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# Mapping It Out

Expository Cartography  
*for the*  
Humanities  
*and*  
Social Sciences

Mark Monmonier



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MAPS HAVE AN IMPORTANT PLACE IN SCHOLARLY writing. Historians, sociologists, and other humanists and social scientists often write about territories and neighborhoods, about global disputes and local conflicts, and about causes and correlations involving areal differences, regional clusters, and other spatial patterns. By helping readers visualize regions and comprehend relative distances and other geographic relationships, maps amplify an author's sentences and paragraphs. After all, a two-dimensional stage may be more efficient than a one-dimensional trail of words for recreating and explaining a two-dimensional event. And symbols spread across a map can more effectively communicate the details and structure of neighborhoods, landscapes, and battle zones than words alone. Military strategists and urban planners need maps, and so do scholars whose subjects have any geographic aspect.

But not everyone who should use maps does. I am perpetually perplexed by the work of geographers who seem to have little interest in employing maps to communicate, interpret, or explain. At times, I ask myself if these colleagues are really practicing geography. And often it is clear that they aren't. Yet, as the holder of a Ph.D. in geography and a faculty position in a department of geography, I am often both pleased and puzzled that many noncredentialed geographers are doing interesting geography in other academic disciplines. Scholarship is not bound by the labels we use to mark territory at universities; nongeographers should practice geography if they choose, just as geographers should feel free to contribute to other social sciences, philosophy, the humanities, computer science, or statistics. Indeed, the domain of geographic scholarship is not only too broad for the meager community of researchers trained in the discipline, but also too important to be limited to people with geography degrees.

The misuses of maps *amaze* and even delight me. The map is a robust medium, and even bad maps may communicate, albeit crudely and inefficiently. That noncredentialed geographic scholars may seem compelled to use them attests to the map's inherent

role in "earth writing"—the literal meaning of "geography." But it is astonishing that careful writers who have spent considerable time planning, sculpturing, and polishing their prose often have little appreciation that mapping, like writing, can be done lucidly and elegantly. Helping the conscientious scholar create and use visually efficient, aesthetically satisfactory maps is my goal in this book.

This chapter begins with a brief commentary on the limitations of verbal discussion and on the neglect of cartographic illustration in master's and doctoral programs in the humanities and social sciences. It then examines location and spatial pattern as elements in scholarly work, and the consequent need for maps.

#### WORDS AND MAPS

As *National Geographic* has demonstrated for decades, maps and other pictures help explorers share with readers their insights and discoveries about both large and minute parts of the world. Humanists and social scientists are explorers, too, and many are geographers in spirit if not in disciplinary affiliation. Because their explorations touch several aspects of place and space, maps can have an important role in their writing. For instance, the literary scholar focusing on Dickens needs to develop and share a broader, more concrete knowledge of the scale and structure of nineteenth-century London than Dickens's classic novels provide. Similarly, the medieval historian might need to know and communicate not only the locations of fortresses and monasteries, but also the theologically influenced cosmological-cartographic world view of twelfth-century nobility. And the student of Napoleon needs to appreciate and explain the effects of the terrain and climate of the Russian steppes, as well as the tribal diversity and economic resources of eighteenth- and early nineteenth-century Europe. The list of non-credentialed geographers is long and includes the anthropologist, the archaeologist, the art historian, the economist, the literary scholar, the political scientist, and the sociologist.

Like a writer for *National Geographic*, an academic explorer needs to appreciate the marvelous capacity of the eye-brain system for processing pictorial, two-dimensional data. Photographs and other pictorial illustrations allow the reader to see what the explorer saw, at least from an insightfully selected vantage point.

The reader can form mental images that foster comprehension and understanding. Scholarly pursuits often call for more complex pictures, such as the spatially meaningful arrangements of abstract symbols on maps and statistical diagrams. These images help the reader see how the academic explorer has organized, processed, analyzed, or interpreted observations and measurements. The author who relies solely upon words may hobble the reader by obscuring facts and hiding information.

