air Commerce, Pan American Airways, and the Monsanto Chemical Company. See Rand McNally Photograph Collections, illustrating different custom made maps, globes, and displays for corporate clients, found in Box 7, Photographs and Scrapbooks, Rand McNally Collection, Newberry Library, Chicago.

23. Even J. Paul Goode recognized the excellence of the German and British atlases yet took care to argue for the democratizing influence of wax engraving on the American map industry.

24. "Brief On Behalf of Map Engravers and Publishers in Support of an Increase of Duties on Maps," Finance Committee, United States Senate, 71st Congress, "History" Box, Rand McNally Collection, Newberry Library, Chicago. Also see Clow (1929).

25. Advertisement in *Review of Reviews*, November 1921. All Rand McNally advertisements collected in unmarked folder, Rand McNally Collection, Newberry Library, Chicago.

26. Advertisement in C.S. Hammond Company Records. Advertisement in *The American*, September 1920. Other ads that referred to the accuracy of Rand McNally world atlases can be found in *World's Work*, November 1920; *Century*, March 1924; *Asia*, April 1924; *Atlantic Monthly*, August 1924; *Sunset*, March 1926; *Sunset*, November 1926; and *Review of Reviews*, May 1928.

27. *Red Book*, 1926. For other ads invoking the romance of the atlases, see *Sunset*, June 1926; *Sunset*, May 1927; *Review of Reviews*, September 1928; *World's Work*, December 1928. Advertisement with an interest in China appeared in *World's Work*, October 1922.

28. Advertisement found in *Geographic*, February 1922.

29. Andrew McNally III, interview with the author, June 14, 1994, Chicago, Illinois. This growth of geography as a leisure activity was also evident in the sales strategies for globes, which were no longer simply schoolroom fixtures but now sold in furniture stores as decorative pieces. See Ruth Leigh, "Selling Globes and Atlases," reprinted from *Publishers' Weekly* (Chicago: Rand McNally and Company, 1929).

#### ACKNOWLEDGMENTS

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## Private Journeys on Public Maps: A Look at Inscribed Road Maps<sup>1</sup>

The exchange of gestural and sketch maps remains one of the most common uses of cartographic representation, despite the fact that printed maps—and now, their digital and broadcast counterparts—are all around us. Common sense supports this assertion, but precious little historical scholarship has addressed the history or nature of ephemeral, informal, or private cartography in modern print cultures. This paper examines twentieth-century American road maps and mapping practices that lie on the cusp between the manuscript and the printed, the public and the private. These practices prompt a reconsideration of the usefulness of these distinctions in the history of cartography and of the traditional emphasis on the end-products of the cartographic process over the use, both public and private, of maps.

Each of us has made our own rough manuscript maps in passing, perhaps explaining to a friend or acquaintance how to get to our home, or where to find the nearest post office. These maps, soon discarded and forgotten, are nevertheless an important part of human cartographic experience. The exchange of gestural and sketch maps remains one of the most common uses of cartographic representation despite the fact that printed maps—and now, their digital and broadcast counterparts—are all around us. Common sense supports this assertion, but precious little historical scholarship has addressed the history or nature of ephemeral, informal, or private cartography in modern print cultures.

The main barrier to the study of ephemeral and private mapping is the traditional propensity of cartographic theory and historiography to focus on the end-products of the mapping process—on artifactual maps (whether in print or manuscript) rather than the process itself. This orientation inevitably turns historical scholars' attention towards maps with outstanding technical merit or innovative qualities, or maps that break new geographical ground. The tendency to view the history of cartography as a narrative of scientific progress is thus reinforced (Edney 1993) and along with it the notion that, in the modern context, only maps produced by the most highly trained cartographers really matter. Rundstrom (1991) has argued that artifactual maps are simply the traces of an ongoing process of mapping and exchange of geographical ideas, which should be at the core of cartographic studies. Taken to its logical conclusion, Rundstrom's argument blurs the distinction traditionally made in cartographic studies between map "makers" (those with the skills, knowledge, and authority to make maps) and "users" (their audience). Applied to the history of later modern cartography, it would also break down the implied distinction between public professional mapping and more ephemeral or informal private mapping exchanges. Amid recent calls for more extensive study of the history and culture of map use (Jacob 1996), it should go without saying that cartography is not a closed enterprise open only to the professionally trained or to those with access to the means of publication. Despite a

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*“. . . increased exposure to map images and access to geographical information, skills, and technology during the nineteenth and twentieth centuries has dramatically increased private access to cartographic communication, thus making any distinction between private and public cartography essentially meaningless.”*

century of scholarship dedicated to establishment of cartography proper as a professional realm with its own rules and standards, everyday people with no particular skill or credentials have continued to make maps for their own use or for others, with serviceable results. It is in fact likely that increased exposure to map images and access to geographical information, skills, and technology during the nineteenth and twentieth centuries has dramatically increased private access to cartographic communication, thus making any distinction between private and public cartography essentially meaningless.

A history of the cartographic process melding map making and map use would also blur a related distinction traditionally made between printed maps (as “finished” products) and manuscript maps (as “unfinished” cartography). An entire series of the Kenneth Nebenzahl, Jr., Lectures in the History of Cartography, held in 1985, for example, examined the sources (mostly manuscript maps) of celebrated examples of early modern European cartography. The lecture series’ title, “Maps in the Making: The Various Sources of Printed Maps,” betrays the prevailing scholarly view of manuscript maps as the poor relations of printed maps.<sup>2</sup> This view rests on the contention articulated by Marshall McLuhan (1962) and Elizabeth Eisenstein (1979) that the exact duplication and wide distribution of works of all sorts made possible by the advent of printing enhanced their authority and even created the concept of authority itself. By implication, maps remaining in manuscript, or communicated by gesture or oral communication, lack authority and weight. This thesis has been recently challenged by Adrian Johns (1998), who argues that the authority of print was more likely constructed by those who had a stake in the success of printing and its products (such as printers, booksellers, and scientists) than it was inherent in the standardizing and publicizing characteristics of print.

Of course, cartographic historians have not dismissed manuscript cartography as meaningless or irrelevant. The Harley-Woodward *History of Cartography* has already filled four books of rich scholarship on cartography generated either before the introduction of printing to mapmaking in Europe or outside of modern European print culture (Harley and Woodward 1987). Kain and Baigent’s (1992) study of modern cadastral mapping concerns a mapping form that was predominantly manuscript during the seventeenth through the nineteenth centuries, and exists on the edges of printed mapping to this day. American indigenous cartographies, largely preserved in the form of manuscript exchanges with European or Euroamerican explorers and colonial officials, have been the subject of two recent books (Lewis 1998; Warhus 1997). And in *Monarchs, Ministers, and Maps*, Buisseret (1992) and his collaborators related the extensive use of both printed and manuscript cartography by the early modern state and have even pondered some of the reasons why certain maps remained in manuscript and others found their way into print. It is worth noting, however, that the vast majority of studies of manuscript cartography in modern Western contexts examines this cartography in light of its public functions, such as the role they play in state administration, empire building, or property management. It is their public function that has lent these maps authority as artifacts and that has, not coincidentally, insured their survival in state archives or research libraries.

Extensive study of more private ephemeral cartographic exchanges will be hindered by the difficulty of obtaining evidence from private individuals. It is certainly true that public archives and research libraries have been slow to collect casually made maps, except as they relate to public figures and functions. Such evidentiary problems are not easily dismissed, but this paper’s examination of three related types of private road mapping

practices in the twentieth-century United States suggests that the evidence of private mapmaking and map use does exist for those who will look for it. In my studies of American road mapping I have come across a number of examples of maps and mapping practices that lie on the cusp between the manuscript and the printed, the public and the private. They prompt a reconsideration of the usefulness of these distinctions in the history of cartography. I shall begin by examining how manuscript annotations to printed road maps add private and personal meaning to public documents. Then I will demonstrate how early American motorists, mapping in a private capacity and primarily for their own amusement, effectively transformed their private interpretations and reconnaissance of the landscape into mappings that made a significant contribution to the initial public understanding and layout of the United States' emerging system of automobile highways.

Sometime after 1973, a woman named Inga annotated a printed map showing a district of western Connecticut, quite near the state boundary with New York, with her own map showing the approach to her house from the southeast (Figure 1). A close reading of the annotations provides some clues about the circumstances in which they were made. "Looking forward to seeing you both!" Inga writes at left center, just above their lakeside home, intimating that her map was intended for a pair of close friends or relatives preparing for a visit. At the lower far right of the map (see Figure 1), Inga self-consciously refers to the amateur character of her draftsmanship, and yet betrays a certain measure of pride in having made the map: "I may not be neat I'm efficient! Inga." At points where turns are required Inga identifies landmarks that will orient the travelers at critical points in the journey (e.g., the store and clock tower in central Sharon, where they are to turn north, and the shopping center and post office, where Low Road, the final approach to Inga's house, diverges from Route 41). There is even a witty warning that they should "drive well on right side of road . . . natives are dangerous drivers." To the north of the home, Hotchkiss School, at the intersection of state routes 41 and 112, is circled, and identified as a preparatory school for Yale University. Is this school part of the reason for the visit? Alas, the map does not support further speculation about the circumstances of Inga's inscriptions, but what interests us here are not the specific details of the journey that generated them, but rather the lived-in and personal nature of the mapping.

In the world of map collecting, usually the greatest value among otherwise identical printed items is accorded to those that are in the best condition. This axiom applies equally to tears, stains, and excessive stray marks or annotations, except (not surprisingly) when the annotations are by famous hands. Most road map collectors will discard annotated "duplicates," because they view these as marring the quality of the item. The Newberry Library, for example, acquired the inscribed map reproduced as Figure 2 from a Minnesota-based collector who was willing to part with it because he had acquired a cleaner copy. The printed map dates from about 1923 and was published by Rand McNally for distribution by the Minnesota Retail Hardware Association, whose members sold camping and fishing supplies to tourists. Towns with stores belonging to the association are marked by orange dots on the map. This in itself was a form of corporate annotation; the base map of the Minnesota auto trails was a generic Rand McNally product, which the firm customized for different corporate clients—in this case the Minnesota Retail Hardware Association—to suit their particular promotional needs. There was further pre-consumer customization of this copy of the map in the form of orange overprinting on

#### INSCRIBED ROAD MAPS

*"Most road map collectors will discard annotated 'duplicates,' because they view these as marring the quality of the item."*

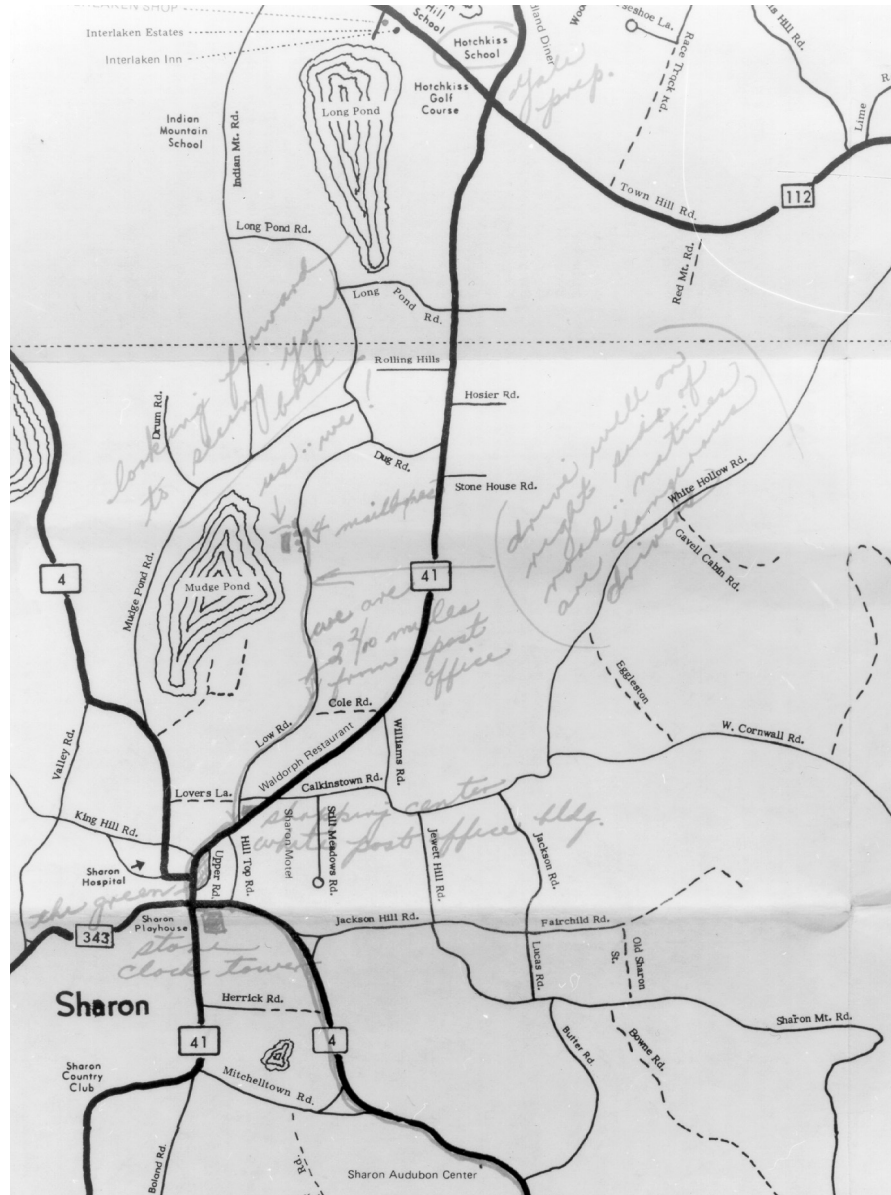


Figure 1. Detail of Albert Borden, New York, Connecticut, Massachusetts Tri-State Area Maps (Amenia, NY: The Link Line Co. for Albert Borden, Lakeville, CT, 1972), annotated by "Inga". Courtesy of the Newberry Library.

"... the hardware chain and C. C. Bruscke were both consumers of Rand McNally's map (and the advertising service it offered) and publishers with Rand McNally of its specific printed content."

the front cover of the map indicating that it was distributed "compliments of C.C. Bruscke & Son," a hardware store in Good Thunder. Presumably, C.C. Bruscke had available for distribution during the 1923 season a stock of one or two hundred of these maps bearing their name, out of several thousand Rand McNally likely printed for the hardware association. These steps in the publication and distribution process would have been unobserved by most consumers, who perceived only a printed road map with information about hardware stores on it. The point nevertheless undercuts any simple distinction between map maker and consumer: the hardware chain and C. C. Bruscke were both *consumers* of Rand McNally's map (and the advertising service it offered) and *publishers* with Rand McNally of its specific printed content. The anonymous tourist-inscriber was likewise a consumer of the map and a map maker.

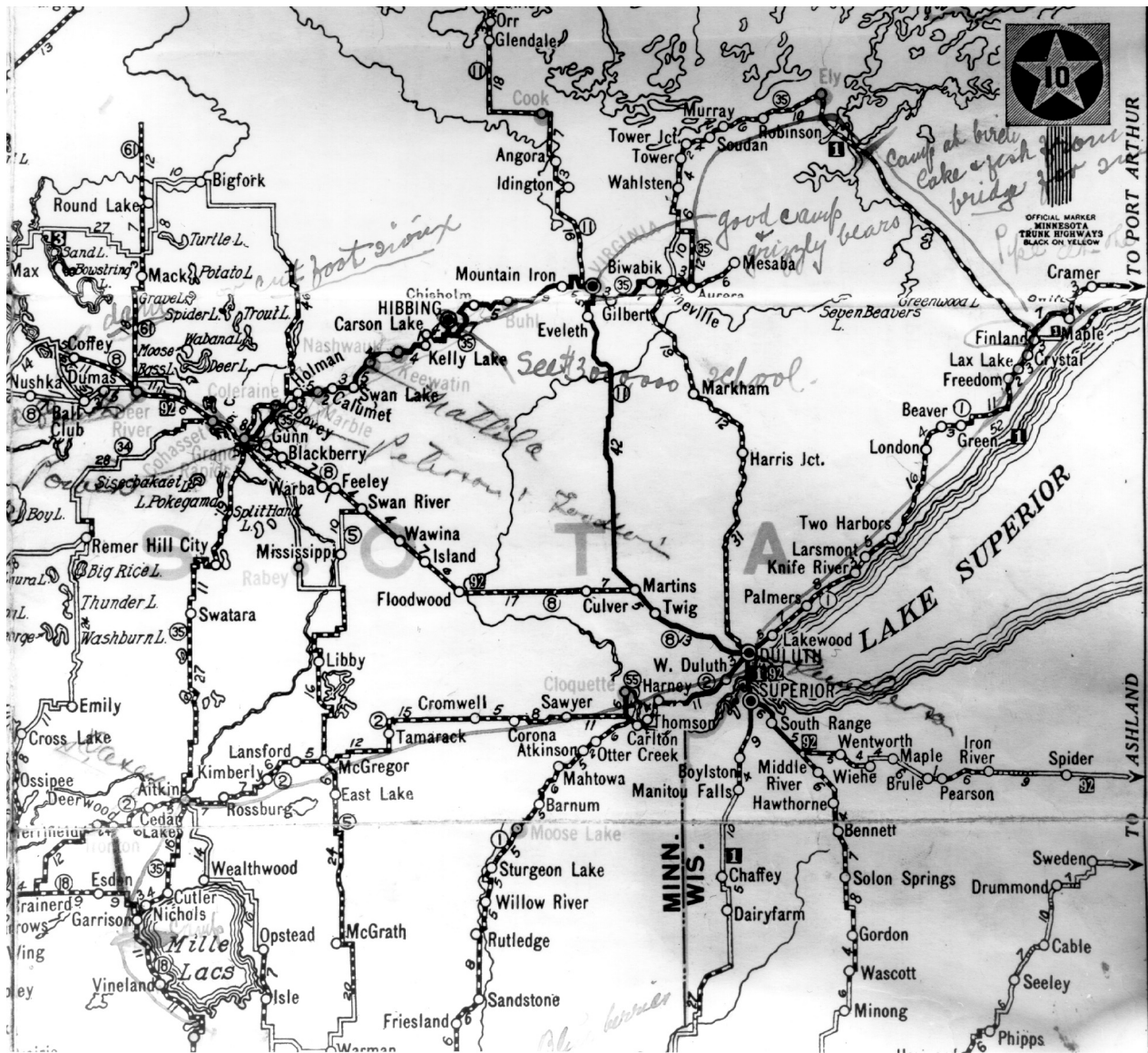


Figure 2. Detail of anonymous annotations, Auto Trails of Minnesota . . . Prepared Especially for Minnesota Retail Hardware Association (Chicago: Rand McNally for the Minnesota Retail Hardware Association, 1923?). Courtesy of the Newberry Library.

We have no idea who, in fact, made the manuscript annotations. We deduce that the tourist or tourists began their journey in the twin cities of Minneapolis and St. Paul, or somewhere further south; for a red inked line begins there that traces the route of an automobile journey northward into the lake-infested land west of Lake Superior and south of the Canadian border (what is known as the Minnesota Arrowhead). Our detail (Figure 2) includes manuscript annotations that relate highlights of the trip. Near Ely, the party camped by a birch tree and fished for sunfish from a bridge. Near Virginia, the party was impressed by its encounter with grizzly bears. Down the road, at Hibbing, in the heart of the Mesabi Range mining region, they were impressed by a “\$3,000,000 school,” likely the Hibbing Technical and Vocational High School, then “the second largest of its kind in the United States” (Minnesota Writers’ Project 1941, 132), which opened in 1923. Many of the notes are indecipherable, but it is clear that they were intended to support personal recollection of the trip and possibly also a private retelling of its story to family friends. The mere survival of the

artifact to the present day suggests that it had some role through the years as a souvenir.