Consider two examples from the work of military historian, naval officer, and sea-power advocate Alfred T. Mahan, whose writings include the two-volume *Sea Power and Its Relationship to the War of 1812*. Mahan used numerous maps to explain the geographic settings and the choreography of naval engagements. Figure 1.1, which reconstructs the costly victory of the American warship *Constitution* over the British frigate *Java* off the coast of Brazil on December 29, 1812, illustrates how maps complement verbal description. Mahan tells his readers that this was not a typical artillery duel but "a succession of evolutions resembling the changes of position, the retreats and advances, of a fencing or boxing match, in which the opponents work round the ring." His map both dramatizes and documents this spatial complexity, as each ship is shown maneuvering to attack with more of its guns facing fewer of its opponent's guns. An arrow indicates wind direction, contrasting boatlike symbols differentiate the two ships, dashed lines portray their courses, and numbers show the time in hours and minutes for various simultaneous positions between

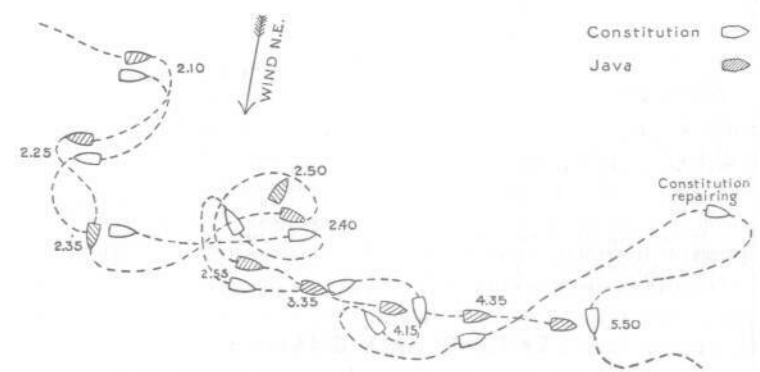


FIGURE 1.1. "Plan of the engagement between Constitution and Java."

2:10 p.m. and 5:50 p.m. Although *the Java* damaged the American ship's wheel, the *Constitution's* guns destroyed all but one of her opponent's masts. After moving away around 4:35 to repair its own damage, the *Constitution* returned at 5:50, and the British surrendered. By helping the reader organize two pages of details about individual attacks and their effects, the map makes its author's words more comprehensible and convincing.

Not all of Mahan's illustrations address events on a featureless sea. Figure 1.2, a less dramatic but more graphically complex

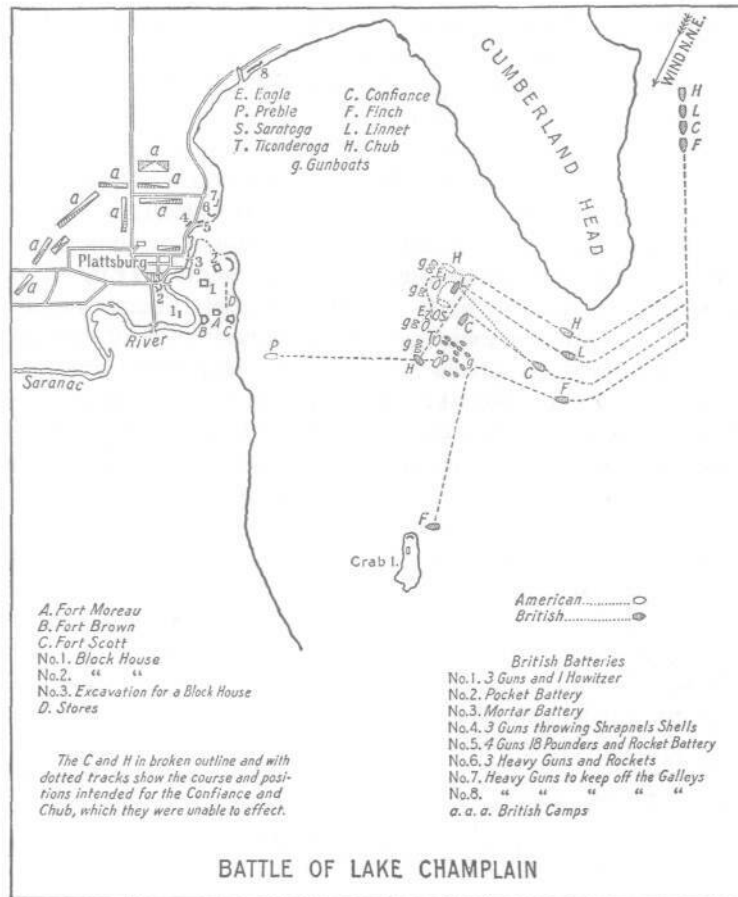


FIGURE 1.2. "Battle of Lake Champlain."