A third example of road map inscription is a map of the entire United States published by the Keystone Automobile Club and neatly labeled "Our Trips" on the front cover (Figure 3). The map meticulously records the routes of five lengthy automobile journeys, taken every year from 1934 to 1938. The record of travel is truly impressive. In these five years our Philadelphia-based tourists traversed every state then in the union, excluding Oklahoma and North Dakota, as well as part of Canada and Mexico. The total distance traveled on these five trips likely would have been in the order of 20,000 miles. The care with which the map was compiled reveals the travelers' pride in these trips and their affection for their memory. Yet, again, the map alone tells us little about its inscribers, except that perhaps they possessed sufficient wealth to support five extensive pleasure trips during the Great Depression.

Though charmingly personalized, these examples of inscribed road maps tell us tantalizingly little about their authors or the events they record. I find myself wanting to know more about the trip narratives recalled each time they were unfolded. These narratives are lost to us, but anyone who has huddled over the souvenirs of a past trip, either with a friend or in personal reverie, might imagine their nature and content. The uneven record of surviving copies of these inscribed maps leaves another doubt: are these isolated examples of an unusual map use, or representatives of a widespread practice among American motorists? At least one class of a more institutional form of American road mapping suggests that the demand for personal cartographic records was in fact considerable.

*"Though charmingly personalized, these examples of inscribed road maps tell us tantalizingly little about their authors or the events they record. I find myself wanting to know more about the trip narratives recalled each time they were unfolded."*

#### PERSONALIZED ROAD MAPS FROM INSTITUTIONAL SOURCES

American motoring tourists' affection for personalized road maps was also satisfied by institutions such as the American Automobile Association (AAA) and its local affiliates, and by travel bureaus jointly organized by oil companies and cartographic publishers. The AAA has provided travel information as part of its basic service to members since its inception in 1901. It became involved in the publication of navigational guides in 1906, when it endorsed as an official AAA publication the route guides prepared by the Automobile Blue Book Company. These massive volumes numbering several hundred pages each provided hundreds of detailed mile-by-mile verbal logs of recommended routes for travel between major cities and towns (Figure 4). During the 1910s, the AAA began publishing its own maps and simple cardboard route logs. During the post-World War II boom in leisure motor travel, these evolved into more elaborate route planners called "Triptiks."

*"American motoring tourists' affection for personalized road maps was also satisfied by institutions such as the American Automobile Association (AAA) and its local affiliates, and by travel bureaus jointly organized by oil companies and cartographic publishers."*

Each Triptik is a small booklet of strip maps providing an easily followed detailed route map of an itinerary requested by an individual consumer. The cartography in the Triptik depicted road segments, major cities, and tourist destinations, and was selected by AAA employees from an inventory of hundreds of preprinted maps. AAA employees assembled the Triptiks following itineraries already established. For example, the route suggested by AAA employee Michael Caplan to John H. Spencer in 1968 required sheets 706 (Boston), 104 (Boston-Greenfield, Mass.), 105 (Greenfield, Mass.-Albany, N.Y.), 702 (Albany), and 106 (Albany-Richfield Springs, N.Y.). The Triptik booklets were assembled in a highly routinized and mechanical way, but consumers received a little atlas of their proposed trips that seemed personal, an impression reinforced by a hand-inked line tracing the consumer's proposed route on the printed sheet (Figure 5). One frequently finds examples of Triptiks that have been further personalized by the consumer. The example reproduced in Figure 5 depicts roads linking Montgomery,



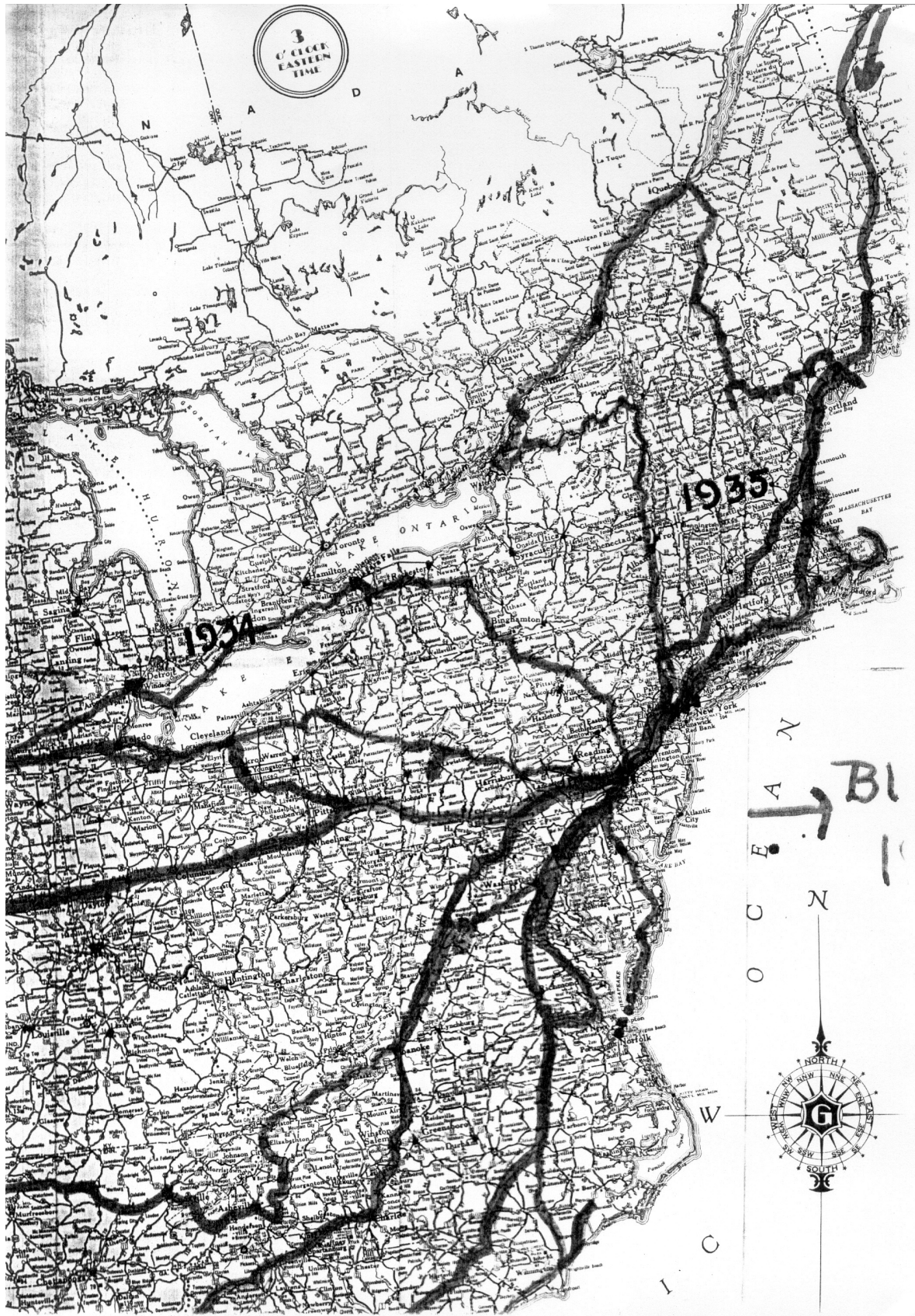


Figure 3. Keystone Automobile Club/Gallup's Transcontinental Highway Map of the United States, Canada & Mexico (Kansas City: Gallup for Keystone Automobile Club, Philadelphia, 1934?), annotated anonymously to 1938. Collection of the author.

*"The Triptik booklets were assembled in a highly routinized and mechanical way, but consumers received a little atlas of their proposed trips that seemed personal, an impression reinforced by a hand-inked line tracing the consumer's proposed route on the printed sheet."*

**Route 102 R****Poughkeepsie Section**

- 21.9 3.8 3-corners at foot of hill, turn right.  
 23.0 1.1 Left-hand road, turn square left into Plymouth Inn, on left.  
 23.3 0.3 **Dover Plains.** Cross RR. at Sta. and iron bridge.  
 24.1 0.8 4-corners, yellow barn on right, turn square right with the travel, crossing iron bridge 25.7. Follow poles joining trolley in **S. Dover** 29.7.  
 30.2 6.1 3-corners, turn left, leaving trolley.  
 (Straight ahead is **Route 12R** to **N. Y. City.**)  
 31.2 1.0 **Webatuck**, 3-corners, bear right.  
 32.2 1.0 Fork, bear left.  
 33.6 1.4 Fork, bear right, curving left thru irregular 4-corners 34.2, past white school just beyond.  
 35.0 1.4 3-corners, turn right away from main travel.  
 35.8 0.8 Left-hand road, turn square left on winding road along Housatonic River. Pass **Boardman P. O.** (on left—40.0), avoiding left, which leads across iron bridge.  
 Right 42.4 is short cut to **Danbury**, avoiding **New Milford**.  
 Straight on across long iron bridge (Housatonic River).  
 42.7 6.9 **New Milford**, bank on left, bear slightly right.  
 Wayside Inn.  
 42.8 0.1 End of street, turn square right, coming along bank of river  
 45.2 2.4 Right-hand road, turn right across iron bridge over gorge of Housatonic River—fine views. Curve right across RR. at **Still River Sta.** (on right—45.6).  
 45.7 0.5 Turn next right across iron bridge (Still River).  
 45.8 0.1 End of road, turn left (short-cut comes in from right).  
 46.4 0.6 Diagonal 4-corners at red barn, turn left on winding road, keeping straight ahead where poles turn right 49.2 thru **Brookfield**, 50.1.  
 55.3 8.9 3-corners, turn left past blacksmith's shop (on left—55.4).  
**Caution**—left curve under RR. arch-55.6.  
 56.5 1.2 Fork, bear right, joining trolley. Go over RR. bridge 56.7 into **White St.**, crossing RR. at station 57.5.  
 City Map, page 46.  
 57.8 1.3 4-corners, turn left with trolley on **Main St.**  
 58.0 0.2 **Danbury**, **Main & West Sts.** at **Monument.**  
 Hotel Green & Garage, 200 Main St.  
 Fillow Garage, 31 Crosby St.  
 For diverging routes see **Index Map**, page 219.

**Route 102 R—Danbury, Conn., to Poughkeepsie, N. Y.—  
58.0 m.**

Route Map, page 219.

Reverse Route, No. 102.

Via **New Milford** and the **Dovers**. Fair-to-good dirt and gravel to **South Millbrook**; balance macadam.

**Total Intermediate Mileages** (For this and other exits see **City Map**, page 46.)

0.0 0.0 **Danbury, Conn.** **Main & West Sts.** North on **Main St.**

0.2 0.2 4-corners, turn right with branch trolley on **White St.** Cross RR. at station (on right—0.5). Go over RR. bridge 1.3.

1.5 1.3 End of trolley, bear left on winding road.

Page 226

Figure 4. Detail of a page from an Automobile Blue Book. Rand McNally Collection, the Newberry Library.

Alabama to Tallahassee, Florida in 1971. The motorist's own annotations meticulously record the rhythms and details of the day's travel. Periodic annotations record the passage of time and miles, and even eating lunch at a rest stop in Quincy, Florida, at 12:58.

Some American oil and tire companies offered travel information to their customers from the mid-1910s—notably B.F. Goodrich and Gulf Oil (Ristow 1964; Yorke and Margolies 1996). By the late 1920s cartographic publishers such as Rand McNally, H.M. Gousha, General Drafting, Mid-West Map, Gallup, and Clason had made the annual production of millions of road maps for free distribution by corporate clients a mainstay of their business. Increasingly, these clients were almost exclusively oil companies. Then as now, the production and distribution of gasoline and motor oil comprised a highly competitive industry. Yet the quality of petroleum products varied little from producer to producer, so the development of a positive and distinctive corporate image was important. By the early 1930s the free distribution of road maps to service station customers had become part of a standard corporate strategy designed to encourage consumer loyalty practiced by almost every major oil and gas retailer (Jakle 1994; Yorke and Margolies 1996). Many of the larger companies raised the ante by establishing travel bureaus that offered travel advice and produced customized route plans. In this they were actively encouraged by the emerging "big three" of American road map publication—Rand McNally, H.M. Gousha, and General Drafting—who saw the travel bureaus and their specialized products as yet another way to increase demand for their own cartography.

Many of the customized route plans generated by these services were simply standard road maps on which the patron's route was traced in colored ink. Others, such as the "Touraides" published by Continental Oil (Conoco) in partnership with H.M. Gousha, represented a significant corporate investment in the development of special map editions and accompanying travel information. Conoco introduced its Touraides in 1936 (Edwards 1936). During its heyday from the 1930s through the early 1960s, the Touraide was a spiral-bound 8.5 x 11-inch booklet that included sectional maps (Figure 6), listings of accommodations, and brief synopses of major sites, cities, and tourist attractions. Like the Triptik, the sequence of maps in the Touraide provided a complete itinerary of the proposed trip, with specific suggested routes traced on the map. Further patron personalization of the trip record was also encouraged by the provision of a chart for logging miles traveled and recording places visited, events, and expenses.

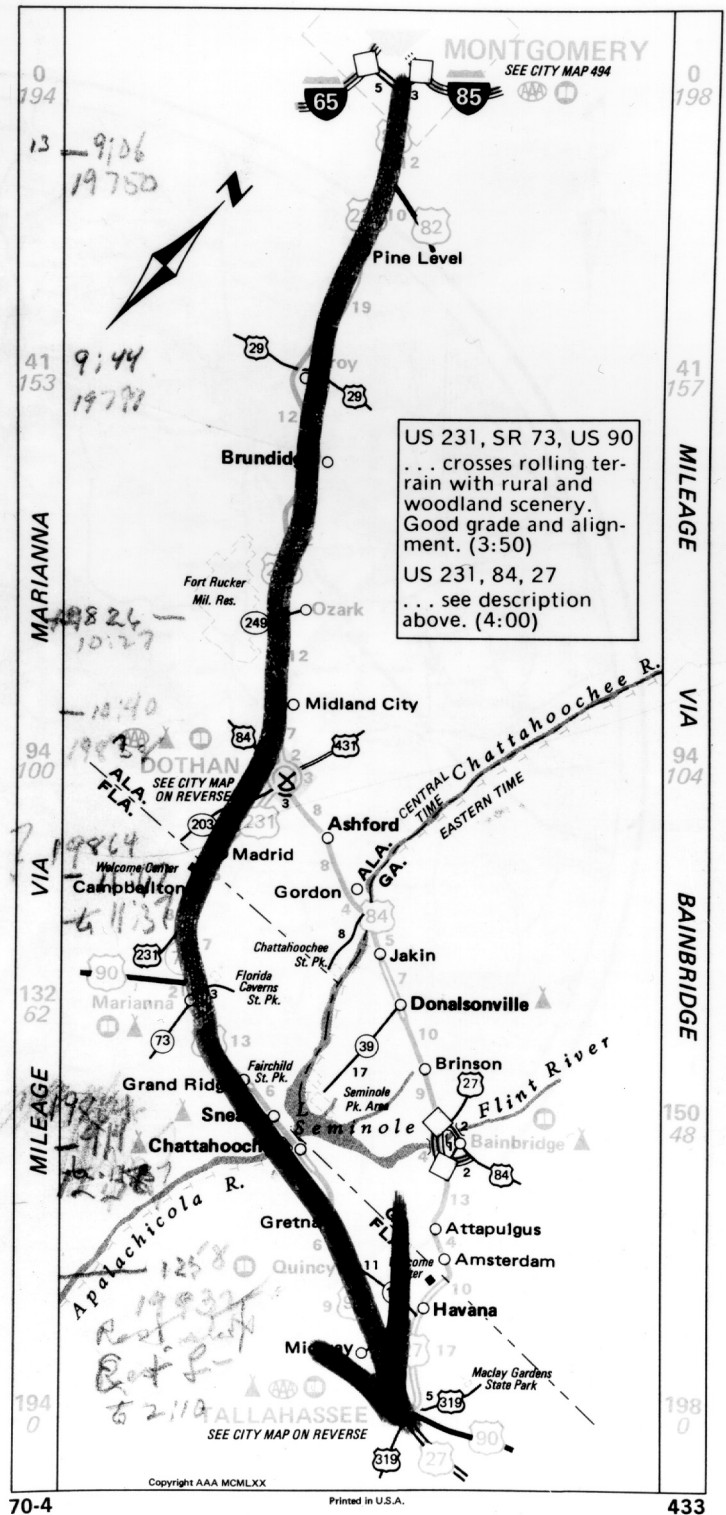


Figure 5. Detail of Triptik prepared by the Chicago Motor Club for an anonymous motorist, 1971. Collection of the author.

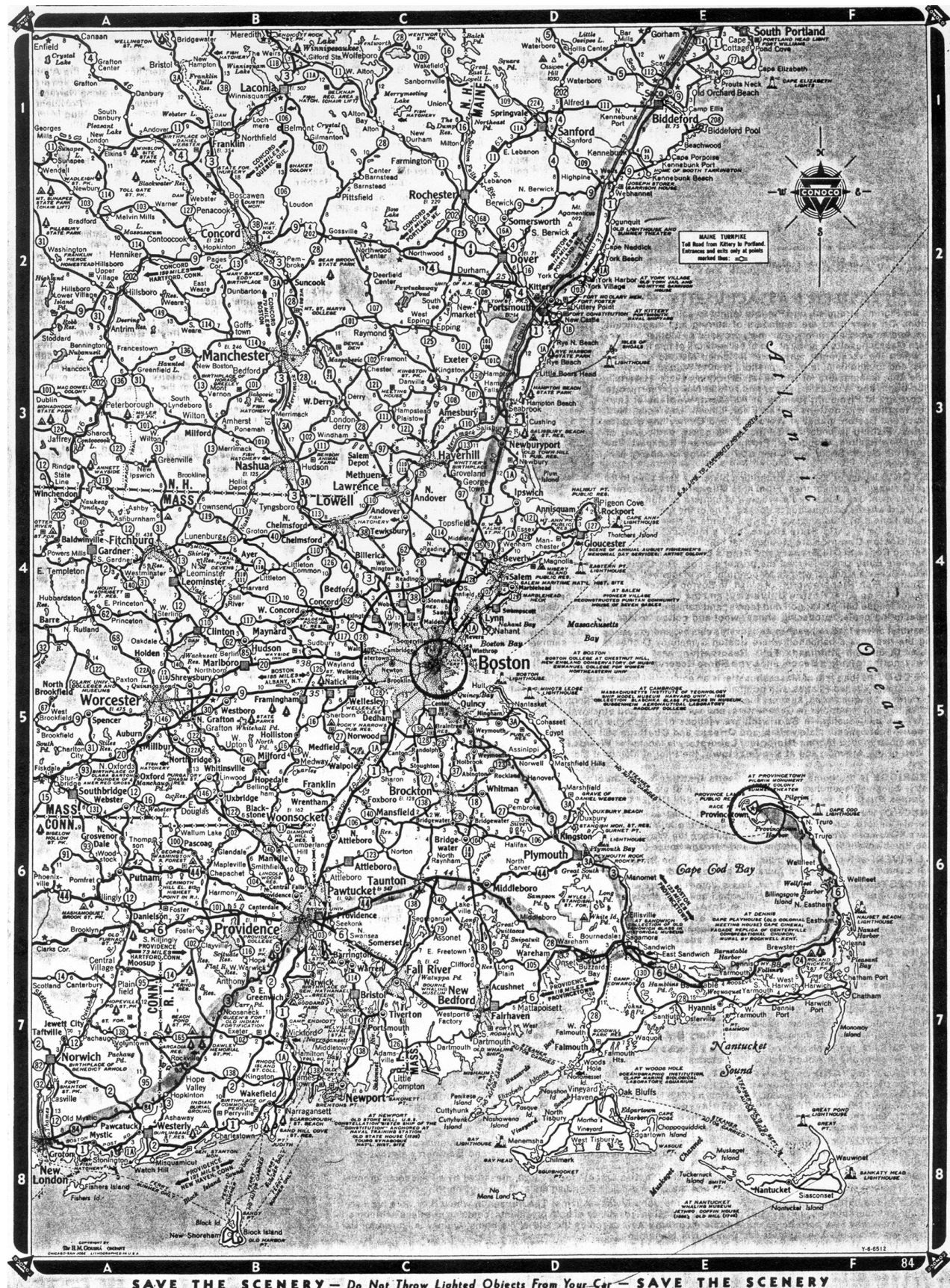


Figure 6. Sectional map of Eastern Massachusetts, Rhode Island, and Southeastern New Hampshire from Touraide Prepared Especially for Marjorie Hennigsen (Denver: Continental Oil Co., 1952). Collection of the author.