map, provides the geographic framework for a 24-page examination of the "decisive" Battle of Lake Champlain on September 11, 1814. Mahan's text describes the weeks preceding the battle, as British troops under Sir George Prevost advanced southward along the western shore of the lake, sacked Plattsburg, surrounded the town, and set up heavy guns on the Saranac River opposite the group of American forts and blockhouses identified on the map. Contrasting open and shaded boat symbols differentiate the American and British ships, smaller open boat symbols indicate American gunboats, and letters and numbers identify individual warships and important land positions. Solid lines show the shore of Lake Champlain, and dashed lines portray the paths of individual ships. Both sides had prepared a strategy, with each vessel assigned to engage a particular opponent, and dotted lines represent the intended courses of three of the four British ships. The American commander Thomas Macdonough positioned his vessels at the entrance to Plattsburg Bay, out of the range of British cannon and sufficiently far north that the British had to approach head on. An arrow indicates the north-northeast wind that brought the British ships around the tip of Cumberland Head into the bay but failed to carry them to their assigned positions. By maneuvering the *Eagle* and the *Saratoga* so that most of their guns were on the "engaged" side, the Americans gained an advantage over the British, who had also counted on support from their heavy artillery at Plattsburg. By the end of this intense two-and-a-half-hour battle, the *Finch* had retreated to Crab Island, and the other three British vessels had surrendered. Mahan's use of this and other maps reflects not only a military commander's experience with battle plans but also a historian's concern with organized and illuminating communication of important details.

Integrating maps and words is the focus of this essay, not the question of whether one is better than the other. When an article, book, or dissertation concerns interaction among places, words *with* maps can be far more powerful as a vehicle for scholarly exposition than the same words *without* maps. Scholarly writing always has and always will depend largely on words. To be useful, maps must complement our sentences and paragraphs, not compete with them. The committed scholar must learn when and how to use all relevant communication tools, graphic as well as literary, and how to employ them in concert, not in isolation.

Most academic researchers—even some geographers, sad to say—know little about making maps. Most undergraduate courses fail to address, much less advocate, the possibilities of employing graphics to explain spatial concepts, and anthropologists, historians, and others who could make frequent and effective use of maps rarely study cartography. Graduate programs in the humanities and social sciences ignore map making as an analytical and expository skill. Indeed, graduate training and disciplinary tradition have treated map making as a service that one buys, rather than as a potentially important part of the scholar's creative work. Thus, when maps are used at all, it seems, someone else draws them, perhaps an illustrator hired by the university press but more likely a free-lancing undergraduate majoring in geography, art, or architecture. The "map author" often relies too heavily on the cartographic advice of an assistant whose only asset is superior hand-eye coordination. The resulting maps at best are visually pleasant, decorative props rather than important supporting players. And at worst, they distract, confuse, or mislead the reader.

Neglect of expository communication in master's and doctoral training programs partly explains the neglect of mapping in the humanities and social sciences. Academic disciplines live and grow by collecting and organizing facts and by developing, refining, and sometimes purging theories to explain these facts. Training programs quite naturally emphasize observing, sampling, and theorizing, and sometimes also a particular research skill such as statistical analysis, computer programming, or reading German. A single course on research methodology might address bibliographic sources, data-collection strategies, and proposal writing. Except in creative-writing programs, graduate faculty presume (often naively) that their students have learned to write as undergraduates. Tradition and a focus on current paradigms preempt formal instruction in writing and other communication skills; professorial mentors rely largely on occasional marginal reminders of the value of topic sentences, active voice, and concise wording. Good writing habits may be reinforced by such informal admonishments, but students usually have no previous academic experience in cartography to rely upon or recall.

Western society's word-oriented view of literacy and expository expression also partly accounts for the limited use of maps by humanists and social scientists. Although reading and writing

are no doubt the paramount communication skills of the educated person, the complete scholar should cultivate three important companions to literacy: articulacy, numeracy, and graphicacy.

*Articulacy* refers to fluency in oral expression and relates to both stage presence and command of language. Sometimes training in articulacy is a formal undergraduate requirement, under the course title "Public Speaking." It may be particularly prized by scholars who want to share their knowledge and enthusiasm with public-television audiences or large-enrollment lecture classes. Other scholars often regard a highly articulate colleague with a mixture of envy and suspicion, considering him or her gifted but perhaps too entertaining, and thus somewhat shallow.

*Numeracy* refers to fluency in the manipulation of numbers. American educators have a supportive but restrained view of numeracy: school boards are pleased if high-school graduates can balance a checkbook, and college faculties insist that students at least have a minimal exposure to algebra and trigonometry. Among the humanities and social sciences, respect for numerical competence varies widely with the discipline's ability to generate or exploit quantitative data. In the postwar era, "quantitative revolutions" occasioned much paradigmatic blood-letting in disciplines in which "quantifiers" and "nonquantifiers" fought for power in the name of principle. Even today, some humanists condemn as too narrowly reductionist any research employing counts and averages, and some social scientists steeped in highly abstract mathematics regard as trivially empiricist studies that are based on actual numbers.

*Graphicacy* refers to fluency with graphs, maps, diagrams, and photographs. The most spatial of the four groups of communication skills, graphicacy has asserted itself in schools and colleges in courses in commercial art, illustration, and mechanical drawing, all of which apparently are too technical and not relevant enough for the needs of liberal arts majors. Yet even some inherently graphic disciplines ignore the value of graphics to organize and elucidate: statistics majors often emerge with no training in exploratory graphical data analysis, for instance, and some geography majors are not offered or required to take a course in cartography.

Attempts to increase the amount of graphic material in publications can provoke bitter debate. For instance, American newspaper publishers who redesigned their papers in the 1970s to

counter circulation losses blamed on television opened an old and sometimes heated journalistic conflict between "word people," who couldn't care less about news photos and other editorial artwork, and "picture people," who had a more catholic view of news presentation. Since there were limited budgets for both personnel and space in the publication, what one person or group gained could be someone else's loss; competition for space and influence often reflected competition for salaries and staff. Thus, a decision to use more information graphics commonly increased the number of artists and the salary and prestige of the art director, possibly at the expense of reporters and junior news editors. The attempts that were made to explain such struggles with intriguing left-brain/right-brain hypotheses ignored the tenuous origin of brain-hemisphere theories in clinical studies of brain-damaged accident victims. In reality, the journalistic furor was a minor debate between stubborn traditionalists and those less conservative in the adoption of new technology. Publishers, owners, and senior editors decided in favor of more graphics because surveys indicated that consumers wanted a more visually appealing, better organized, more readily understood newspaper. Although *USA Today* received much attention for its spectacular color printing and editorial artwork, the *New York Times*, *Christian Science Monitor*, *Washington Post*, and other "elite" newspapers had increased their use of information graphics even before the appearance of their more colorful competitor.

Technology clearly was the driving force. Before computers, electronic publishing, and graphics networks, the print media used fewer information graphics largely because they cost too much and took too long to produce. Newspaper firms are businesses, after all, and news is a perishable commodity. That newspapers at one time used woodblock engraving and other tedious techniques to illustrate with maps their accounts of important battles attests to the expository power of two-dimensional representations. That newspapers used comparatively little editorial art attests to journalism's word-oriented origins in the "news-letters" of the fifteenth and sixteenth centuries. Advances in photographic engraving in the 1880s, electronic facsimile transmission in the 1930s, and computer graphics in the 1980s allowed news publishers to add more graphics and to more effectively explain spatial events in a spatial format.

Despite successes in integrating words and graphics in news-

papers and weekly news magazines, the print media have yet to integrate words and graphics in the creative routine of working journalists. Ever since the cottage-industry newspaper became a mass-communications enterprise, news publishing has relied upon a highly structured, compartmentalized labor force. Indeed, one of the newspaper executive's more demanding responsibilities has long been to negotiate with and referee jurisdictional disputes among more than a dozen specialized craft unions. Although electronic technology has replaced the typesetter and given editors fuller control over the work of reporters and the layout of the paper, writers still almost always do the writing while artists do the drawing. To be sure, quality control is no longer an obstacle, for graphics software and a rich library of "clip art" provide aesthetic support and the editor and the art director can easily sharpen and reformat the reporter's self-composed graphics. This technical and professional support for grass-roots explanatory graphics should yield more accurate reporting and more lucid writing.