One of these charts (Figure 7) from a Touraide prepared in 1937 for Evelyn B. Fronell of Chicago documents a two-week excursion to Colorado by carefully recording the cost of gasoline fill-ups, frequent greasings, and many nights' lodgings. In the midst of the Depression, even the indulgences of a cherry cider and a Coca-Cola were not judged insignificant. Fronell's traveling companion, E.M. Nixon, has annotated the log at center right with the affirmation: "I hereby certify that Evelyn[n] B. Fronell is a AA1 Driver."

Like the Triptik, the Touraide differed from maps inscribed by map consumers themselves in one respect: its inscriptions carried the stamp and authority of a major mapping corporation and the supposedly profes-

MILEAGE AND EXPENSE RECORD															
DATE	TOWN AND MILEAGE	GAS	OIL	COST	MEALS	LODGING	MISCELLANEOUS EXPENSES	DATE	TOWN AND MILEAGE	GAS	OIL	COST	MEALS	LODGING	MISCELLANEOUS EXPENSES
7-20	Waukegan, Ill.						Tire Repair 50								
7-20	"				.30										
7-20	"	8		1.37											
7-20	Wester, Neb.						Cherry Cider 10								
7-20	Big Springs, Neb.	8		1.77	.30										
7-20	St. Mary, Mo.						Coke .05								
7-20	Denver, Colo.	9		1.87	.70										
7-20	"			5.01	1.30	1.00	.65								
7-20	Total						7.96								
7-21	Colo Springs, Colo.				.85	.75									
7-22	"					.75									
7-23	"						film .30								
7-23	"						greasing 2.55								
7-23	Palmer Lake, Colo.	5		1.05											
7-23	Denver, Colo.					1.00									
7-24	"	7		1.74											
7-25	"					.75									
7-26	"	8		1.76											
7-27	Essex Park	4		1.00											
7-28	Grand Lake, Colo.						2- films .57								
7-28	Grand Lake, Colo.	9		1.44											
7-29	Seelye, Neb.	5		1.08											
7-29	Osalla, Neb.					.75									
7-30	"	9 1/2		1.30 2.36											
7-30	Waukegan	7 2		1.46	.30										
7-30	Blair				.30		Toll Bridge 55								
7-30	Truman, Ia.	5		.90											
7-30	Capitol, Ia.				.65		Dinner								
7-30	Jefferson, Ia.	9		1.62											
7-30	Boone, Ia.					.50									
7-31	Boone, Ia.	5		1.25			greasing 1.00								
7-31	Osaka Rapids, Ia.	9 1/2		1.70											
7-31	Clinton, Ia.						Toll Bridge 25								
7-31	St. Charles, Ill.						Soda .15								
7-31	Chicago, Ill.	5		.95											
TOTALS								TOTALS							

I hereby certify that Evelyn B. Fronell is an AA1 Driver signed E.M. Nixon

Figure 7. "Mile and Expense Record" from Conoco Touraide Prepared Especially for Evelyn B. Fronell (Denver: Conoco Travel Bureau, 1937). Annotated by Evelyn B. Fronell July 18-31, 1937. Collection of the author.

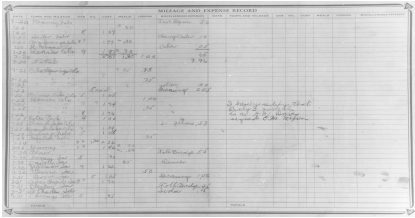


Figure 8. Detail of cover of Touraide Prepared Especially for Marjorie Hennigsen (Denver: Continental Oil Co., 1952). Collection of the author.

*“Though personalized travel aides told motorists how to conduct their proposed journey, the individuality of the each Touraide and Triptik emphasized the unique nature of each trip, reinforcing each motorist’s sense—or illusion—of control over one’s travel choices.”*

#### ASSOCIATION HIGHWAYS AND PATHFINDERS’ MAPS

sional staff of a travel bureau. A promotional page on the back of a 1951 Touraide declared that making a Touraide required “125 experts, each highly trained in his own job, [performing] 19 operations, each requiring a special skill” (Continental Oil Co. 1952). The rhetoric of the ad was meant at once to impress the consumer with the scale and expertise of the operation and to stress the personalized nature of the final product, which was completed by the “hand-lettered” name appearing on the cover (Figure 8). The high volume of requests for Touraides—up to 4,000 per day, according to the advertisement—required that they were prepared by a process that was highly routinized and allowed the “experts” little room (or time) for individual judgment or sentiment, and ultimately produced a product that was personalized in “hand-lettered” name only.

The producers of Touraides and Triptiks and other products tried to flatter their patrons by asserting each of these customized atlases was in some sense their own. It’s doubtful that many consumers accepted this rhetoric at face value. In his wry travelogue, *The Air-Conditioned Nightmare*, Henry Miller observed that “At the Automobile Club in New York I remember the fellow taking a greasy red pencil and tracing a route for me backwards while answering two telephones and cashing a check” (Miller 1945, 210). Yet travelers like Evelyn Fronell and her companion did take up Conoco’s invitation to make their Touraides their own, transforming them into their own maps and into souvenirs. More generally—and ironically—these products may have reinforced motorists’ sense of personal control over their itineraries. Though personalized travel aides told motorists *how* to conduct their proposed journey, the individuality of the each Touraide and Triptik emphasized the unique nature of each trip, reinforcing each motorist’s sense—or illusion—of control over one’s travel choices. This was something that the rigid schedules of routes of trains and buses could not offer, and was critical to the emergence of car travel as a popular American recreation.

Whether created privately or “professionally,” inscribed road maps both challenged and contributed to the authority of the printed road map. The printed network of lines and intersections, sites, towns, route distances, and boundaries provided an adequate background for the personal travel experience. To this, map inscribers and consumers of route planning aides added something of themselves. Their inscriptions and hand-drawn itineraries represented a personal remapping of the roadscape that reaffirmed the truth of the printed map by confirming that routes it plotted could indeed be driven. At the same time, consumers’ inscribed traces of their travel experiences and impressions enlarged, altered, and corrected the assertions of the map. In this way, consumer inscription of maps echoed the strong independent mapping impulses of early American motoring tourists, to whose efforts we will now turn.

One of the most intriguing aspects of early automobile road mapping in the United States is the extent to which it was organized by private organizations and individuals who had no previous experience or reputation as cartographers. Until the passage of the first federal road aid act in 1916, there was little federal or state governmental involvement in the construction and maintenance of highways. Most of the road improvements necessary to support the new mode of overland travel were performed on a local basis. Consequently, any motorist wishing to take longer trips from state to state or across the entire country had few highways worthy of the name to support this travel, and only a string of bad-to-indifferent county and local roads along which he or she somehow had to navigate. Many fine road maps existed for local districts and for some states, particularly

in the northeast, where the roads were traditionally quite good. Cross-country motorists in this period, however, literally had to imagine their own highways, and to map them on their own, often with little help from local authorities.

Not that this deterred the more intrepid travelers. The first transcontinental automobile trip was achieved in 1903, and one estimate held that between five and ten thousand motorists traveled from coast to coast along a single route, the Lincoln Highway, in 1916 (Joy 1917). Compared to the millions who would go motor camping annually in the 1920s (Belasco 1979), these numbers were still small, but they were encouraging to automobile manufacturers and other business interests who stood to profit from the expansion of automobile travel. Along with motor clubs, these interests took the lead in forming scores of highway associations, which were concerned with the creation, marking, and improvement of specific interstate and transcontinental routes. The majority of these highways were eventually incorporated into the numbered state highway systems that were developed in the 1920s, or into the system of numbered federal highways created in 1926. The most successful of these association highways was the Lincoln Highway, an east-west transcontinental route (New York to San Francisco) first proposed in 1912 by a group of automobile and auto parts manufacturers based in Indiana and Michigan, and formally opened in 1915 (Lincoln Highway Association 1935). Most of the association highways bore similar patriotic names or geographical names referring to origins and destinations. The highway associations published maps that promoted their routes to potential tourists, but these highly generalized maps had little practical value to motorists, since none of the private associations had the financial resources to make the road improvements that would make them the rapid through routes the associations envisioned. The highway associations did take responsibility for marking their routes in the field, a necessary precondition to detailed mapping, yet this work was often incomplete (Akerman 1993a, 1993b). A guidebook published by the Lincoln Highway Association in 1916, one year after the official opening of the highway, revealingly confessed that in "many places this marking is not as thorough as it should be. . . . [nevertheless] it is possible to find one's way across the country on the Lincoln Highway without the necessity of making inquiries" (Lincoln Highway Association 1916, 7). The guide itself was of little help. It included a general map of the route and a verbal "log" listing the towns along the route, distances between them and their distances from the highway's termini. But since neither map nor log provided the essential navigational information that motorists needed to get from town to town, early travelers on the route indeed had to rely on making local inquiries. However, larger scale orientation maps to each state were added to later editions (McKenzie 1963, 20-22).

The case of Emily Post, a columnist for a New York newspaper, and later the leading American published authority on proper etiquette, gives us some idea of the navigational information routinely available to motorists. In 1915, she planned with her editor, on very short notice, a transcontinental journey by car from New York to San Francisco. Her published account of this journey, *By Motor to the Golden Gate*, relates a frantic search for reliable information about the roads she might travel. Nothing concrete was to be had at any of the standard travel agencies. The 1915 edition of the standard reference in use at the time, the *Automobile Blue Book*, had not yet been published, and the 1914 edition was out of print. Told "that the best information was to be had at the touring department of the Automobile Club," Post resolved to enlist their help. But the "polite young man" she encountered there confessed that the bureau seemed "to be out of our

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*“Post’s publication of her personal cartography may strike us as presumptuous today, but it also reveals the extent to which early American motor tourists had to make and map their own highways, particularly on Western trips.”*

Western maps,” and proceeded to urge upon her the standard and more genteel New Yorkers’ tour of rural New England. At length the conversation passed to the suitability of the Lincoln Highway and of the Santa Fe Trail farther south, which was generally conceded to offer the safest way across the mountains and deserts of the American west. Of particular concern was the Arizona desert. “‘Can we get across that?’” she asked the polite young man. “‘That is the question,’” was his answer, prompting Post to observe that “‘Perhaps we had better just start out and ask the people living along the road which is the best way farther on?’” The young man brightened at once. “That would have been my suggestion from the beginning.” (Post 1916, 5-6).

This exchange explains why Post herself felt compelled to attach to the end of her book a series of seventeen maps showing the entire route of her journey with historical notes, navigational suggestions, and information about accommodations (Figure 9). Post’s publication of her personal cartography may strike us as presumptuous today, but it also reveals the extent to which early American motor tourists had to make and map their own highways, particularly on Western trips. The publishers of a small and flimsy 1914 map of another Western highway, the Yellowstone Trail, were far more honest in this regard than the Lincoln Highway guide. This route, promoted by the Twin Cities-Aberdeen (S.D.) and Yellowstone Park Trails Association, was intended to route traffic from the East to the famous national park through towns in northern South Dakota—most prominently Aberdeen. Crudely drafted by an unknown hand—perhaps that of the association’s president, J.W. Parmley of Ipswich, S.D., who held the copyright—and printed by the News Printing Co., the map is informal, like many others from this period, emerging from no established state or

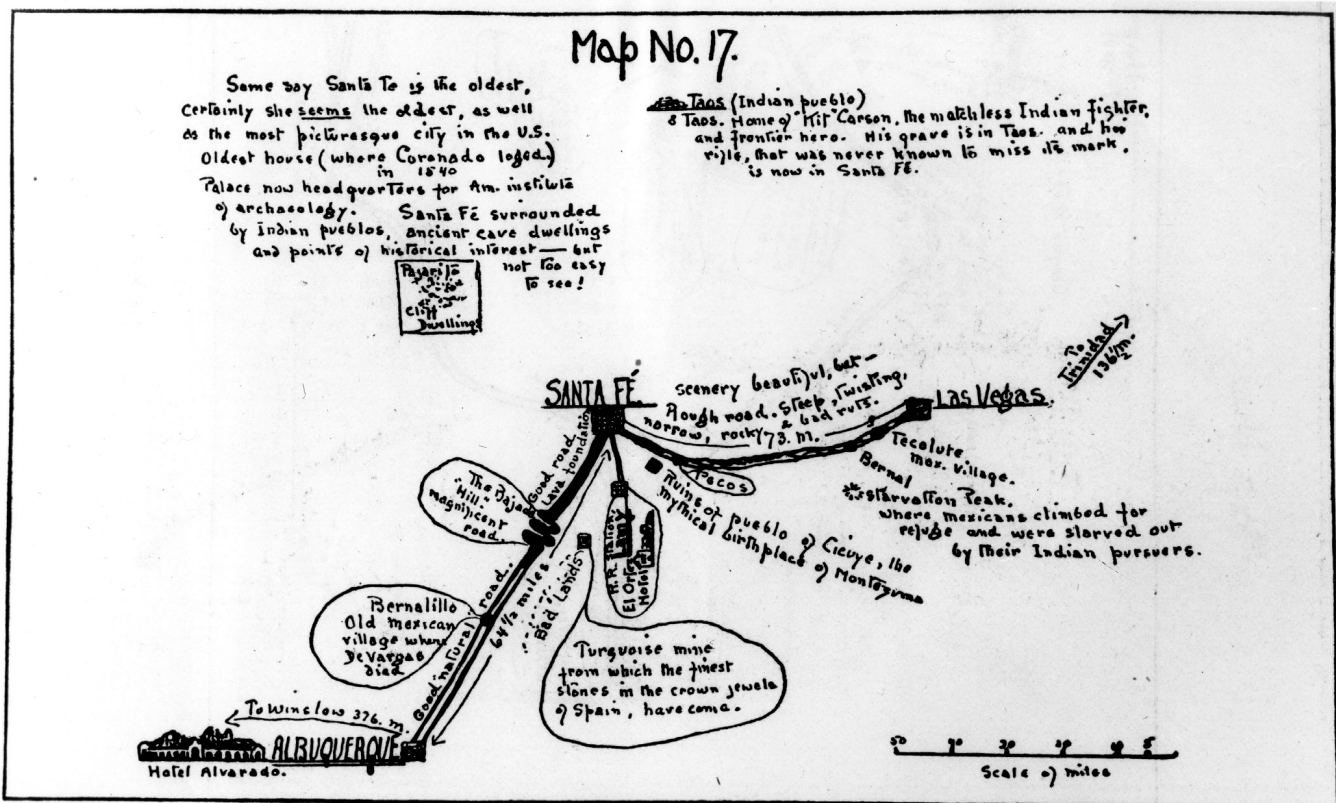


Figure 9. “Map No. 17” from Emily Post, *By Motor to the Golden Gate*, (New York: D. Appleton, 1916). Courtesy of the Newberry Library.



cartographic authority. It is little more than a plan for a route, and frankly confesses to its readers that:

We are lacking in accurate information and data. If the tourist and local patron of the Trail knows of inaccuracies we will greatly appreciate exact information. Should there be any places where the marking should be more distinct, give us the spot. We would appreciate several logs, and ask those making the run to mark on a map the exact distances between towns as shown by the speedometer, and to forward such maps to us. A new one [apparently reflecting the suggested changes] will be returned in exchange. (Yellowstone Trail Association 1914)

As noted earlier, Post's difficulties might have been solved had she searched successfully for an Automobile Blue Book (see Figure 4). The Blue Books' extensive collection of route logs were compiled and published in steadily increasing number of volumes from 1901 to 1927, covering every region of the country only from 1911 (McKenzie 1963, 19). Though the sources for the route logs in the Blue Books were unidentified, the logs were the product of a peculiar breed of early motorist who, like Post, found that their pleasure drives gave them intelligence about road conditions for which there was a hungry public audience.

One such intrepid route logger was Thomas W. Wilby, who was hired by the U.S. Office of Public Roads temporarily in 1913 to make a grand circle tour of the United States with the goal of logging "Middle and Southwestern routes from the Atlantic to the Pacific which would make feasible transcontinental highways of the future." Wilby's account of the journey in a popular magazine explains how route logging was performed, evidently with the anticipation that readers would follow his advice:

Equipped with an odometer and a set of a well understood signs, the "logger" sets his instrument at zero and draws a line upward from the bottom of his notebook to represent the direction in which his car travels from the starting point. Forks, crossroads, three and five corners, are added to the diagram as they occur, and the distances from one to the other are noted exactly. No landmark of any prominence which can assure the motorist that he is on the right road is omitted; indeed I knew of one enthusiastic "logger" on the plains who, in his zeal for literal accuracy, added to his 'log' the injunction: 'Turn Left by the Dead Steer,' and "Proceed to Bones on Hill." (Wilby 1912)

Others turned this passion into full-time employment, and were able to earn a living producing these logs in both verbal and cartographic format and publishing them on their own or, more often, through motor clubs. They styled themselves as "pathfinders" or "trailblazers" in clear reference to American trail guides of the eighteenth and nineteenth centuries, to whom they frequently compared themselves. This comparison was not as exaggerated as it might initially seem. As we noted at the outset, while virtually all of the roads the pathfinders traveled and logged physically existed as local paths and rights-of-way, these roads had to be imagined as parts of a single overland route. They had to be mapped in a form comprehensible and useful to tourists before they could in fact become practical highways for motorists at large. The activities of William "Bill" Rishel, of Salt Lake City, illustrates this point. In the 1890s he had gained local notoriety and knowledge of Utah highways as an overland bicyclist. He claimed to have driven the first automobile in Utah in 1900, and it was about that time that he started providing inquiring tourists what he

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“was convinced was the first cross-country road map ever drawn” (Rishel 1983, 53). Rishel soon established a private touring agency that eventually affiliated with the American Automobile Association as the Utah State Automobile Association. In 1911 he began working full time exploring and logging excursion routes for publication in the *Salt Lake City Tribune* sports section from behind the wheel of a rugged “pathfinder” automobile provided by the newspaper. By 1920 Rishel’s *Salt Lake Tribune Automobile Book* logged more than 20,000 miles of roads in Utah and the six states bordering it. Rishel’s routes became the basis of several of the great transcontinental highway association routes passing through Utah (the Lincoln Highway, Pike’s Peak Ocean to Ocean Highway, Victory Highway, Zion Park Highway, Evergreen Trail, and Pershing Historic Highway), and were later followed wholly or in part by U.S. Highways 6, 30S, 40, 50, 89, and 91, and 189 (Rishel 1920). On one of his pathfinding trips, blazing a new road into Yellowstone National Park from the West in 1911, he was forced to remove tree stumps from the bed of an existing wagon route, since his was the first car, with its low-slung chassis, to pass through (Rishel 1983, 65-69). This route became the park exit followed by today’s U.S. 20.

Another well-known route-logger was A.L. Westgard, who laid out a number of overland routes as an official “Pilot” for the AAA. Westgard gained his fame from his employment as the pathfinder for several of the annual Glidden tours, which from 1904 to 1913 were organized by the AAA and motoring enthusiast Charles A. Glidden to prove the reliability of automobiles for long-distance travel. Westgard was also instrumental in determining the routes of the Lincoln Highway and Midland Trail, and in 1915 was appointed Director of Transcontinental Highways by the National Highways Association, an organization that promoted the creation of a federally owned system of interstate highways. A map of the United States, now in the Library of Congress, showing the NHA’s routes includes advertisements for Westgard Tires and sundry travel toilet articles bearing his name (National Highways Association 1919).

Pathfinders like Rishel and Westgard began their careers as hobbyists. Their accumulated knowledge and skill opened the way for their logs and maps to enter a more public route mapping process. Some of their contemporaries continued to map motoring *terra incognita* for the sheer pleasure of it. Around 1920, for example, an anonymous motorist and his family arrived at a ranger station on the North Rim of Grand Canyon National Park.

The father alighted, went in, and began comparing the available maps of southwestern Utah with his field made ones. It developed that he was a professor of engineering in a midwestern university. . . . “There isn’t a map of the section through which I came that correctly represents most of it,” he remarked. “We wandered here and there and often were able to make no more than fifteen miles a day, but we have plotted the route over which we came, and every one of us is in finer physical condition because we really got back to Nature. Furthermore, we will give the world a better picture of motoring facilities in the region through which we came.” (Showalter 1924, 24-25)

## CONCLUSION

The evident pride with which this last anonymous cartographer recounted his family’s own Western expedition reminds us of the pride Inga, our Minnesota motorists, and our Philadelphia tourists expressed in their own annotations of printed maps. All of the private mapping practices discussed here are clearly linked by the cartographic literacy (if not skill) and self-motivation of their practitioners. The apparent historical insig-

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nificance of latter-day map inscribers relative to figures such as Rishel, Westgard, and Post was largely a matter of timing, social status, and entrepreneurial spirit. The logs and maps of early motoring pathfinders more easily fit into a general history of cartography than privately inscribed printed maps because they played a demonstrable role in the early public and institutional mapping of American motor routes. This role was reduced and then largely erased from American public memory after the 1920s, when the state and federal governments took over responsibility for highway designation and construction, assigning numbers to the pathfinders' highways. Meanwhile, larger cartographic firms, motor clubs, and oil companies produced the most widely distributed road maps. Yet road mapping performed on a small scale by private individuals and non-professional cartographers continued to play a public role after the 1920s.

A more general view of Inga's map (Figure 10) reveals that the printed component of the artifact itself straddles the boundary between public and private cartography. Though not hand-drawn, the map was rather inelegantly prepared for a local realtor named Albert Borden by the Link Line Co. Borden's inscription—or rather, that of his firm—can be found at upper right. Around the margins of the map are a host of advertisements for other small, local businesses (including painting contractor Bayliss Suydam and registered pharmacist Anthony Gentile). Road and street maps like this, prepared and financed by local private interests, have become commonplace at local chambers of commerce and tourist information bureaus in virtually every community in the United States. Few of them will ever be regarded as landmarks of twentieth-century American cartography. Neither is it likely that a copy of this map has been preserved by a state archive or by the Library of Congress, circumstances that would give it some public legitimacy as a cartographic oeuvre. Yet Borden's map clearly had a public life. It helped to generate business for Mr. Borden and his supporting advertisers. And it was an authority on local geography suitable for distribution in public place and for use by potentially thousands of consumers who were total strangers to Mr. Borden, to the staff of the Link-Line Co, and to Inga. The public (and historical) significance of the Borden map thus rests on its role in the life of the community it represents. Inga's inscriptions and those of the map's advertisers represent different moments in the life of the map and motivations for its use, and both reveal how private lives engaged and constantly redefined the meaning of public cartographic images.

A traditional construction of the relationship between cartography and its consumers in this context might assert that the booming American business in road maps simply tapped into a huge demand for road and travel information. The engagement of commercial advertisers and of private motorists in the early public mapping of American highways, however, suggests that road mapping developed among motorists who were at once mapmakers and map consumers. In time, as the scale and influence of American car culture expanded and as automobile travel became commonplace for the great majority of Americans, road mapping came to be dominated in Americans' imaginations by larger institutional producers such as Rand McNally, the AAA, and the corporate clients they served. As the invention of personalized travel guides demonstrates, the emergence of road mapping as a national industry did not diminish its engagement with the private lives of travelers. Trends in the design of road map cover art from the 1920s also suggests that road mapping was engaged with its consumers in ways extending beyond traditional definitions of map functionality. During the 1920s and 1930s this art frequently depicted female drivers either in the company of men or alone, in con-

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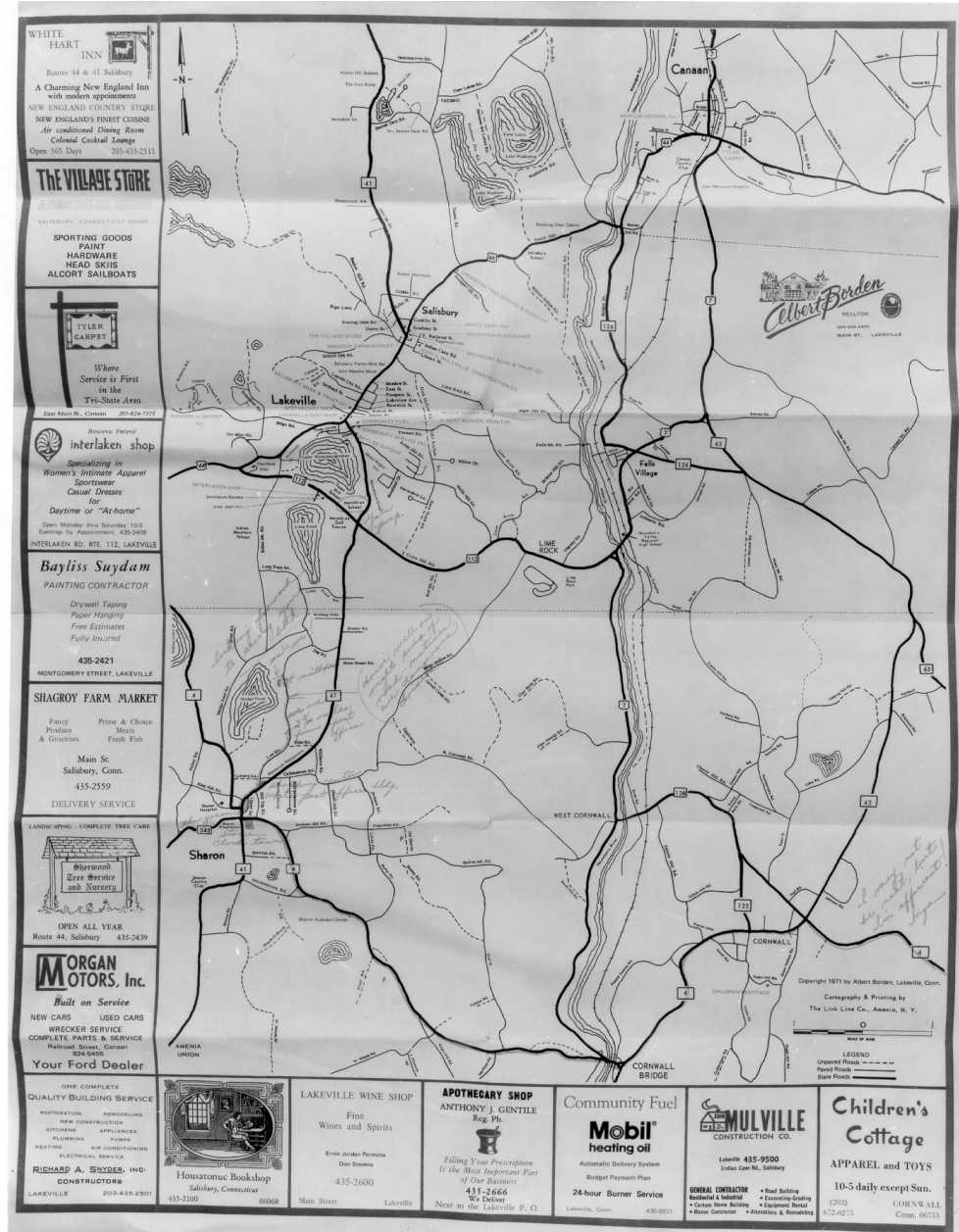


Figure 10. Albert Borden, New York, Connecticut, Massachusetts Tri-State Area Maps (Amenia, NY: The Link Line Co. for Albert Borden, Lakeville, Conn., 1972), annotated anonymously.

scious reference to freedom of movement the automobile had begun to offer many women (Scharff 1991). After the Second World War, the tone of cover art shifted to appeal to the leisure use of the automobile by the nuclear family, stereotypically appearing on maps as a family of four, with a boy and a girl, and perhaps a dog. Inside these covers, the cartographic depictions of the highway network were punctuated by points of interest, motel recommendations, and the location of gas stations. As we have seen, such annotations were similar to the private manuscript annotations of individual consumers—though they referred to potential behavior in the space described by the map rather than to actual trips.

Whether road mapping was organized on a small or large scale for institutional or personal purposes, the almost unlimited access twentieth-century Americans had to this cartography made it one of most socially

influential forms of mapping in history. Road maps were significant lenses through which Americans imagined and experienced their personal and national geographies. The evidence of but a few inscribed maps presented here suggests that Americans not only read their road maps intently and took them seriously, but viewed them only as intermediate representations useful to their own personal mapping of the American roadscape. A more comprehensive search for additional examples of inscribed and otherwise personalized maps as well as to references to road map use in the popular press and travel accounts will allow us to broaden our understanding of map use in this intensely map-conscious society.

The American road mapping experience demonstrates that the lines between map maker and map user and between printed and manuscript cartography are indeed blurry ones. We have seen how the meaning of printed cartography is not frozen by the act of printing, but is reworked and transformed into new meanings and maps by use. We have also seen how private map consumers can become public cartographers in the voids left by institutional mapping. Where access to printing technology is relatively open and consumer demand for cartographic information is high, as it has been in the United States in this century, private mapping voices can influence public mapping and even social agendas. One of the great claims for the current digital revolution is that it will increase individual access both to mapping technologies and to the means of exchanging geographical information with others, while challenging the primacy of modern print culture. If this turns out to be the trend in the twenty-first century, historians of cartography would do well to look for its precedent in the twentieth.

1. An earlier version of this paper was originally presented in July 1999, in Athens, Greece, at the Seventeenth International Conference on the History of Cartography. I am indebted to Matthew Edney for early conversation about this paper, as well as to the three anonymous reviewers for their insightful and helpful criticisms.

2. Ironically, given the subject of the series, these lectures were never published as a unit. Related works that emerged from the series include Godlewska (1988) and Stone (1989).

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*"Where access to printing technology is relatively open and consumer demand for cartographic information is high, as it has been in the United States in this century, private mapping voices can influence public mapping and even social agendas."*

#### NOTES

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## A History of Distributed Mapping

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My intent in this paper is to answer two questions: what were the principal events in the development of distributed mapping, and how should a narrative of its development be written? Distributed mapping is a mode of cartography arising from the convergence of the World Wide Web, GIS, and digital cartography. It marks a significant break with traditional cartography because (1) the set of rules that shape the map archive are being fundamentally altered; (2) the distributivity of spatial data, their analysis and visualization are at unprecedented levels; and (3) new forms of interactivity are emerging. After discussing some theoretical issues in the history of cartography, I locate the multiple origins of distributed mapping in the work on animated mapping during the quantitative revolution in geography and the availability of computing power from the 1960s through the 1980s. The technology is a series of non-deterministic negotiations with resistance leading to delays in implementation, back-tracking, and multiple avenues of exploration. The popularization of the World Wide Web during the latter part of the 1990s brought commercial attention to distributed mapping, not as cartography, but as a support service for travel sales channels. Commercialization will detach distributed mapping from academic geography as it did with GIS before it. In conclusion, I outline the foreseeable research issues for distributed mapping.

### INTRODUCTION

This paper addresses an important new development that might fundamentally change the way in which spatial data are accessed, analyzed, and communicated. The explosion of the Internet and its convergence with geographical tools have made spatial data display and analysis readily available to a wide, asynchronous audience. Also labeled "Internet GIS" (Peng 1999), "GIS Online" (a regular column in trade journal *GIS World*), and "Web-based GIS," distributed mapping is a highly dispersed, multi-user activity with conceptual ties to the distributed databases of the 1970s.

Much distributed mapping currently occurs on the Internet or the World Wide Web, but it can occur elsewhere too, and historically did so. For example, a distributed mapping environment could be made available via an Intranet or as a hybrid CD-ROM/network product. The term "mapping" is preferable to another suggested term, "distributed geographic information" (Plewe 1997) because the latter included the distribution of non-interactive spatial databases and is associated with a particular technology, GIS. By contrast, distributed mapping is not a technology but a strategy. In addition, I emphasize the creative problem-solving and visualization capabilities of mapping as an interactive process of spatial knowledge discovery and creation. Whatever its technological manifestation, mapping is likely to endure as a spatial problem-solving activity.

Although distributed mapping is recent, a history of it can be justified by its extremely rapid rise, which parallels the growth of the Web itself. Second, it is little understood, and its implications and research issues (e.g., on map design, on geographic education, or on how space is represented) are not yet fully identified, let alone solved. One way to increase

*"Distributed mapping is a mode of cartography arising from the convergence of the World Wide Web, GIS, and digital cartography."*



understanding is to examine the way distributed mapping is historically related to developments in cartography, GIS, and geography, as well as to larger societal developments such as the Internet.

What is distributed mapping? The critical concepts are:

1. Access to spatial data processing and visualization tools to a dispersed audience
2. Interactivity with map or a spatial database
3. Spatial problem solving or visualization need.

A “distributed” system is one which has elements of dispersion (L. *dispargere* to strew) and dispensing (L. *dispendere* to weigh out). In distributed mapping maps are therefore spread out (dispersed) but also (inter)actively allotted on demand (dispensed).

A typical implementation of a distributed mapping system would comprise a spatial data server, a network, and access via client computers (Figure 1).

SERVER ————— NETWORK ————— CLIENT(S)

Figure 1. Idealized schema for distributed mapping.

This is the simplest and most inclusive model—there are many variations in practice (Plewe 1997), some of which are discussed in this paper. In the simple scheme illustrated here, the Internet or the Web can comprise the network. These two networks are not identical—the Internet was developed during the 1960s, whereas the Web was established in the 1990s as a more user-friendly interface to parts of the Internet (see Hafner and Lyon 1996 for an excellent history of the Internet)—although both transmit packets of data using TCP/IP (Transmission Control Protocol/Internet Protocol). In Figure 1 spatial data are served out across the network and interactively accessed by multiple clients. The server implementation can vary, with the HTTP (hypertext transfer protocol) and map/GIS servers separate or combined. If most of the processing is done by the client, the term “thick client” is sometimes employed, but if the server assumes the bulk of processing, the client is considered “thin” (Peng 1999).

An interesting variation on this scheme is provided by Public Participation GIS (PPGIS), an outcome of the Society and GIS Initiative 19 (Pickles 1999) in the National Center for Geographic Information and Analysis (NCGIA). The goal of PPGIS is to provide access to the full functionalities and data of a GIS at the local level without necessarily employing a network. The GIS may be in a mobile van that visits several neighborhoods or returns periodically to the same neighborhood. Because mapping capabilities are distributed to a wide and multiple audience who interact with the data (e.g., in making local planning decisions during road construction), it is appropriate to call PPGIS “distributed mapping.” This example also illustrates the inappropriate narrowness of the term “Internet GIS” (Peng 1999).

This paper covers distributed mapping, with an emphasis on interactive systems that provide massively distributed but individually tailored maps. It is not a history of digital cartography as a whole. Obviously there are overlaps with related developments, such as mapping software and the history of GIS, but I do not consider these here. Equally obvious, this

#### DEFINITION OF DISTRIBUTED MAPPING AND SCOPE OF PAPER

*“A ‘distributed’ system is one which has elements of dispersion (L. *dispargere* to strew) and dispensing (L. *dispendere* to weigh out).”*

CRITICAL THEORETICAL  
ISSUES OF DISTRIBUTED  
MAPPING

*"Theoretical issues raised in the literature . . . include the relationship between maps and power, representation under empiricist or constructivist approaches, the notion of contingency in the development of maps and mapping practices, and questions of how mapping environments produce spaces and places."*

*"Theory Engagers believe that the other two groups lack critical engagement with theory; Group 1 because it prefers to ignore theory and Group 2 because it seems too entranced by it."*

paper is merely an initial attempt to explore the subject, and much more work needs to be done.

Theoretical issues raised in the literature complicate the work of anyone attempting to offer a history of a cartographic practice. These include the relationship between maps and power, representation under empiricist or constructivist approaches, the notion of contingency in the development of maps and mapping practices, and questions of how mapping environments produce spaces and places.

There are a number of possible responses to these issues, and cartographers and geographers have at one time or another adopted them all:

1. The issues are irrelevant, are not accepted, and need not be engaged (Theory Avoiding);
2. The issues are already known, have been accepted, and need not be further engaged (Theory Embracing);
3. The issues are important, are still unresolved, and need to be engaged (Theory Engaging).

The labels in parentheses reflect fundamental differences in outlook and approach. If you believe that (1) "The issues are irrelevant, are not accepted, and need not be addressed at all," then theory simply gets in the way of the job. If you could not imagine discussing with your students or your boss Derek Gregory's observation that "advances in GIS . . . assume that it is technically possible to hold up a mirror to the world and have direct and unproblematic access to 'reality' through a new spatial optics" (Gregory 1994, 68), you are a Theory Avoider.

If you are a member of the second constituency, the ones who respond with (2) "The issues are already known, have been accepted, and need not be further addressed," you will recognize in Gregory's remarks an attack on the correspondence theory of representation implicit in cartographic practice for most of the second part of the twentieth century. Correspondence theory is the idea that a neutral, objective representation of reality can be made in maps, language, or other sign system, and that it is our goal as cartographers to do so. You may also feel that this critique is already being successfully mounted against cartography via the work of, *inter alia*, Brian Harley, Denis Wood, Matthew Edney, and John Pickles. You are a Theory Embracer.

Members of these first two camps seem to face in opposite directions. For every worker in an intellectual environment in which theory is only a distraction from the problem-solving capabilities of GIS, another scoffs at the idea that cartographers still employ the map communication model. For the most part, these constituencies have occupied different realms of discourse, and although various attempts (e.g., Pickles 1995, 1997; Wright *et al.* 1997) have been made during the 1990s to bring them together, these efforts produced little intellectual movement. To clear decks and define terms is an important step in critical engagement, but as yet, the fray has not been joined in a wider sense.

Members of the third group who respond "The issues are important, are still unresolved, and need to be addressed" may be forgiven for having a sneaking admiration for Eagleton's adage that "hostility to theory usually means an opposition to other people's theories and an oblivion to one's own" (Eagleton 1983, viii). Theory Engagers believe that the other two groups lack critical engagement with theory: Group 1 because it prefers to ignore theory and Group 2 because it seems too *entranced* by it. Members of Group 3 want to argue with the technological determinism of

Neil Smith's assertion that the "Gulf War was the first full-scale GIS war" (Smith 1992), as theory gone too far, but also feel that most cartographic practices, including distributed mapping, are under-theorized.

This paper has been written to make membership of this third group seem our best choice in understanding mapping practices and their history. For we Theory Engagers, although the first two groups have produced some useful arguments, on the whole we find that Theory Avoiders are oblivious to their own theories of the correspondence theory of representation (which with Group 2 we see as discredited), while Theory Embracers too often see cartographic practices as *necessarily* technicist, militaristic or engaging in that baleful "spatial optics" of surveillance (which with Group 1 we see as throwing the baby out with the bathwater). To engage with theory in cartography is to seek a middle ground between the non-theoretic and the overly theoretic.