Some large newspapers have recognized the need for increased integration of words and graphics by creating a new specialist, the graphics editor or graphics coordinator. An experienced journalist who acts as liaison and broker between reporters and artists, the graphics coordinator tries to anticipate by at least several hours the need for maps and diagrams and to make certain that the artwork agrees with and reinforces the story. In this scheme, the reporter might collect and annotate maps, make pencil sketches, and even collaborate face-to-face with the artist, but someone else designs and draws the map, even a very simple one. The graphics revolution in news publishing needs two institutional breakthroughs to finally win the battle of representational integration: each reporter needs to be provided with a competent graphics workstation; and a broader view needs to develop of the journalist's responsibilities and necessary skills.

Despite a slower start, humanists and social scientists are freer than media journalists to fully integrate words and graphics in their thinking and writing. The scholar is not burdened by the institutional baggage of a complex business divided into specialized departments linked to a single product, but can be seen as an entrepreneur running a one-person small business of sorts. Taking full advantage of powerful yet inexpensive electronic publishing systems is therefore easier. The academic researcher can ere-

ate and manufacture a manuscript by processing words, graphics, bibliographic information, and numerical data on a personal computer. Even on big projects involving several collaborators or assistants, the separation of words and graphics need be no more pronounced than the division of labor for analyzing data and for writing and editing reports.

Yet graphics software no more guarantees good maps than word-processing software assures good writing. Artistic ability does not imply cartographic skill, and making maps well, even simple maps, requires training or at least some informal study. Like expository writing, cartography is not wholly intuitive. Cartographic symbols have a unique vocabulary, logical rules that promote efficient, unambiguous decoding, and stylistic conventions that reflect both pragmatism and aesthetic biases. Cartographic grammar might not be as well developed as linguistic grammar, but some combinations of data and symbols work better than others, some combinations don't work at all, and some combinations can easily mislead the ignorant map author, as well as the naive map reader.

Beware of software products that promise instant maps. Unfortunately for many would-be map makers, not all developers of mapping software are aware of the principles of cartographic design. And unfortunately for many software users, it is possible to produce an attractive, well-balanced map with neat symbols and crisp labels that is a confusing, graphically illogical puzzle, useful perhaps for decoration but for very little else. In later chapters I discuss the basic concepts of cartographic representation and present design strategies useful to writers who want to explain their analyses, interpretations, and ideas with simple maps. Like those of most grammars, the cartographic rules are usually straightforward and logical, yet often unforgiving when ignored.

#### MAPS, LOCATION, AND SPATIAL PATTERN

Writing with maps works best if the scholar learns to think spatially and to use maps at all stages of research, not just while writing. Mapping, after all, is not solely a medium for communication, but is also a tool of analysis and discovery. So if we want to optimize our use of maps and to gain whatever insights they may hold for us or our readers, we need consciously to search for

maps while researching in the archives or conducting interviews, or to annotate them while observing subjects' behavior or studying our data. Maps work best for organizing information if we condition ourselves to look for information worth mapping.

Among the many social scientists and humanists who have found the map a useful research tool is Robert Park, a sociologist by disciplinary affiliation but clearly a geographer by instinct. Among Park's more intriguing publications is *Old World Traits Transplanted*, cowritten with Herbert A. Miller and first published in 1921. This study explores the customs and institutions that European and Asian immigrants brought to American cities. Some of its maps describe and explain regional patterns. Figure 1.3, for example, uses open dots representing Roman Catholic churches and schools using the French language to show concentrations of French Canadian immigrants in the mill towns of New England and in areas immediately adjacent to Quebec. Despite its crudely drawn state boundaries, the map presents an instructive view of the French Canadian immigrant's preference for rural or small-city destinations close to Quebec. The absence of dots in Boston and New York City is as revealing as the clusters in north-



FIGURE 1.3. "French Canadian parishes of New England and New York."

ern Maine, northeastern New York, the Connecticut and Merrimack valleys, and the Narragansett Bay area.

Park and Miller included more city and neighborhood maps than regional maps. Some of these maps portrayed concentrations, but others focused on diversity. Figure 1.4, for instance, shows the wide variety of national origins of the founders of Jewish synagogues in a twenty-block area of lower Manhattan. Point symbols differing in shape and darkness represent eleven different countries as well as an "unknown" category. The map is an effective testament to the ethnic and linguistic complexity of the early twentieth-century New York Jewish "community," in which Levantine Jews were isolated by language from Yiddish-speaking Jews. As the authors observed, "Only the Jews themselves appreciate how profound are these differences. While their spiritual life is based on the same historic traditions, the different groups have lived in different ghettos as separate, self-governing communities, suspicious of any intrusion whatever into their affairs." But making a statement about the astonishing level of diversity is far less effective than demonstrating it with a map. Park and Miller used other detailed maps to show distinct geographic differences among Manhattan's various "Italian colonies" in their residents' places of origin within Italy.