### Theory in the History of Distributed Mapping

In order to understand why we might want to be a Theory Engager in understanding the history of distributed mapping, I have employed some concepts and terminology from work by Matthew Edney (1993, 1996, 1997). Edney's work is embedded in a discourse associated in the history of cartography with Harley, Pickles, Wood, the *History of Cartography* project itself, (edited by Harley and Woodward), and the Monmonier of "carto-controversies" (Monmonier 1995), which emphasize maps as social constructions. Edney argues that the discipline of cartography has adopted a monolithic view of the history of cartographic practices. This view sees cartography as the progressive enlargement of information collected about the world—a spatial database. The database has several notable assumptions: it is scaleless; geographic facts have single geometrical locations ("location might be inaccurate or imprecise, but it is never ambiguous; each place exists in only one location" Edney 1993, 55); the data are commensurable (data can be added together or compared, and do not contradict each other—an assumption I argue leads to the current focus on "inter-operability" in GIS); the database is enlarging and becoming "better" (more comprehensive, precise and accurate) over time; and the facts of the world can be read off from nature and collected (empiricism, or technically in positivism *le reel*). Note that this last assumption appeals to the correspondence theory of truth behind the map communication model and that Theory Avoiders hold most of these assumptions.

Edney argues that it is time that we drop these assumptions, because they gloss over a more productive way of seeing cartographic history as the evolution of different "modes" of mapping. Each mode of mapping is intimately tied to social, cultural, and technological relations, which are contingent on particular times and places. For example, after the Renaissance the three primary modes were chorography, charting, and topography, reflecting mapping activity at various scales. By the early eighteenth century, however, these modes had merged into a single mode of mathematical cosmography (i.e., the geometrical and astronomical processes of mapping). "This merger was effectively complete by 1750: geographic data were held to be conceptually scaleless so that the scale-based distinction between chorography and special geography dissolved" (Edney 1997, 43). This period of unification lasted until approximately the early nineteenth century, when cartography again fragmented into several modes, including thematic mapping, systematic mapping, and the revival in new forms of chorographic, charting, and topographic activities.

*"Edney argues that the discipline of cartography has adopted a monolithic view of the history of cartography as the progressive enlargement of information collected about the world—a spatial database."*

*". . . after the Renaissance the three primary modes were chorography, charting, and topography . . . By the early eighteenth century, however, these modes had merged into a single mode of mathematical cosmography."*

Is progressivism in cartography simply a “straw man which can easily be knocked over” (Monmonier 1999, 235)? After all, technology has yielded many benefits and advantages, including the high customization of distributed mapping, as Monmonier points out. However, non-progressivists such as Edney do not gainsay societal benefits but are concerned with the account we give of those benefits. The account they challenge says that progress takes place inevitably and linearly over time (without retrenchment, ruptures, dead ends, etc.); that it is based on a model of mapping which is empiricist; and that a database of commensurable data can gradually be built up. True, this aspect is fading thanks in part to the History of Cartography project, but there were many histories prior to this (and in part what it was written against, see Edney 1999, esp. p. 2) which adopted the linear model. And some recent textbooks (e.g., Tyner 1992, 4-5) still offer it.

In Edney’s view, no particular mode is historically privileged over the others. Instead, the various modes are inter-related, contesting, and dominant at different times. Each mode may emphasize different cartographic techniques (the survey, the traverse) or different conceptions of space (geometrical, commodified, or personal). Edney’s account is non-teleological in that it does not see cartography as getting better and better maps in the sense of getting our maps to reflect reality more truthfully. Instead maps are a historically contingent set of relations adapted to their environment: “a map is a representation of knowledge; the representation is constructed according to culturally defined semiotic codes” (Edney 1996, 189). On this view, there is no such thing as a temporally stable, historically transcendent answer to the question “What is a map?” It would be impossible to give “a” definition of a map, yet very easy to offer multiple, competing ones (Andrews 1996).

*“... distributed mapping is a (socially) constructed ‘mode of cartography’, whose history is best written non-progressively without recourse to the empiricism of the map communication model, and without a search for ‘the origin’ of a practice or a simplistic, linear sequence of influences. Delays, discontinuities, and retrenchments are likely to be found. Power and resistance circulate through a technology and its social relations.”*

One reason Edney’s viewpoint is useful is that it forces us to confront contemporary mapping in the same evolutionary light, and to discard determinist models of technology. Using an argument developed in a discussion of the ethics of the Internet (Crampton 1999a), I argue that technologies such as distributed mapping should not be assigned inherent logics or powers, as when the Internet is condemned as inherently surveillant or praised as inherently emancipatory. On the contrary, technologies are part of intellectual traditions, and are constituted through sets of mutual relations with society. Those relations may be constraining or emancipatory, but are not necessarily either. Contrary to the more provocative critics of GIS who warn of a powerfully dominating technology (Smith 1992; Pickles 1991), I find it more useful to think of power and technology not as domination but as something that produces resistance and requires negotiation of its implementation (Foucault 1980, 142). Thus a technology such as distributed mapping, GIS, or the Internet becomes a site of negotiation and contestation with those who resist *and* modify it, as when, for example, information technology threatens personal privacy. I also argue that scholars and practitioners should take part in this negotiation, as Internet activists, and shape distributed mapping into the form they most prefer (Crampton 1999a).

In examining the history of distributed mapping I therefore wish to apply the following concepts: distributed mapping is a (socially) constructed “mode of cartography” (in Edney’s phrase), whose history is best written non-progressively without recourse to the empiricism of the map communication model, and without a search for “the origin” of a practice or a simplistic, linear sequence of influences. Delays, discontinuities, and retrenchments are likely to be found. Power and resistance circulate through

a technology and its social relations. In the next section I explore the relevance of these concepts to the historiography of distributed mapping.

Distributed mapping is an emerging area that represents one of the most interesting outcomes of the convergence of spatial technologies such as GIS, remote sensing, and digital cartography with the World Wide Web (MacEachren 1998; Plewe 1997). This convergence combines the methods and techniques of interactive mapping and spatial analysis with the distribution of functionality and resources in new and provocative ways. Two recent developments in particular have led to a surge of interest in distributed mapping by cartographers, the GIS community, and the commercial sector. The first of these is the potential afforded by “user-defined” and “on-demand” mapping functionality. User-defined mapping refers to user control of data coverages, perspectives, speed of animation, and other facets of the map.

Monmonier was one of the first cartographers to recognize the importance of distributed user-defined maps when he spoke of “individually tailored, one-of-a-kind maps” being sent electronically (Monmonier 1985, 172). Monmonier applied the suggestions of Toffler on the “de-massifying” effects of technology. De-massification is a feature of post-Fordism (extremely flexible modes of production and labor deployment), and distributed mapping’s capability to create individualized maps means that it is a form of post-Fordist cartography. This suggests interesting avenues of research into the labor practices of distributed mapping.

In a previous book (Monmonier 1982) had also noted the outgrowth of distributed databases from remote time-sharing computing during the 1970s. In some of these early distributed databases a limited degree of interactivity and thus user-definition was possible. One of these was the US federal government’s DIDS or Decision Information Display System, which had been developed by NASA, the Department of Commerce, and the Census Bureau. DIDS was meant to share and distribute data to many agencies, legislators, universities and other users (Monmonier 1982, 146). Although DIDS underwent extensive testing, it was never installed because of the cost of specialized computing hardware and a lack of demand for its data. Yet many of its functions can be found in today’s distributed mapping systems. For example, DIDS had progressive zooms or scale changes, analogous to MapQuest’s maps. DIDS was probably ahead of its time.

On-demand mapping refers to maps that the user creates at the moment of need, in contrast to previously compiled maps collected in archives or map libraries (Crampton 1999b). Indeed, the rules under which maps are created and archived, discussed, appropriated, forgotten or remembered have undergone a radical break. Maps are used quite differently in distributed mapping, as we shall see below. Transience and ephemerality are hallmarks of online mapping: neither printed out nor saved, maps exist for minutes or hours rather than centuries. And the typical map library has no record of a map’s creation or use.

In this context (the archives as the set of rules) it is useful to apply the concept of an “archeology” as described by Foucault (1972). An archeology is an attempt to uncover the historical rules of the formation of knowledge seen as a set of discourses. How are some things said or not said, conserved, remembered, or appropriated? Further, what are “its modes of appearance, its forms of existence and coexistence, its system of accumulation, historicity, and disappearance?” (Foucault 1972, 130). Foucault’s focus on discontinuities, displacements, and transformations in the history of systems of thought are relevant to contemporary cartographic history.

#### THE HISTORY OF DISTRIBUTED MAPPING AS A MODE OF CARTOGRAPHY

*“Two recent developments in particular have led to a surge of interest in distributed mapping . . . ‘user-defined’ and ‘on-demand’ mapping; and interactive three-dimensional representations.”*

*“Three-dimensional online mapping is an extension of both traditional static 2D maps, and 2D interactive online maps, whether from GIS vendors or online mapping services.”*

In particular, user-defined (individualized) and on-demand (transience) approaches to mapping distinguish traditional cartography (with its emphasis on communication and static *maps*) from contemporary developments in interactive mapping and distributed GIS that emphasize mapping *environments* in which the maps themselves are fleeting and transient.

The second development is the capability of an interactive digital environment to handle distributed three-dimensional representations, sometimes referred to collectively as “Web3D.” This latter capability has been much aided by several technical developments for world-building, which can be distributed via the Internet. Three-dimensional online mapping is an extension of both traditional static 2D maps, and 2D interactive online maps, whether from GIS vendors or online mapping services (Crampton 1999c). A 3D mapping experience takes advantage of the exploratory, highly interactive nature of GVis (geographic visualization). It can also provide a “co-space” that can be occupied by more than one “avatar,” or representational person, therefore allowing interaction between users. The goal is not a single “best” map but a fully realized spatial environment—in effect, the user can enter the map itself. At the moment, though, this is nothing more than an intriguing possibility.

In brief, distributed mapping (i.e., 2D or 3D) consists of tools, methods, and approaches to using, producing, and analyzing maps via the Internet, especially the World Wide Web. It is highly user-oriented, characterized by a distributed ability to create user-defined maps on demand. These features enable distributed mapping to be highly interactive and exploratory. Compared with traditional static maps, most distributed maps are neither printed nor saved, with important implications for map collectors as cartographic archives.

### **Distributed Mapping in Historical Context—Early Developments**

Edney’s notion of cartographic modes allows an insightful historical assessment of distributed mapping and its effect on the archive. Figure 2 illustrates the merging and branching of the various fields that converged in the 1990s to form the current picture of distributed mapping, especially cartography, GIS, and the Internet (then later the World Wide Web). Due to space limitations, I will focus on the more significant events and their implications.

### **Cartography and GIS**

Experiments in digital mapping were first made during the 1960s and 1970s. These maps were not massively distributed, although mapmaking software such as SAS/GRAPH and SPSS was available for mainframe computers. Geography was well into a period of intellectual growth, later known as the “quantitative revolution,” that emphasized systematic analysis (Gould 1979; Billinge, Gregory and Martin 1983; Livingstone 1992, esp. chapter 9) and computer display hardware was becoming widespread (Peterson 1995, 64 ff.). The quantitative revolution created an intellectual space for technical enquiry, and recent graduates of departments with an emphasis on spatial analysis shaped the field during the 1960s. The most important of these departments was the University of Washington, in Seattle. Also influential were the geography departments at Iowa, Chicago, Northwestern, and Ohio State, which initiated the field’s flagship journal, *Geographical Analysis* in 1969. Notably innovative geographers include William L. Garrison, a Northwestern University PhD (1950), and a quartet of Washington PhDs: Brian Berry (1958), William Bunge (1958),

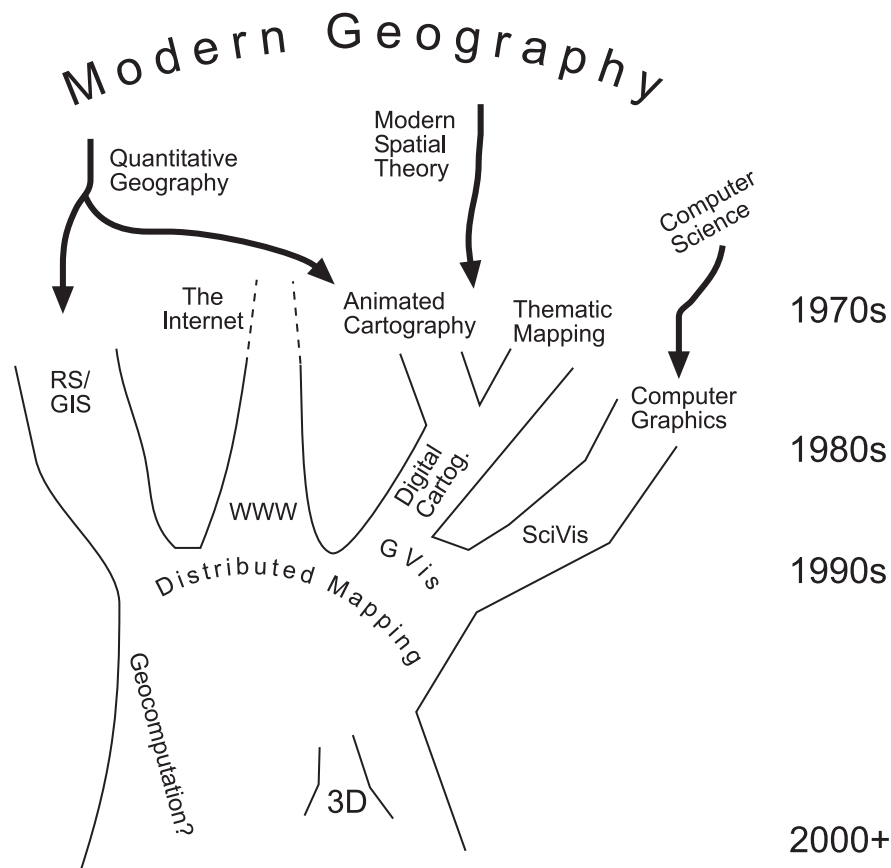


Figure 2. History and Development of Distributed Mapping as a Mode of Cartography.

Richard L. Morrill (1959), and Waldo Tobler (1961). In an early article, "On Automation and Cartography," Tobler (1959) discussed the map as part of a data processing system (the map as storage unit, output device, and so forth) and provided an intellectual foundation for computer cartography (Clarke 1995, 5). Bunge (1966, viii) credited Arthur Robinson for his initial thoughts on "metacartography," and several of the others acknowledged the migration models and spatial probability surfaces of Torsten Hagerstrand, a 1953 PhD graduate of the University of Lund.

Although these early experiments were not interactive maps, a paper by one of the most intellectually fertile quantitative geographers, Waldo Tobler (1970), revealed a latent interest in dynamic cartography. In a study of urban population growth, Tobler used film animation to visualize solutions to geographical problems as well as to explore spatial data, much the same as today: "the expectation . . . is that the movie representation of the simulated population distribution in the Detroit region will provide insights, mostly of an intuitive rather than a formal nature, into the dynamics of urban growth" (Tobler 1970, 238). His movie was based on an explicit model of population, so that changing the terms of the model would alter the rate of change of the urban growth and provide the theme for a new animation. Although Tobler did not discuss interactivity directly, his paper reflects a "mapping or visualization need." Even so, this is a far cry from the interactivity of systems able to respond in less than a second (<1s) (Crampton, forthcoming), and only later (late 1970s and 1980s) did researchers become interested in the techniques and concepts of animated and interactive mapping. Of particular note was the early involvement of military funding agencies, such as the Office of Naval Research, which

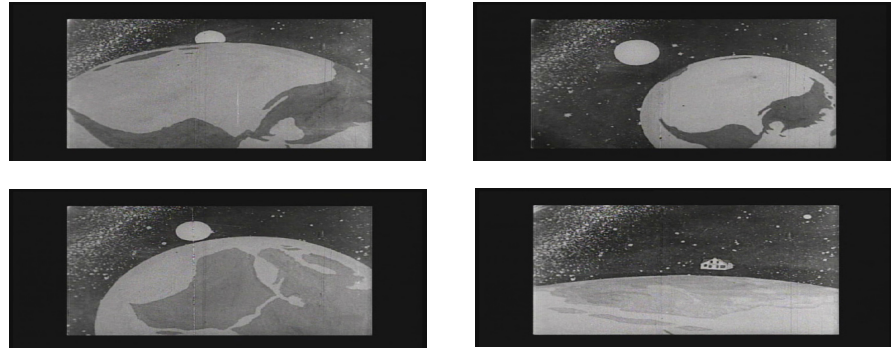


Figure 3. Very early animated "map" featuring a spinning globe. Source: Animation Legend: Winsor McCay ©1993 Cinémathèque Québécoise and Lumivision. Used with permission.

sponsored a symposium on quantitative geography in 1959 and funded Tobler and others' work (e.g., the Harvard Graphics Laboratory) through the 1960s (Mark *et al.* no date).

Earlier efforts outside geography produced numerous (non-computer, non-interactive) cel animations for the public. Cel animations were first used in the film *The Sinking of the Lusitania* by the cel pioneer Winsor McCay in 1918. In Figure 3, a sequence from a 1921 animation *The Flying House* (also known as "Rarebit Dreams"), a flying house is shown circling a rotating earth (rotating the wrong way!). This may well be the first ever animated "map."

In an early study Thrower (1961) examined 50 short (~3 minutes) educational film sequences with cartographic cel animations made between 1936 and 1957. Although these animations lacked many important cartographic components, Thrower pointed out that animation is "unexcelled" for certain kinds of spatial relationships, especially for people conditioned on moving images in movies and TV (p. 28). He ended his discussion by pointing out that animation is not a substitute for static cartography, a point equally relevant to today's distributed mapping.

Although competent computer graphics hardware, available in the 1960s, fostered the more fully computerized compositions that quickly replaced frame-by-frame animation (Campbell and Egbert 1990), the most influential computer program of the decade did not support animation. SYMAP—the acronym means SYnagraphic MAPping, that is "acting together graphically" (Cerny 1972, 167)—was originally conceived in 1963 by Howard Fisher at Northwestern University and later at Harvard's Laboratory for Computer Graphics and Spatial Analysis in 1968 (Chrisman 1988). SYMAP performed geographic computations such as interpolation and point-to-polygon conversion and produced choropleth and isarithmic maps on the widely available line printer (Monmonier 1982, 50-65). Fisher, an industrial architect, established the Harvard Lab in 1966, with a grant from the Ford Foundation; the Office of Naval Research provided funding after 1969, when William W. Warntz, a leading quantitative geographer, became the Lab's director (Warntz 1983; Mark *et al.*, no date).

The history of these technical developments is well documented. Especially useful are Monmonier's two books (1982, 1985), a paper by Coppock and Rhind (1991), a special issue of *The American Cartographer* (Petchenik 1988), and in the field of GIS, Foresman's (1997) *History of Geographic Information Systems* and the NCGIA Core Curriculum Unit on the History of GIS (Klinkenberg 1997). Other important developments during the 1960s and 1970s include the Census Bureau's DIME and TIGER databases, the CIA's World Databank II—later used by the first online mapping system, the Xerox PARC MapServer, established in June 1993—and the found-



ing of ESRI, Intergraph and Laser-Scan. The history can be divided into several periods: the early pioneers (1960s); the role of the government agencies (1970s); and the commercial development period (1980s onwards). With the emergence of Web-based GISs, we are perhaps entering a new period of "user-defined" cartography characterized by user creation of maps on demand, using highly interactive systems (Crampton 1999b). These developments were technically and socially linked. For example, several researchers who developed the ODYSSEY system at the Harvard Lab moved to ESRI and became instrumental in the development of GIS (Chrisman 1988).

Despite the triumphs of computer-assisted cartography and GIS, delay and retrenchment marked the first years after the prescient papers of Thrower and Tobler. Hardware was a principal impediment as concepts emerged before the inexpensive computing power needed for implementation. Statistical software with mapping capabilities (such as SPSS and SAS-GRAPH) became widely available during the 1980s, but animation and interactivity lagged. Campbell and Egbert (1990) felt so strongly about the lack of progress that they wrote a critical article arguing that cartography had a long way to go if it was to do more than just "scratch the surface." This thirty years of stagnation underscores the relationship of mapping to larger societal developments (in this case sufficient computing power).

### **The History of the Web and Contemporary Development of Distributed Mapping**

The history of the Internet has received considerable attention, reflecting its high visibility during the 1990s among journalists, academics, and the public. The most incisive book on the origins and early history of the Internet is the study by Hafner and Lyon (1996), but—perhaps predictably—the most detailed narrative is an online timeline known as "Hobbes' Internet Timeline" (Zakon 1999). Although I will not delve into the history of the Internet, it is worth reflecting on the origins of the Web itself.

The World Wide Web (which should always be carefully distinguished from the Internet) formally originated in March 1989 in a proposal by a British physicist, Timothy Berners-Lee, working at the European Nuclear Research Center (CERN, an acronym of its name in French) in Geneva. The particular circumstances surrounding it were mediated through intellectual and social connections, and its work did not progress smoothly. The original plan for the Web was an information retrieval and ordering device. During the 1980s Berners-Lee had been searching for ways of organizing information for spatially separated scientists, who used different computing environments, spoke different languages, and worked on rapidly evolving complex systems. His solution was a distributed hypertext system that in 1989 he called "Mesh" (the term World Wide Web was substituted in 1990). Hypertext had received considerable attention in the 1950s and 60s through the work of an independent researcher Ted Nelson, whose own work was inspired in 1945 by presidential science advisor Vannevar Bush, who directed the Office of Scientific Research and Development. Bush's "Memex" was not physically implemented into any working system. But by the late 1980s renewed interest in hypertext among many computer scientists was apparent in a USENET newsgroup alt.hypertext, a special issue in 1988 of the *Communications of the ACM* (Association of Computing Machinery), and at least two conferences. Berners-Lee was aware of these developments, and modified an Apple HyperCard-like organizational system he had first developed in 1980 called "Enquire" to handle project management (Berners-Lee 1989).

*"The history of technical developments can be divided into several periods: the early pioneers (1960s); the role of the government agencies (1970s); and the commercial development period (1980s onwards)."*

*". . . delay and retrenchment marked the first years after the prescient papers of Thrower and Tobler."*

*"Hypertext had received considerable attention in the 1950s and 60s through the work of an independent researcher Ted Nelson . . ."*

Put into place in 1990, these ideas generated little interest outside CERN. After all, hypertext had been around for more than forty years (perhaps earlier if rudimentary annotation systems such as the commentaries on the Torah are counted). What the Web needed was a way of making the ideas tangible and easy to understand. This came in the form of a graphical browser, Mosaic. Mosaic was the “killer app” for the Web, first for the X windows system under UNIX, then for the Mac and Windows. It was not the first client browser (this honor again belongs to Berners-Lee, who in 1990 wrote one called “WorldWideWeb” [no spaces, later renamed Nexus to avoid confusion]) but it was the first browser available to the public. Although now largely replaced by Netscape and Microsoft Internet Explorer, Mosaic initiated the era of the graphical browser in 1993, and the Web as we now know it had arrived.

Figures for Web usage confirm the network’s rapid growth. Indeed, during the period of 1992-1995, the Web’s share of traffic on the NSF’s backbone network increased from zero to 26.3 percent, and rose in rank to first place (Table 1).

Date	FTP as Percentage of Traffic (Rank <sup>†</sup> )	World Wide Web as Percentage of Traffic (Rank <sup>†</sup> )
6/92	50.4 (1)	–
12/92	46.1 (1)	0.002 (186)
6/93	42.9 (1)	0.5 (21)
12/93	40.9 (1)	2.2 (11)
6/94	35.2 (1)	6.1 (7)
12/94	31.7 (1)	16.0 (2)
4/95*	21.5 (2)	26.3 (1)
[1999	~13 (n.a.)	~68 (1)]**

Table 1. NSFNET Backbone Data: Proportion of Traffic in Bytes by Port (WWW = 80, ftp = 20). Other services not listed include finger, gopher, nntp, telnet, etc. Source: Compiled by author from archives at ftp://nic.merit.edu/statistics/nsfnet/. <sup>†</sup>Rank of proportion of packets. \*The NSFNET backbone was disbanded in April 1995. \*\*Source: Peterson (1999, 573) percentage of all Internet traffic.

The trend has continued since 1995 as can be seen by the last line of Table 1. In fact, today’s Internet is so congested (particularly with “.com” traffic) that a consortium of universities and business (the University Corporation for Advanced Internet Development,UCAID) has developed an advanced backbone network for “Internet2” member universities that offers sufficient commercial-free bandwidth to enable live online video-conferencing and other bandwidth-dependent scientific research. This is called the Abilene project.

*“Despite this amazing growth, the Web is available only to a tiny fraction of the world’s population.”*

Despite this amazing growth, the Web is available only to a tiny fraction of the world’s population (see Table 2). This fact is sometimes forgotten in the hyperbole surrounding the Web and the Internet. Furthermore, access is highly constrained by geography, social status, age, gender, and other variables (Crampton 1999a). For instance, the Washington, DC area has been reported as the USA’s most Internet connected region, with nearly 60 percent online. Globally, the average is only 5.4 percent for 2000. This disparity is known as the “digital divide.”

As Figure 2 shows, the capabilities of the Internet first merged with those of GIS/cartography in the early 1990s. The first interactive mapping capabilities were established to test interactivity, rather than as cartographic or GIS applications per se. Not until the late 1990s were distrib-

Date	Online Population (millions)	As Percentage of World Population
1996	60	1.0
1997	100	1.7
1998	150	2.5
2000	327	5.4
2005	720	11.2

Table 2. Persons with access to the Internet as a percentage of total world population, all ages, 1996-2005. Source: US Census Bureau, NIU.

uted mapping systems established for the express purpose of providing GIS/cartographic functionality.

The earliest map server is the Xerox PARC (Palo Alto Research Center) server developed by Steve Putz to test Common Gateway Interface (CGI) scripts via the Web, and put online in June 1993 (Putz 1994). CGI is a method for external clients to execute commands interactively and remotely on information servers. Notably, the maps were created "on-demand" with the PERL scripting language according to a set of basic user inputs (latitude/longitude, scale, etc.) embedded in the URL, rather than serving images from a map archive. The on-demand maps were then served out via an HTTP process running on a Sun workstation at Xerox PARC (Figure 4). Basic usage statistics indicate that the Xerox PARC map server is highly popular, with some 130 million accesses since it started in June 1993 through summer 1999. Holding at approximately 60,000 map images per day, the level of access has not changed substantially since Spring 1996. For a while, though, the server was also accessible via a geographic name server (a service now alternatively available for US cities from the Census Bureau).

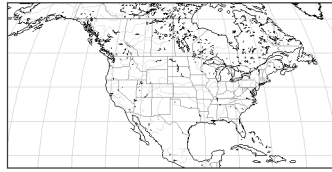
Archival information provides only a partial glimpse at the history of this innovative mapping environment. A record of the types of map in use, their geographic focus, and scale is not available. The conditions of knowing and storing this kind of information have been lost. We do not know, for example, what parts of the world are mapped or by whom. Are the maps used to explore events in the news (knowledge discovery) or to look up your hometown (knowledge confirmation)? What are the common scales used: small-scale (synoptic) or large-scale (local)?

Other significant developers were the Bureau of the Census, which put its TIGER databases online in 1995 and the Digital Libraries Initiative, established in 1995 to promote cartographic interfaces for georeferenced data. A cartographic "front end" helps the user of a digital library search for images, maps, or other environmental data and metadata. The best known example is the Alexandria Digital Library (Buttenfield 1999). Other government agencies, including the U.S. Geological Survey, also provide distributed data, though not necessarily interactively. "Earthview" at CERN, another well-known service, produces about 60,000 user-defined map views per day (Peterson 1999). By comparison, the USGS, often thought to be the world's largest producer of printed maps, distributes an estimated 500,000 non-custom maps each week.

By 1996, commercial vendors had also recognized the potential value of distributed mapping, and were offering a variety of products in the marketplace. These products fall into two categories, the first of which consists of interactive map generators and online spatial data providers (true "online mapping"). These include MapQuest, which not only provides maps at its own site but also provides maps for Yahoo! and other Web sites; MapBlast!, provided by Vicinity Corp., a business services company that

*"Are distributed maps used to explore events in the news (knowledge discovery) or to look up your hometown (knowledge confirmation)? What are the common scales used: small-scale (synoptic) or large-scale (local)?"*

Xerox PARC Map Viewer: world 40.50N 102.46W (4.0X)



Select a point on the map to zoom in (by 2), or select an option below. Please read About the Map Viewer, FAQ and Details. To find a U.S. location by name, see the Geographic Name Server.

**Options:**

- Zoom In: (2), (5), (10), (25); Zoom Out: (1/2), (1/5), (1/10), (1/25)
- Features: Default, All, +borders, +rivers
- View Color Legend for world map
- Display: monochrome; Projection: elliptical, rectangular, sinusoidal; Narrow, Square
- Change Database to USA only (more detail)
- Hide Map Image, Retrieve Map Image Only, No Zoom on Select,
- Place mark at (40.50N 102.46W), Reset All Options

Requested region is 90.00 deg. wide by 45.00 deg. (3105.00 miles) high.

Figure 4. Illustration of Xerox PARC map webserver, the first online mapping environment.

uses data from Etak; mapping services associated with online phone and people directories, such as MapsOnUs, Switchboard, and BigFoot; and most recently a joint Microsoft/USGS product called TerraServer. A commercial implementation of the digital library concept, TerraServer offers a database of imagery via either a cartographic or a geographic name interface, and provides declassified Russian satellite imagery (SPIN-2, 2-meter resolution) for global images as well as USGS aerial photography (digital orthophotographs of 1-meter resolution) for the United States. Developed initially by Microsoft as an experiment in terabyte (trillion byte) data scalability, TerraServer was only incidentally a spatial data provider.

The second category consists of spatial data analysis and visualization tools available over the Internet. These offer full-blown distributed mapping capabilities rather than mapping solutions. Two developments are noteworthy: GIS companies positioning themselves to offer Web enabling of GIS, and further integration of GIS/Web/visualization technology (Cook *et al.* 1997) and database cross-linking (Carr *et al.* 1998). The latter extends the early and highly innovative work of Monmonier, who first applied the concepts of geographic brushing in cartography.

Changes are rapid and extremely competitive in the commercial sector, where six-month upgrade cycles are common. I will refrain, therefore, from reciting specifics because these developments are no longer "history" but contemporary and ongoing development. It is apparent, though, that spatial technologies are continuing to converge.

### Implications of Distributed Mapping

**1. Transience.** A critical difference between Web maps and print maps is their historical legacy: Web maps last for minutes rather than years, whereas the print maps in archives are most certainly more numerous than the Web maps in existence at any given time. Further research is needed into how many print and virtual maps exist, who has access to them, and how they are used. Yet, if we distinguish between the map and a mapping environment (as I think is necessary), then it is likely that far more people potentially have access to mapping environments than to print maps. Equally apparent is a shift from the map as a product to the mapping environment as a process.

This transience has several implications. First, because historical archives do not capture the range of contemporary mapping activities, there

*"Web maps last for minutes rather than years . . ."*

is a danger that many mapping practices will not be recorded. Certainly, librarians, and others are keenly aware of this issue. Second, transience raises the issue of what can and should be recorded. Should the maps themselves be archived, or merely the queries used to generate them? After all, MapQuest generates millions of maps per day, but they are fairly similar. Perhaps what should be recorded is the scale, region, and database query, not the map.

**2. Cartographer/User Convergence.** Accompanying these sweeping structural and procedural changes in cartography in transition is a declining need for "the cartographer" as an expert mapmaker. Although specialists might never disappear entirely (should they?), distributed mapping is eroding the traditional distinction between cartographer and map user. Clearly historians of cartography need to trace the nature and extent of this transition, as well as the forms and intensity of whatever resistance has arisen or might arise.

**3. Map Use and Cognition.** In 1999, in recognition of new map use environments fostered by distributed mapping, the International Cartographic Association (ICA) reorganized the Commission on Map Use as the Commission on Maps and the Internet. Although users could always interact with maps, interactivity is now defined as an environment in which the display changes in response to user input, usually very rapidly (<1 second response time). This is a real change, which raises many conceptual and research issues, including user interface studies (Torguson 1997), cognition, and the distinction in geographic visualization (GVIs) between high and low interactivity. Among the many research topics that warrant attention is the question of navigation within so-called data landscapes. Are interactive, 3D environments more efficacious in learning new environments? How does immersibility affect spatial cognition? And do map metaphors work well in visualizing abstract data, as when a news organization depicts news stories as topographic maps, with local peaks (popular news stories) and valleys (less well-covered news stories).

**4. Commercial Applications.** Distributed mapping seems likely to replicate the history of GIS, which developed in academic geography but is now centered in commercial applications. Clearly the vast majority of Web maps exist not as ends in themselves but to support electronic commerce. As examples, the typical Web map is provided free in hope that the viewer will notice the accompanying advertising, and many of these free maps are closely tied to the travel and tourism business, which is forecast to comprise 35 percent of Web sales by 2002.

In this paper, I have examined in a preliminary way the history of a particular mapping practice. Drawing on the work of Edney, Harley, and other historians of cartography, I have argued for a non-progressivist history, which not only emphasizes contingencies, delays and dead ends but rejects the reductionist map communication model. I suggest that the history of distributed mapping marks a significant break in (rather than a continuation of) traditional cartography. This discontinuity raises several fundamental questions. What model of representation is most appropriate? A model that considers all spatial data necessarily interoperable and thus amenable to standard definitions and data structures? And thus a model unable easily to accommodate nonstandard spatial data such as local knowledges and spatial cognitions? If so, the history of distributed mapping might simply perpetuate the atheoretical progressivist perspective by treating cartography as an ever-increasingly accurate database with a new name.

*"... distributed mapping is eroding the traditional distinction between cartographer and map user."*

*"One of many cognitive research topics is the question of navigation within so-called data landscapes."*

CONCLUDING REMARKS

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## Anatomy of a Cartographic Surrogate: the Portrayal of Complex Electoral Boundaries in the *Congressional District Atlas*

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Compiled and published by the Bureau of the Census, the *Congressional District Atlas* describes the boundaries of the nation's 435 congressional districts. Since its inception in 1960, the atlas has grown in length from 103 to 1,272 pages. The most noteworthy increase, between the 1987 and 1993 editions, reflects judicial pressure to equalize district population within a state as well as Department of Justice efforts to maximize the number of minority-majority districts. Single-district states like Delaware and Wyoming still consume a single printed page, and because county boundaries are documented elsewhere, a single-page map is usually adequate for states in which district boundaries do not split counties. By contrast, non-traditional borders winding through multiple counties require numerous large-scale maps efficiently formatted as telescopically nested insets. In the most recent edition, published in two volumes in 1993, Florida and Texas individually account for more pages than the entire first edition, and North Carolina's 12th district, which the Supreme Court ridiculed in *Shaw v. Reno*, stretches across 30 separate pages. Because of this parsimonious portrayal of boundaries, the atlas affords a convenient state-level descriptor of geographic complexity: the ratio of map pages to seats in the House of Representatives. Cartographic and statistical analysis of this index reveals a concentration of complex boundaries in the Southeast and other areas in which the Voting Rights Act mandates preclearance by the Justice Department. Not surprisingly, the index is a near-perfect predictor of judicial challenges to race-based redistricting.

### INTRODUCTION

Temporal series of maps warrant the attention of historical geographers, historians of cartography, social historians, and historians of science and technology. Well-known examples include town plans (Reps 1965), fire-insurance atlases (Ristow 1968), and county atlases sold by subscription (Conzen 1984). For the historical geographer, these artifacts provide authored views, if not exact geometries, of past landscapes (Black 1997; Harley 1972). For cartographic scholars these same sources hold insights to nineteenth-century commercial cartography (Ristow 1985). Equally valuable are temporal series of topographic quadrangle maps, which afford detailed snapshots of streets, boundaries, terrain, and place names as well as raw data for examining the evolution and impact of federal-state cartographic cost sharing and improved land-survey technology (Monmonier 1985). At smaller scales, federal maps of weather, land cover, and hazard zones reflect evolving scientific understanding as well as increasing awareness of government's role in environmental protection and growth management (Monmonier 1997). Because the volume of carto-

graphic activity can be a meaningful surrogate for a geographic phenomenon, scholars might usefully compile time-series counts for relevant maps.

This paper views the Census Bureau's *Congressional District Atlas* (U.S. Bureau of the Census 1960–95) as a cartographic surrogate for the complexity of electoral boundaries. (A *cartographic surrogate* may be defined as a map or atlas that in its presence, size, number, or level of detail serves as a significant indicator of the existence or pervasiveness of a social, political, economic, or biophysical phenomenon.) As a complement to special census tabulations for congressional districts, the atlas provides an official, standardized description of the nation's 435 congressional districts and their boundaries. The Bureau of the Census published the first atlas in 1960, before Supreme Court decisions in *Baker v. Carr*, other landmark redistricting cases, and the Voting Rights Act of 1965 led to radical new approaches to spatially structuring the nation's voting districts. Subsequent editions of the atlas captured the impacts of the court's one-person-one-vote doctrine of the 1960s, the expanded minority voting rights initiatives of the 1980s and early 1990s, and the court's more recent retreat from geographically complex districts crafted to elect more African Americans and Hispanics to the House of Representatives. Because these evolving one-person-one-vote districts would have been difficult to construct and draw several decades earlier, the atlas also reflects the effect on redistricting of spatially more refined (block-level) data and high-interaction geographic information systems.

Three and a half decades have witnessed an extraordinary evolution in the atlas's size and level of detail. The first edition, issued in June 1960 for the 86th Congress, contained a mere 99 pages of maps, plus a short preface and table of contents. Each of the fifty states, even those with only one representative, merited at least one page. A single county-unit map was sufficient for most other states as well: split counties were comparatively rare before *Baker v. Carr*, and most congressional district boundaries typically followed county lines. Noteworthy exceptions include California, with additional map pages for Los Angeles, Oakland, San Diego, and San Francisco; Massachusetts, with separate pages for Boston, Fall River, Lynn, and Somerville complementing a four-page town-level statewide treatment; and New York, with a one-page statewide map and nine pages covering the state's larger cities and urban counties. Thirteen other states with large urban centers required multiple maps: Connecticut, Illinois, Louisiana, Maryland, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, Ohio, Pennsylvania, Rhode Island, and Washington.

By contrast, the twelfth edition, published in 1993 for the 103rd Congress (1993–95), is a mammoth two-volume set with 1,272 pages, most with at least one map. As in the 1960 version, states with a single House member warrant only one page, whereas all other states require at least one page each for a statewide map, a map key, and lists of counties and selected municipalities included wholly or partly within each district. In addition, one or more inset maps provide detailed descriptions of district boundaries at the subcounty level. Treatments of states with more than one representative range in size from 4 pages for Rhode Island and West Virginia to 189 pages for Texas. Additional pages portray the District of Columbia, American Samoa, Guam, and the Virgin Islands, which have nonvoting delegates in the House of Representatives, and Puerto Rico, which has a nonvoting "resident commissioner."

The preface of the 1960 edition noted that redistricting based on the new census would soon alter many of the boundaries shown. "When the majority of these changes have been accomplished," an anonymous author

*"A cartographic surrogate may be defined as a map or atlas that in its presence, size, number, or level of detail serves as a significant indicator of the existence or pervasiveness of a social, political, economic, or biophysical phenomenon."*

#### CONTRASTS AND TIME LINES

*"... the twelfth edition, published in 1993 for the 103rd Congress (1993–95), is a mammoth two-volume set with 1,272 pages . . ."*

*“... in late 1998 the Bureau published an electronic, compact disk version covering all states for the 105th Congress; maps are formatted like those in the 1993 edition...”*

*“The 1966 edition, 25 percent larger than its immediate predecessor, heralded a period of expansion that saw the atlas double in size by the end of the decade.”*

wrote, “a revised edition of this atlas may be published” (p. iii). Use of “may” seems deliberate: that the atlas had become a regular Census Bureau publication was not apparent until the 1968 edition, for the 91st Congress, described itself as “the fourth in this series” and applied the label “edition” to the three previous versions (p. 2). In addition to the two-volume 1993 edition, the Bureau of the Census issued packets of supplementary maps covering states with boundaries changed for the 104th (1995–97) and 105th (1997–99) Congresses. And in late 1998 the Bureau published an electronic, compact disk version covering all states for the 105th Congress; maps are formatted like those in the 1993 edition, and users can view PDF files on the screen as well as print the entire atlas or individual pages.