As these examples suggest, location and spatial pattern are important elements in the description, explanation, or interpretation of many phenomena that interest scholars. Moreover, although we might prefer not to admit it, at least part of what most social scientists and humanists do is journalism, albeit with a thoroughness, thoughtfulness, and attention to detail that the profit-motivated, deadline-driven news media would not tolerate. The similarity to journalism lies in six basic questions scholars ask: Who? What? When? Where? Why or how? And, so what? Of course, geographers might pay more attention to "where," and historians to "when," and sociologists and anthropologists to "who," but from time to time all six questions arise for all of us, with the first four providing a foundation for addressing the last two.

The journalist's first four questions arise early in large projects requiring an electronic database. The researcher must decide what entities, attributes, and relationships to include in designing a database. These database concepts—entity, attribute, and relationship—are not meaningless jargon; all areas of scholarship,

especially the humanities, are rapidly recognizing their importance. Briefly, an *entity* is an object or event described by one or more *attributes* and linked to other entities by one or more *relationships*. "Where" might arise in any of the database elements. Some entities, for instance, might be cities, with attributes such as population size, land area, type of government, and date of incor-

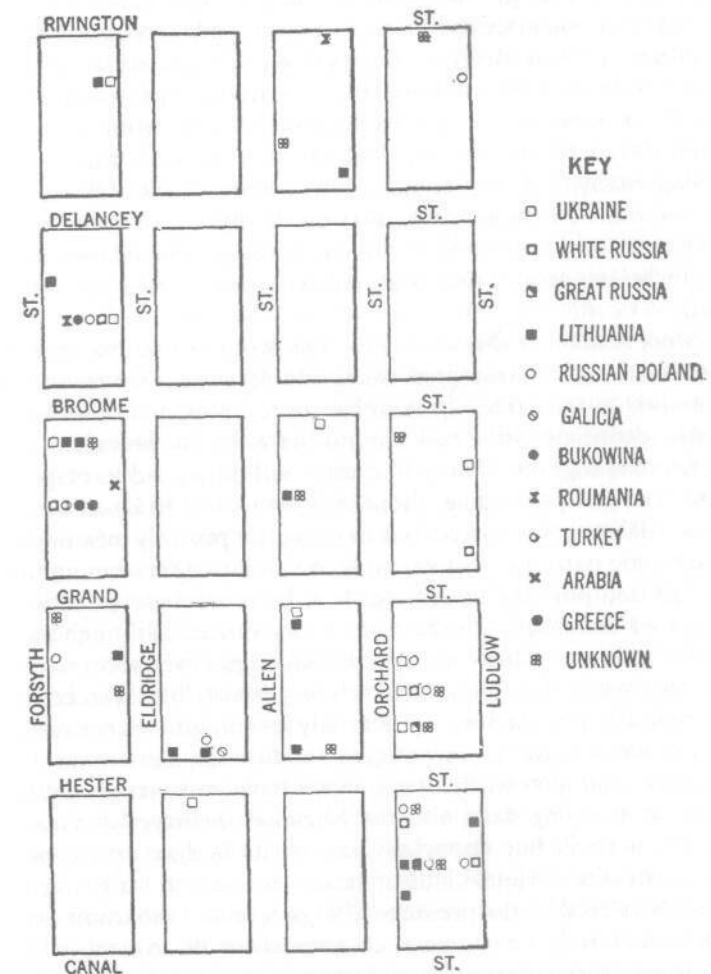


FIGURE 1.4. "Birthplaces of the founders of the Jewish synagogues in a congested New York district."



poration. A "within" relationship might link the city to one or more states, and an "including" relationship might point to the census tracts that subdivide the city. These three kinds of entity (state, city, census tract) might have as locational attributes the latitude and longitude of a single center point or a list of coordinates that describes the length and shape of the entity's boundary. At a finer level of detail, the schedule of entities might include individual buildings—say, an important writer's birthplace, elementary school, place of first employment, and favorite bar. Each building's street-address attribute allows a "street-distance" operator to link these structures to an electronic representation of the street network, so that the system can then define a "minimum distance" relationship linking pairs of such entities. Although many of us will be spared the complex task of designing an electronic database, all researchers should determine whether spatial entities, locational attributes, or geographic relationships might be important, and if so, devise a strategy for including them.