As the upper part of Figure 1 illustrates, the atlas grew in spurts, with new editions two to six years apart. The 1964 edition, which reflects boundary adjustments in response to the 1960 census, was not much larger than the earlier version. The 1966 edition, 25 percent larger than its immediate predecessor, heralded a period of expansion that saw the atlas double in size by the end of the decade. Another major increase is apparent in the 1973 edition, which was 65 percent larger than its 1970, pre-reapportionment counterpart. A third spurt, starting in 1983, reflects substantial and steady growth during the late 1980s. Even so, none of the pre-1990 revisions is as revolutionary as the two-volume atlas published in 1993.

Equally revealing are the publication dates: the Census Bureau issued a new atlas or supplement for every Congress between the 89th (1965–67) and the 95th (1977–79) Congresses as well as for the 98th (1983–85)

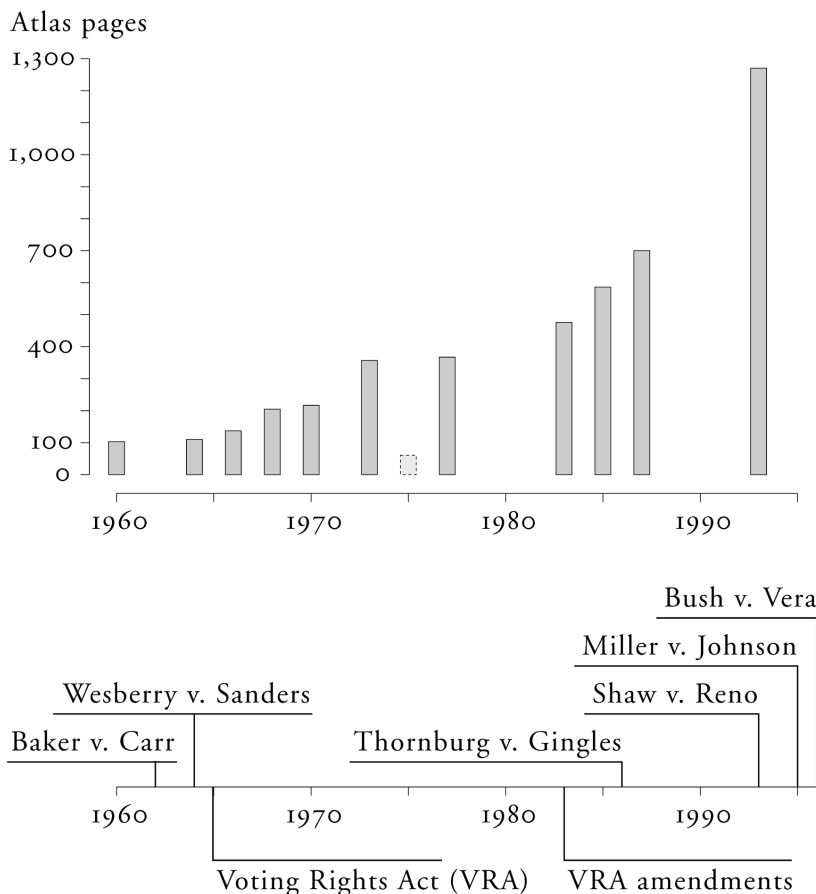


Figure 1. Temporal trend in the size of the twelve editions of the Congressional District Atlas reflects significant legislation and Supreme Court decisions on redistricting. The 1975 edition was a supplement, with maps for only three states.

through the 100th (1987–89) Congress. What's apparent is a steadily growing need for cartographic detail from the mid 1960s through the mid 1970s as well as during the mid 1980s.

Students of American constitutional history will recognize the pattern immediately. In normal times, the Census Bureau would issue a new edition of the atlas in a year ending in three (e.g., 1973, 1983, 1993), to document changes resulting from the most recent decennial census, and a revised edition or supplement two years later, to reflect a few court-ordered adjustments as well as new districts for Maine, which redraws its boundaries two years later than other states (Benenson 1993). The time line in the lower part of Figure 1 helps explain several obvious exceptions to this scenario. Starting in 1962 with *Baker v. Carr*, a case involving state legislative districts in Tennessee, the federal courts began to impose increasingly strict population equality on voting districts (Dixon 1969). In 1964, in *Wesberry v. Sanders*, the high court extended the one-person-one-vote doctrine to congressional districts. Several states had been adjusting district boundaries only when they gained or lost a seat, and many others tolerated wide disparities in population (Hacker 1963; Silva 1965). As a result, rural areas with shrinking populations were over-represented relative to cities and their suburbs. States that refused to honor the equal-population principle risked having their boundaries remapped by a special master appointed by a panel of federal judges (Musgrove 1977, pp. 56–59). To comply, redistricting officials often had to split counties, which forced the compilers of the *Congressional District Atlas* to add inset maps and extra pages. Additional editions of the atlas in the late 1960s and very early 1970s reflect the courts' unwillingness to wait for the next census or accept inadequate remedial revisions.

Equally consequential is the Voting Rights Act, passed in 1965 and extended several times (Grofman and Davidson 1992). One provision of the law requires states with a history of racial discrimination to have their redistricting plans approved by the Department of Justice. As amended in 1982, the act's "preclearance" provision authorizes Justice officials to reject any plan that dilutes minority voting strength, regardless of intent. In 1986, in *Thornburg v. Gingles*, the Supreme Court ruled that the Justice Department must also consider whether members of a minority group are sufficiently numerous and clustered within an area to form a voting district in which the group is dominant. During the Bush and Clinton administrations the Department interpreted this to mean that states should maximize the number of districts in which a minority is the majority population (Issacharoff 1996). The impact of the *Gingles* decision was not widely apparent until the post-1990 remap, for which several states devised highly irregular districts, which critics (e.g., Thernstrom 1991) dubbed "racial gerrymanders." Their intricate boundaries, drawn with the aid of block-level census data and geographic information systems, required additional map pages, which greatly increased the size of the 1993 atlas. As the congressional district map excerpt in Figure 2 illustrates, a boundary that winds in and out, to exclude or capture blocks with voters of a particular race or ethnicity, demands a large-scale map if all streets are to be named.

Arguing that appearances can be harmful, the Supreme Court subsequently sounded a retreat from remedial racial redistricting (Hammond 1997). In 1993, in *Shaw v. Reno*, the court ruled by a 5 to 4 vote that a highly contorted congressional district in North Carolina might be unconstitutional and sent the case back to a lower court; eventually North Carolina adopted a new map with more regular boundaries. In 1995, in *Miller v. Johnson*, the high court overturned a Black-majority district in Georgia, and in 1996, in *Bush v. Vera*, the justices struck down three minority districts in Texas. Ordered to draw more compact districts in which race is

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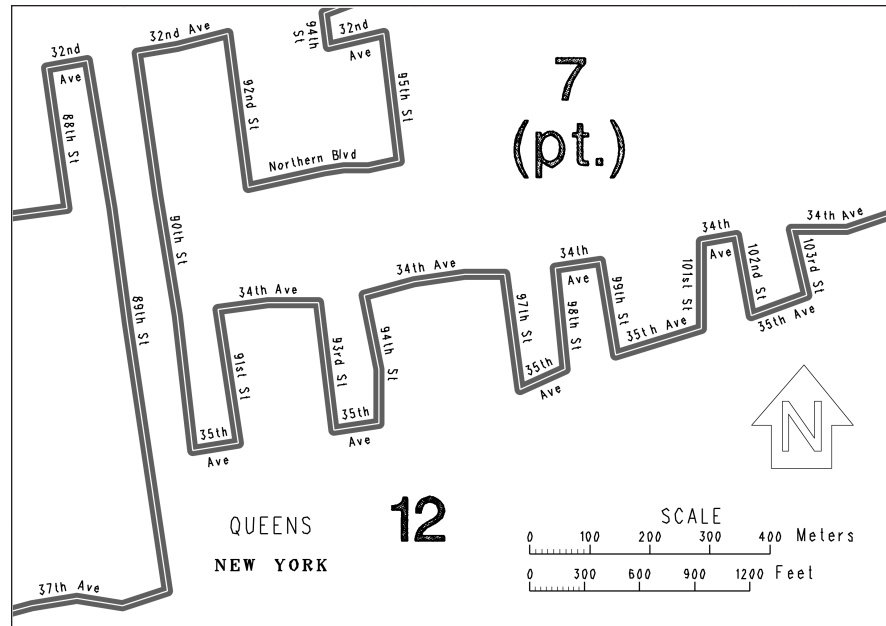


Figure 2. The sinuous boundary of New York's 12th Congressional District, crafted in 1992 to provide a second Hispanic-majority district, demands large-scale treatment. Excerpt from U.S. Bureau of the Census. 1993. Congressional District Atlas: 103rd Congress of the United States. Washington: Government Printing Office, p. NEW YORK-47.

not the predominant factor, several states adopted less irregular boundaries requiring fewer atlas pages. The unbound atlas supplement for the 105th Congress illustrates how increased compactness reduced Georgia's redistricting plan from 35 to 8 map pages and cut the Texas treatment from 177 to 96 map pages. Court orders or judicial threats account for equally substantial cartographic cut-backs for Florida, Louisiana, and North Carolina.

#### SINUOUS BORDERS AND A HIERARCHY OF INSETS

Although the temporal pattern of page counts appears to reflect the deteriorating compactness of congressional districts, the utility of the *Congressional District Atlas* as a cartographic surrogate hinges on several fundamental questions: Is a page in the 1960 atlas comparable to a page in the 1993 atlas? Are the pages comparable across the entire set of twelve editions? Does a page in the recent atlas contain, on average, at least as much information as a page in earlier editions? However the basic question is phrased, the answers are yes—fundamentally, uniformly and conservatively, yes.

Because of both subtle and radical changes in the atlas's design and layout, the answers are also complicated. Although the pages of all editions and supplements are approximately letter size (8.5 by 11 inches), it would be inaccurate to imply that a page is a page is a page. Since 1968, the atlas has included tables listing counties and selected places contained wholly or partly within each district. In the 1993 edition, the Census Bureau left some pages blank so that each state's section begins on a right-hand page. And immediately after the statewide map for each state requiring county or inset maps, the 1993 edition and its supplements include a separate page explaining the maps' symbols and noting the date their boundaries became official. But because the atlases do not mix maps with tables and standardized explanations, it was easy to compile the refined counts of map pages used later in this paper to explore spatial patterns.

Compared to their most recent counterpart, the early atlases have a slightly cobbled-together look of a product largely compiled from other Census Bureau publications. As Figure 3 illustrates for the 1960 atlas,

*"... the early atlases have a slightly cobbled-together look of a product largely compiled from other Census Bureau publications."*

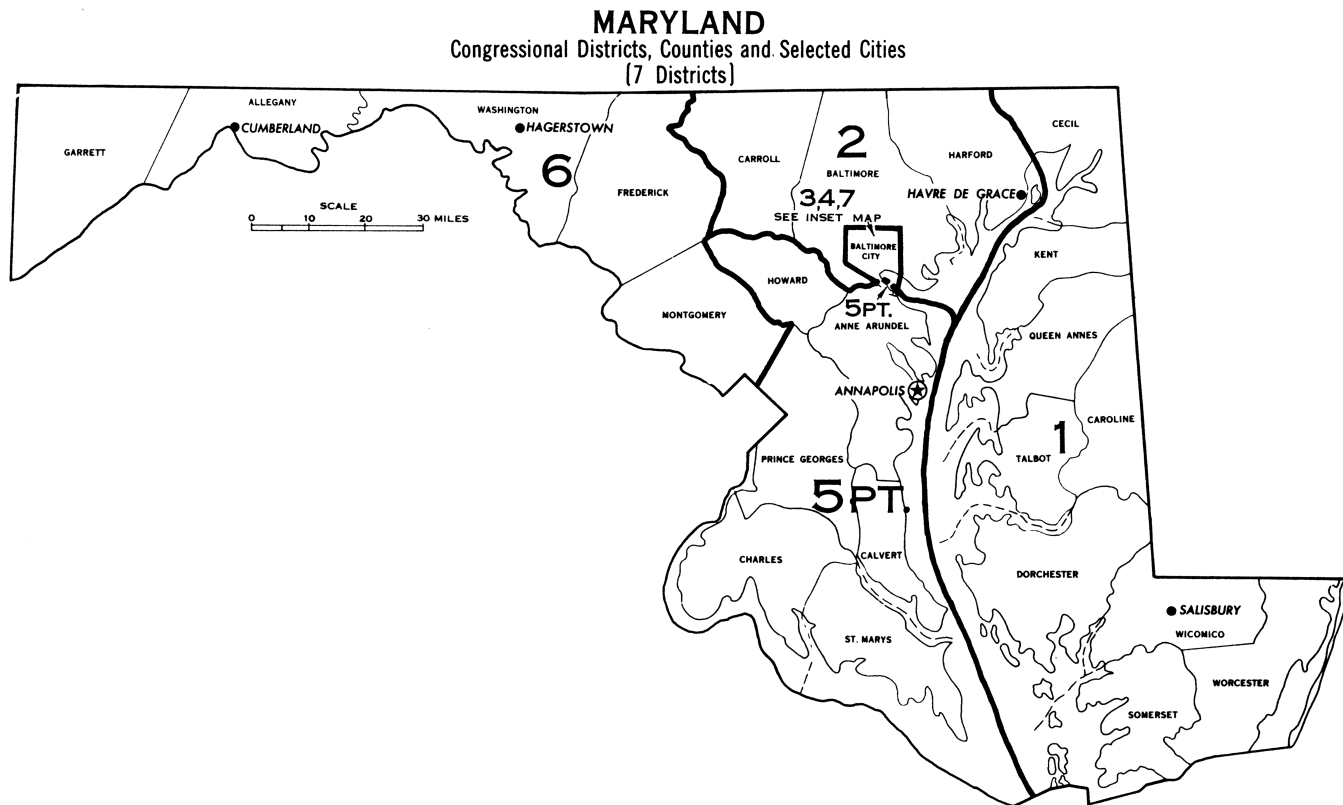


Figure 3. Statewide map of Maryland reflects enhancements of existing basemaps. But note the reference to the inset map in Figure 4. Excerpt from U.S. Bureau of the Census. 1960. Congressional District Atlas of the United States, April 1, 1960. Washington: Government Printing Office, p. 28.

the atlas’s authors appear merely to have added thicker boundaries and district numbers to existing county-unit base maps. Notable exceptions are the detailed maps describing district boundaries that subdivide cities and metropolitan counties. Figure 4, a portion of the map for Baltimore City, illustrates the custom-lettered treatment of boundaries not available at the same scale in other Census Bureau publications.

Inset maps with a custom-tailored geographic scope are comparatively new. Although the first edition employed progressive, hierarchical enlargement—in western New York State, for example, intricate district boundaries required separate maps for Erie County as well as the county’s largest city, Buffalo—before 1993 Census Bureau staff delineated insets principally to preserve political units rather than to highlight complex portions of a boundary. Because focused rectangular inset maps like the example in Figure 5 use space more efficiently than cartographic enlargements of political units or large portions thereof, the map pages of later editions of the atlas are, on average, richer and more relevantly informative than their earlier counterparts. But because the neatlines of insets follow cardinal directions, the efficient portrayal of a diagonal boundary occasionally requires a step-like succession of insets like those in Figure 6.

Some boundaries require nested insets—essentially insets within insets—which are a key element in the system of whole-county, partial-county, and subcounty inset maps introduced in the 1993 atlas. A diagram (Appendix A) in the introduction describes two nested sequences of progressively larger-scale views: one moving from the state map to a whole-county inset to a subcounty inset, and the other from a partial-county inset to a subcounty inset (labeled Inset A) to a still larger-scale inset (labeled

*“... the map pages of later editions of the atlas are, on average, richer and more relevantly informative than their earlier counterparts.”*

Figure 4. Divided among four districts, Baltimore City required a detailed inset map. From U.S. Bureau of the Census. 1960. Congressional District Atlas of the United States, April 1, 1960. Washington: Government Printing Office, p. 29.

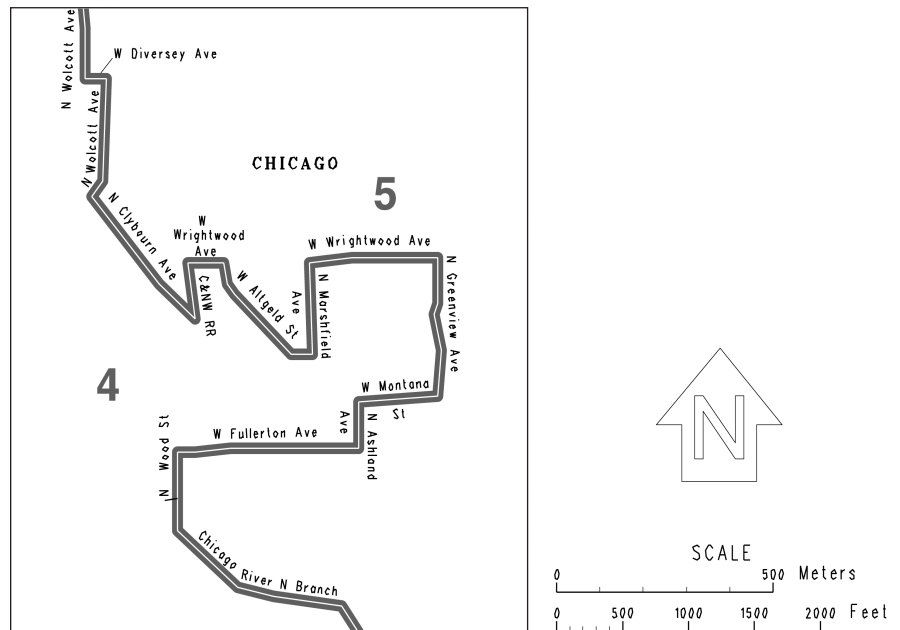
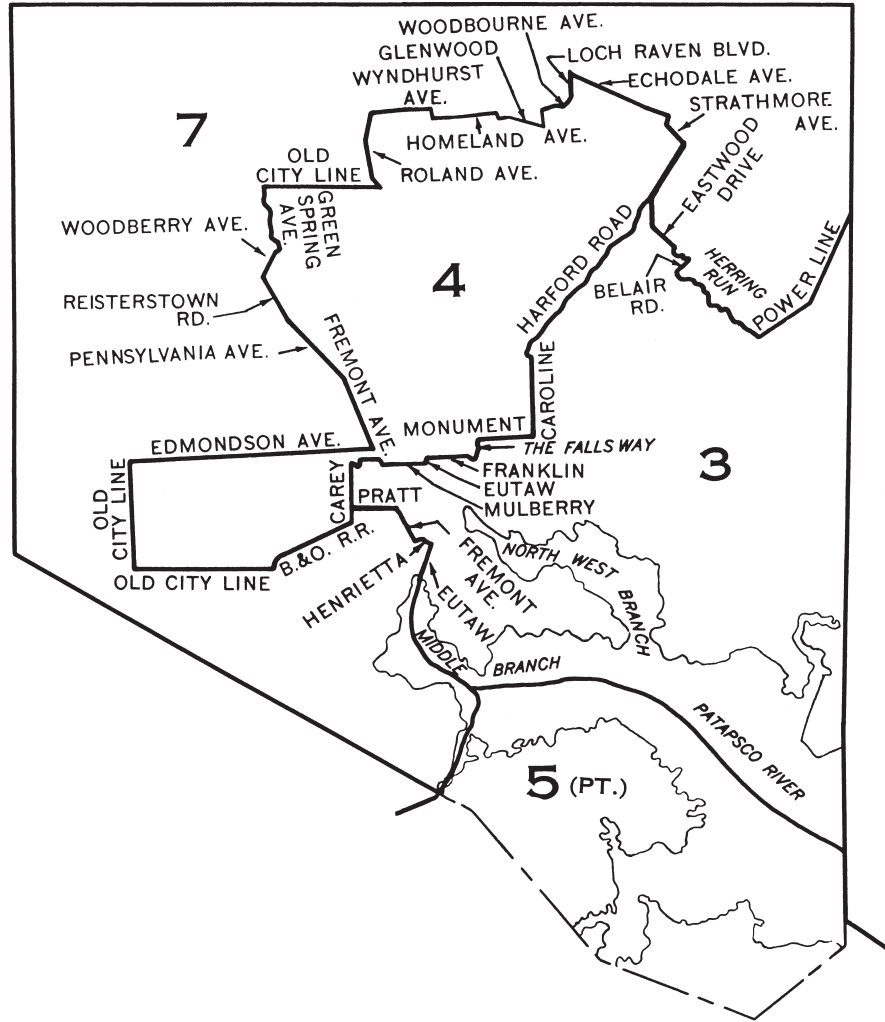


Figure 5. A rectangular inset customized to fit part of a district boundary. From U.S. Bureau of the Census. 1993. Congressional District Atlas: 103rd Congress of the United States. Washington: Government Printing Office, p. ILLINOIS-18.