Most readers of this book probably will not need to develop their own highly structured electronic database. Yet recording addresses, place names, geographic coordinates, and other locational identifiers while collecting other data can be valuable if there is the slightest chance that there will be a need to map the data. The goal, of course, should not be merely to know where individual events occurred, but to recognize possibly meaningful geographic patterns—for example, a similarity between annual rainfall and population density, or a decline in land value with increased distance outward from a city center. Although such relationships are hardly unexpected and might even seem trivial, the map might also reveal areas where general, logical trends do not hold. Such anomalies—potentially meaningful exceptions to an expected pattern—can suggest additional, heretofore unknown causal factors. Epidemiologists have long recognized the value of mapping data, and the National Institutes of Health devotes a small but important part of its budget to mapping death rates for various kinds of cancer in a search for hot spots possibly related to the presence of high levels of radiation, hazardous materials, heavy-metal contamination of drinking water or air, or other environmental factors. Good research requires thoroughness.

Maps can also point out what we don't yet know and still need to look for. In conducting a survey of local governments, for instance, a map might be used as a checklist to show which municipalities did not respond to an initial questionnaire. The map might reveal a pattern of nonresponse related to distance, type of government, or party affiliation. While suggesting the need for a carefully focused follow-up, the map might also be useful for planning whatever face-to-face approaches are required to complete the survey. Plotting critical responses on maps can suggest the need to enlarge the study area or indicate the efficiency of intensive sampling in only a few key places. A map can summarize what is known and not known about a city, neighborhood, or region; the blank spaces and question marks that emerge after recording what the existing literature tells us can suggest where further inquiries might productively be focused. Geologists often use maps to determine where to sample next, and sociologists, anthropologists, historians, and others can benefit from a similar strategy. Also, composite maps of what the discipline as a whole knows can reveal inconsistencies demanding detailed study. I have argued that geographers who want to work on important questions might begin by composing the table of contents of a good thematic atlas and then noting those sections or individual maps for which reliable information is lacking. As a form of exploration, geographic research needs to probe a variety of frontiers, some continental or regional, but some in our cities, and many in our neighborhoods.

Appropriate strategies for collecting and analyzing data vary widely among the readers I hope to reach with this book. Economists, sociologists, and others who work with censuses and surveys should look carefully at their data before calculating rates or computing statistical correlations. For data already identified by location or aggregated to states or census tracts, mapping is an essential part of *exploratory data analysis*, a collection of statistical and graphic techniques particularly useful in confronting poorly structured problems in an information-rich environment. Recognition of distance relationships, density variations, and similarities with other variables can be a productive path to a higher level of understanding.

Humanists and social scientists who collect their own data may find the map a convenient framework for taking notes or or-

ganizing field observations. Research in the humanities is often a holistic endeavor, and if location is at all a factor, the map provides a useful structure for allowing isolated facts to form a pattern, either among themselves or in relation to other geographic features. In addition to supporting a systematic cataloging of geographic facts and hunches, the map can stimulate serendipitous discovery.

Gathering data might also include collecting maps. In addition to providing information about a past geography, maps in archives can prompt useful insights about map makers and the cultures and societies in which they worked. For example, older published or manuscript maps sometimes suggest to the critical scholar how governments, explorers, writers, or earlier researchers saw an area themselves, or how they chose to represent it to others. Humanists might want to share with their readers facsimiles of representative or important maps, or to use cartographic artifacts as evidence of propaganda or biased interpretations.

For all of the reasons mentioned in this section for using maps to collect, organize, and analyze information and to communicate spatial facts and relationships to readers, awareness of maps while carrying out the research and preparing the manuscript will improve an author's ability to recognize, understand, and discuss geographic concepts and details. Although maps added after writing the first draft can be beneficial to both author and reader, earlier awareness of cartographic information and cartographic concepts can assure a fuller, more coherent integration of maps with words. By focusing the following essays on principles and practices particularly relevant to the humanist or social scientist, I hope to elevate the typical reader's limited awareness to a working knowledge of the full role of maps in scholarly communication.