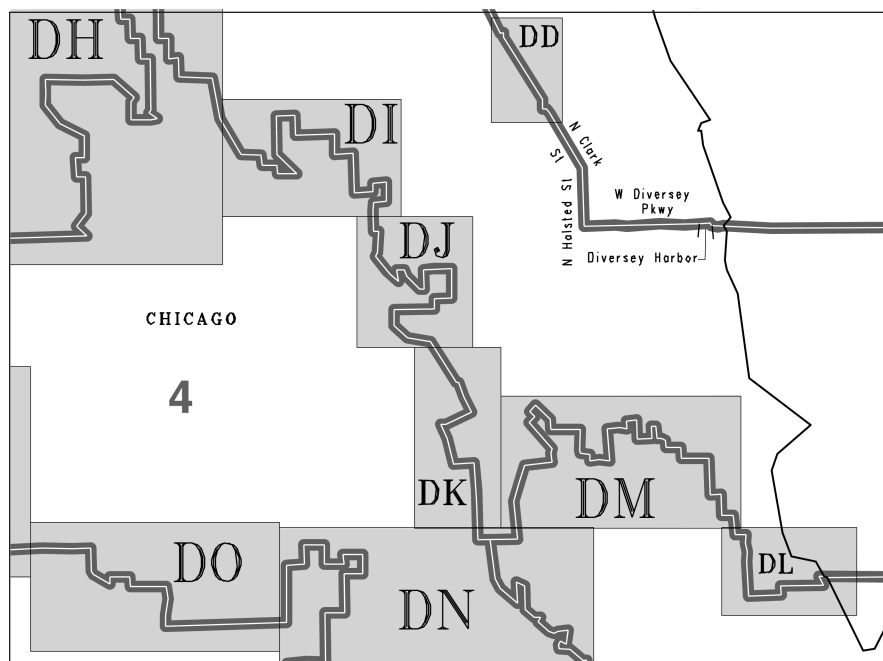


Figure 6. Because insets are bounded by meridians and parallels, an intricate boundary trending northeast or northwest might require a succession of insets, like those identified on the inset map for Cook County, Illinois. Excerpt from U.S. Bureau of the Census. 1993. Congressional District Atlas: 103rd Congress of the United States. Washington: Government Printing Office, p. ILLINOIS-13.

Inset AA). Counties are organized alphabetically, with each county map followed on successive pages by its insets. A light-gray shading indicates areas covered by a more detailed view, and each inset's scale and geographic scope reflects the complexity, overall shape, and extent of the boundaries shown. Without this hierarchy of "telescoping" insets, an atlas of only 1,272 pages could not begin to cope with the intricate, *Gingles*-inspired, GIS-facilitated boundaries of post-1990 redistricting.

Because a time-series graph of page counts reflects judicial, statutory, and administrative pressures on congressional redistricting, a logical next step is to search for meaningful geographic patterns by mapping the data at the state level. Two adjustments are needed: restricting the counts to map pages and dividing by the number of House members.

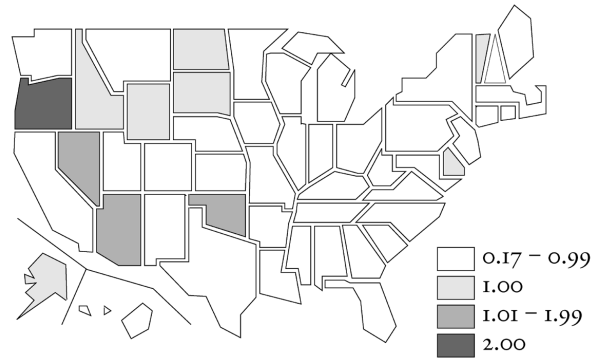
As the 1983 and 1993 maps in Figure 7 demonstrate, the resulting ratio of map pages to representatives shows little significant variation until the post-1990 remap, when the effects of remedial racial gerrymanders are readily apparent. (Similar maps for other, earlier editions of the atlas were equally less informative.) Most noteworthy are the high ratios on the 1993 map for Texas, Louisiana, Georgia, North Carolina, and New York, all of which had their redistricting plans overturned by the Supreme Court because of noncompact, racially motivated districts (Elving 1997; Hicks 1997). Indeed, North Carolina's District 12, denounced as "bizarre" by Justice Sandra Day O'Connor, who wrote the majority opinion in *Shaw v. Reno*, stretches across 30 separate map pages. High rates are also apparent for Florida, which chose not to fight a lower court challenge to its redistricting plan (Gruenwald 1996); Illinois, which successfully defended a remedial racial remap drawn up by a panel of federal judges but endorsed by the state legislature (Elving 1997); and South Carolina, which drew up a Black-majority district to appease the Justice Department's Voting Rights Section and fended off a

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A CONFEDERACY OF SCRUNCHES

*"... North Carolina's District 12, denounced as 'bizarre' by Justice Sandra Day O'Connor, who wrote the majority opinion in Shaw v. Reno, stretches across 30 separate map pages."*

1983 edition  
(98th Congress)



1993 edition  
(103rd Congress)

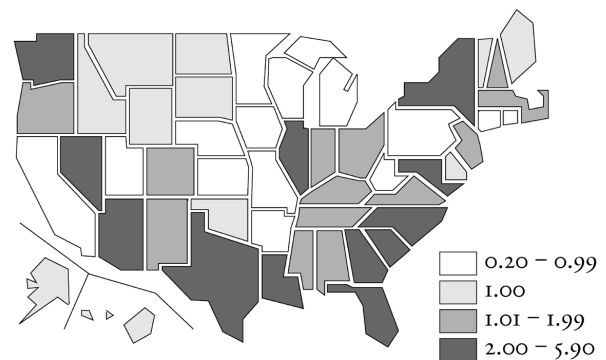


Figure 7. Ratio of map pages to House members, mapped for the 1983 and 1993 atlases.

*“Overall, the 1993 map of the pages-members ratio shows generally high rates for all states requiring statewide preclearance.”*

challenge by plaintiffs who dropped their suit when the state admitted race had been the predominant factor (Greenblatt 1997). By contrast, the map’s highest category omits Virginia, which the high court told to revise its remedial racial plan (Whitley 1998), and Alabama, which had its plan challenged by Black plaintiffs who wanted a second district as well as White plaintiffs who didn’t want any (Greenblatt 1997; Kaplan and Duncan 1993). Overall, the 1993 map of the pages-members ratio shows generally high rates for all states requiring statewide preclearance (Figure 8). The notable exception is Alaska, which has only one representative.

#### MEASURED COMPACTNESS, CORRELATED IRREGULARITY

*“... numerical measurements of compactness afford a further test of the atlas’s value as a cartographic surrogate.”*

Although the relationship between complex, contorted boundaries and the ratio of map pages to representatives is logical as well as apparent, numerical measurements of compactness afford a further test of the atlas’s value as a cartographic surrogate. I found the necessary data in the *Michigan Law Review*, in a 1993 article by Richard Pildes and Richard Niemi titled “Expressive harms, ‘bizarre districts,’ and voting rights: evaluating election district appearances after *Shaw v. Reno*.” How unusual was the North Carolina district recently struck down by the Supreme Court? these authors asked. And what other districts might be similarly bizarre? To address these questions, they arranged for Election Data Services, a private consulting firm that advises legislatures and other clients interested in redistricting issues, to compute two shape indexes for each congressional district for the post-1980 and post-1990 remaps. The *dispersion score*, computed by dividing the area of a district by the area of the smallest circumscribed circle, distinguishes long, thin shapes from full, compact shapes. By contrast, the *perimeter score*, computed by dividing the area of a district by the area of a circle with a circumference equal to the district’s perimeter, measures the efficiency of a district’s boundary. Both measures

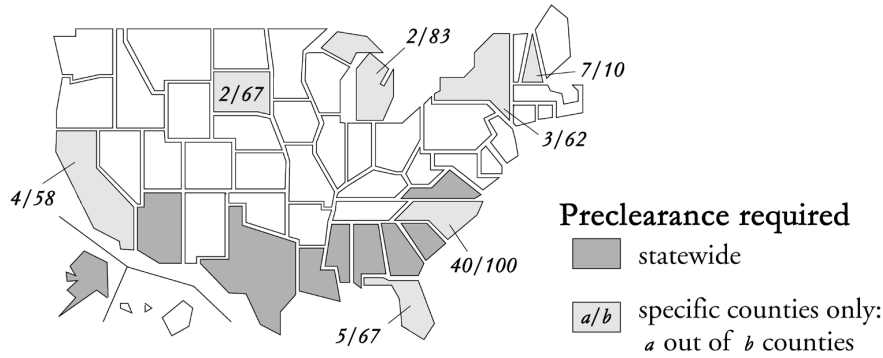


Figure 8. Map showing states requiring Department of Justice preclearance for their 1993 redistricting plans. Some states needed statewide preclearance whereas others needed approval only for a fraction of their counties with a history of discriminatory voting practices.

range downward from 1.0 for a perfectly compact, spherical district and approach 0.0 (in theory at least) for a maximally irregular district. For states with more than one district, a table lists the state means and the state minima and maxima for both indexes (Pildes and Niemi 1993, pp. 571–573). Not surprisingly, the nationwide means and minima for both indexes are lower for the 1990s than for the 1980s.

More revealing is the emergence of noteworthy correlations in the 1990s between the atlas and the state-level shape measures. As Table 1 indicates,

	Map pages / House members ratio	
	1980s	1990s
Dispersion score		
mean	0.02	–0.44
minimum	–0.07	–0.45
Perimeter score		
mean	0.03	–0.59
minimum	0.01	–0.63

Table 1. Product-moment correlations between map-pages ratio and state-level shape indexes. Based partly on measurements reported by Pildes and Niemi (1993), the correlations ignore the seven states with only one representative in the 1990s.

the ratio of map pages to House members for the 1983 atlas was largely unrelated to the shape indexes for the corresponding post-1980 congressional districts. In contrast, the correlations for the 1993 atlas and post-1990 district boundaries are not only noticeably higher but appropriately negative, indicating lower compactness scores for states with higher pages-members ratios. Even so, the correlations are modest at best. Indeed, the –0.63 linear correlation indicates that the ratio and the minimum perimeter score account for only 40 percent of each other’s variance. And because the shape indexes are intercorrelated, a multiple regression (not shown) revealed that the four shape variables collectively account for no more than 43 percent of the variation in the pages-members ratio. Clearly, the shape measures and the page counts are complementary, not redundant.

Which, then, is most revealing: the shape indexes or the map pages-House members ratio? I would argue that the pages-members ratio is more useful because the numerical indexes make no distinction between a discretionary boundary set by a legislature or special master and an

*“... the shape measures and the page counts are complementary, not redundant.”*

*“... the pages-members ratio is more useful because the numerical indexes make no distinction between a discretionary boundary set by a legislature or special master and an unavoidably irregular boundary fixed by a shoreline, a state boundary, or an international border.”*

unavoidably irregular boundary fixed by a shoreline, a state boundary, or an international border. By contrast, the *Congressional District Atlas* invokes large-scale inset maps only for boundaries within the purview of redistricting officials. Although the dispersion and perimeter scores treat all edges as equal, no matter who created them or for what reason, readers who want detailed views of non-discretionary boundaries like the Mississippi River or the North Carolina coast must look elsewhere.

## CONCLUSIONS

Changes in the design and content of the *Congressional District Atlas* are revealing in several ways: as a reflection of recent changes in the legal and political process of redistricting, as an indirect consequence of the electronic cartographic technology (block-level data, interactive GIS software) that made remedial racial gerrymandering easy, and as an example of a government agency's creatively parsimonious response to an escalatingly complex phenomenon. Continued publication of the atlas confirms the need for paper maps, at least for now, and the Census Bureau's apparent reluctance to deviate from a north-up view—other than by turning maps sideways on the page—reflects the cultural conservatism of an apparent consumer preference as well as an embedded producer practice.

*"In offering a precise, forensically detailed picture of the power of maps, the Congressional District Atlas has few rivals."*

That the atlas is a mirror rather than the object of controversy within the larger society ought not diminish its significance to historians of cartography, who need to probe the map's deeper connections to societal and political processes. The human impact of the atlas per se may be slight, but its contents and evolution demonstrate the pervasive role of mapping in census enumeration, redistricting, and racial politics, not to mention the embeddedness of single-member voting districts and winner-take-all elections in the American schema of territory-based representative democracy. In offering a precise, forensically detailed picture of the power of maps, the *Congressional District Atlas* has few rivals.

How the atlas responds to the next round of redistricting will be revealing. If state legislatures, the Department of Justice, and the federal courts back away from racially-motivated redistricting, the 2003 edition should be smaller—unless, of course, political cartographers seize the courts' fixation on racially-motivated remapping as an invitation for extensive race-neutral partisan gerrymandering. Whatever the outcome, the atlas's role as cartographic surrogate seems secure. Indeed, litigants hungry for evidence and propaganda will readily realize that page counts are as convincing as the shape indexes used to attack several post-1990 redistricting plans. And because the atlas's format might continue to evolve, look for digital products yielding revealing counts measured in kilobytes rather than map pages.

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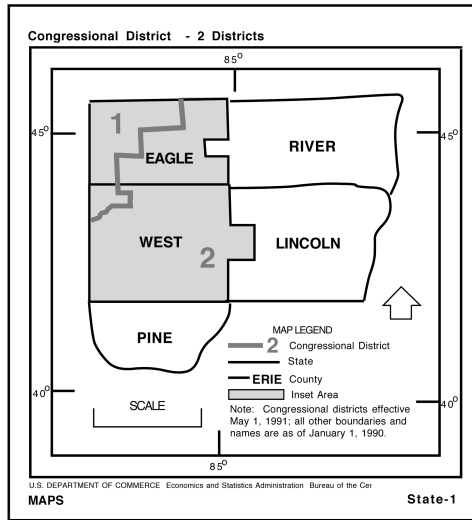
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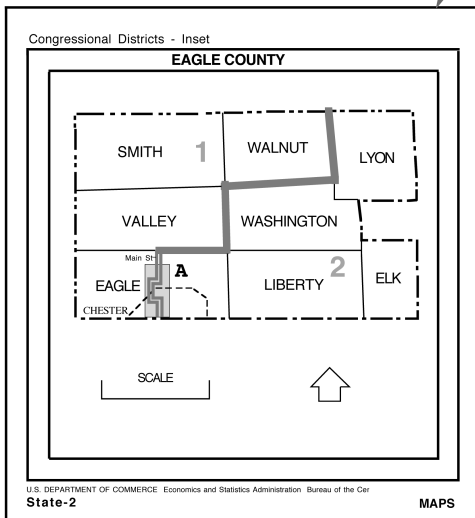
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APPENDIX A

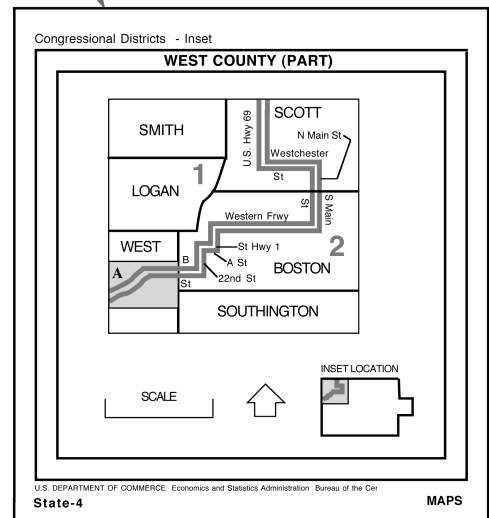
STATE MAP



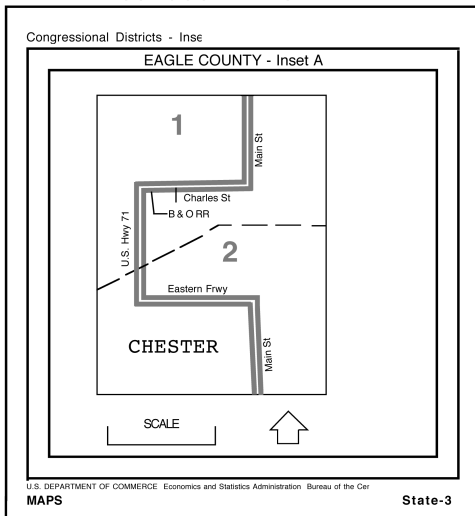
WHOLE COUNTY INSET



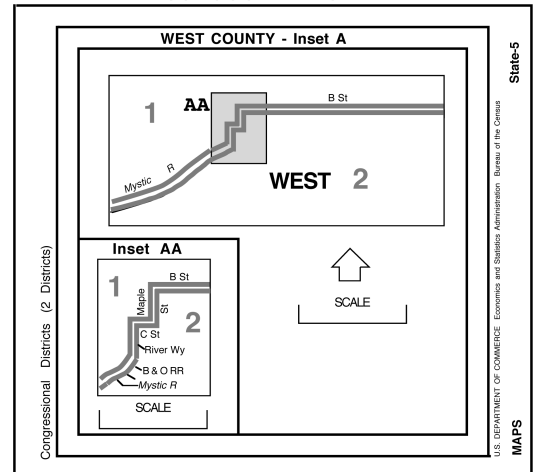
PARTIAL COUNTY INSET



SUBCOUNTY INSET



SUBCOUNTY INSET



# NACIS

## Student Web Map Contest 2000



### A New Map Contest!

The North American Cartographic Information Society (NACIS) invites you to participate in the second annual NACIS Student Web Map Contest. The contest is designed for the new millennium—it recognizes the importance of the Internet, new media, and interactivity in cartography today. The purpose of the contest is to encourage student map design excellence and promote the dynamic use of emerging new technology. Jacqueline Shinker, from the University of Oregon, and Nathaniel Vaughn Kelso, from Humboldt State University, each won \$500 first place awards in last year's contest—you can explore Jacqueline and Nathaniel's winning websites at [www.nacis.org](http://www.nacis.org).

### About the Contest

- Like the maps to be judged, the contest itself will be administered entirely on-line. A panel of cyber judges will evaluate student map entries by going to url's submitted via an automated entry form.
- There is no entry fee. The contest is open to North American students.
- Maps may be submitted between now and October 7, 2000.
- All contest finalists will receive award certificates. Top prizes of \$500 will be awarded in two categories: Map Animation and Interactive Maps.
- The winners will be announced and demonstrated during our annual banquet on October 13, 2000 at the NACIS XX meeting at Knoxville, Tennessee.

Enter the contest by visiting [www.nacis.org](http://www.nacis.org)