TWO

# The Potential of Spatial Humanities

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Space is everywhere, and its definitions are legion. We are inherently spatial beings: we live in a physical world and routinely use spatial concepts of distance and direction to navigate our way through it. But this routine and subconscious sense of space is not the one that engages us as humanists. We are drawn to issues of meaning, and space offers a way to understand fundamentally how we order our world. Here, contemporary notions of space are myriad: what once was a reference primarily to geographical space, with its longstanding categories of landscape and place, is now modified by class, capital, gender, and race, among other concepts, as an intellectual framework for understanding power and society in times near and distant. We recognize our representations of space as value-laden guides to the world as we perceive it, and we understand how they exist in constant tension with other representations from different places, at different times, and even at the same time. We acknowledge how past, present, and future conceptions of the world compete simultaneously within real and imagined spaces. We see space as the platform for multiplicity, a realm where all perspectives are particular and dependent upon experiences unique to an individual, a community, or a period of time.[1] This complex and culturally relativistic view of space, the product of the last several decades, has reinvigorated geography as a discipline, just as it has engaged scholars within the humanities.

We perhaps are most aware of these intellectual currents when we contrast them to once dominant—and still popular—notions of space in the American experience. In this accounting, space in the form of land shaped the national character.[2] Compared to Europe, the American continent was vast and served as a canvas for utopian dreams and dysto-

pian nightmares. The propagandists for settlement touted its supposed riches, describing a land ripe for conquest. Puritans and other religious settlers, who otherwise embraced it as a New Eden, also saw its wildness as another reason for an obedient and vigilant community. By the early national period, any gloomy insistence on the New World as unredeemed wilderness dimmed in comparison to republican celebrations of an American empire for liberty, with its vast open spaces the precise remedy for the crowded, freedom-denying cities of Europe. Period maps and literature alike symbolized how the great swath of accessible land was the foundation for the economic independence, democracy, and nationalism that made the nation, as Abraham Lincoln claimed, "the last, best hope of mankind." The mythology that justified westward expansion found expression in American historiography when Frederick Jackson Turner advanced his frontier thesis, an interpretation that gained currency in part because it was so unremarkable. Even in the counter-narrative that cast space as a progenitor of violence, deviance, or insularity, such as in the fiction of William Faulkner or Cormac McCarthy, conceptions of natural geography played a central role in how American imagined themselves from the earliest settlements to the last decades of the twentieth century. Space also was central to another narrative based on time, in which the new nation advanced progressively toward perfection. In this mythology, America was immune to inevitable cycles of decay or decline. Space in the form of nature was the fountain of renewal that made continued progress both possible and inevitable.

No longer does this exceptional sense of space and time dominate our national conversation, in part because we are more aware as a society of how diverse the world is but also because it has been challenged so successfully within the academy. The humanities and social sciences especially have advanced new lines of inquiry characterized by a different and more nuanced understanding of space, or, as David N. Livingstone has written, in "recent years there has been a remarkable 'spatial turn' among students of society and culture."[3] This spatial turn began in the pioneering works of social scientists such as Clifford Geertz, Erving Goffman, and Anthony Giddens and has been advanced in the humanities through the work of Michel Foucault, Michel de Certeau, Edward Said, and others whose investigation of space took the form of a focus on the "local" and on context. Subject matter once organized largely by periods increasingly

embraces themes of region, disapora, colonial territory, and contact zones and rubrics such as "border" and "boundary." The shift has been accompanied by and reinforced through an equivalent concern with material culture and built environment, in observations of local representation in dress, architecture, eating, music, and other cultural markers of space and place. Climate, topology, and hydrology—all of which were important to early twentieth-century *annalistes*—likewise have reemerged as important considerations in the investigation of literatures, histories, and social and political life. As a result, our national story has become more complex and problematic. Like time, space no longer has providential meaning, but in the process it has assumed a more interesting and active role in how we understand history and culture.

Today, humanists are acutely aware of the social and political construction of space. Spaces are not simply the setting for historical action but are a significant product and determinant of change. They are not passive settings but the medium for the development of culture. All spaces contain embedded stories based on what has happened there. These stories are both individual and collective, and each of them link geography (space) and history (time). More important, they all reflect the values and cultural codes present in the various political and social arrangements that provide structure to society. In this sense, then, the meaning of space, especially as place or landscape, is always being constructed through the various contests that occur over power.[4] Consider two examples: as women have gained economic and political status, feminist geographers have called attention to how we have used gendered tropes—Mother Nature or Virgin Land—to identify space, a characterization that suggests nurture but also invites exploitation. American Indians protest, rightfully, that the vast open spaces of the New World were not wilderness but their home. There is nothing new in this development—power arrangements can be seen even in the earliest maps—but humanities scholarship increasingly reflects what may in fact by the greatest legacy of postmodernism, the acknowledgement that our understanding of the world itself is socially constructed.

Now, we face a different challenge from an unexpected quarter. An attractive and increasingly ubiquitous technology, Geographic Information Systems (GIS), suggests that the world indeed is flat, at least metaphorically, by offering a view of the physical environment seemingly stripped of its cultural assumptions. Its unparalleled ability to manage and visualize data within a spatial context has led to a rediscovery of the power of the map, although often in a peculiar, culturally uninformed way. As with many technologies, GIS promises to re-invigorate our description of the world through its manipulation and visualization of vast quantities of data by means previously beyond the reach of most scholars. Increasingly, humanists are acting on this claim, but in doing so, we again run the risk of portraying the world uncritically, this time with a veneer of legitimacy that is more difficult to detect or penetrate. GIS is a seductive technology, a magic box capable of wondrous feats, and the images it constructs so effortlessly appeal to us in ways more subtle and more powerful than words can. In our eager embrace of GIS, we have been swayed by its power but have little knowledge of how it developed or why. Yet it is this history that makes us aware of both the limits and potential of GIS for the humanities—and how much it still must change to suit our needs.

GIS emerged in the early 1960s as mapping-cum-analysis software. It emerged independently from both the Harvard Laboratory for Computer Graphics, which aimed to produce automated cartography, and the Canadian GIS, which developed computerized methods to map the land capability of Canada.[5] Its intellectual and methodological lineage is much longer than this recent past—for example, the logical overlay technique, a key feature of GIS, existed as early as the eleventh century—but what was new were powerful computers and an emergent demand from such widely distributed fields as environmental science, landscape architecture, and urban planning that prized its ability to overlay data on a map of the earth's surface. With the creation of ArcInfo®, the leading commercial package, in the 1980s, GIS quickly moved into the mainstream of computing applications and spawned a wide array of location-based services.[6]

Its movement into other parts of the academy was considerably slower. For many humanists, GIS was simply another software package, with little application to the cultural and social problems that attracted their attention. Geographers, perhaps surprisingly, found themselves divided over its value. It became the focus of quantitative geographers who saw its potential to solve spatial problems by its capacity to manage large data sets and visualize the results of spatial analysis. This latter characteristic was especially important: making data visual spurred intuitive interpretation—recognition of patterns, for instance—that remained hidden

in statistical analyses. Opponents, especially human geographers, were unconvinced. As late as 1988 the president of the American Association of Geographers felt comfortable labeling GIS as "a mere technique." Tension existed between scholars who viewed the technology as the herald of a shift in scientific methodology and those who saw it as a vehicle for extending existing geographic concepts. The divide ran along a fault line increasingly known as Geographic Information Science (GIScience), a critique that GIS, although well equipped to manage quantitative spatial data, rested on a positivist and naïve empiricism and was incapable of knowledge production. Representing this view was *Ground Truth* (1995), a collection of essays edited by John Pickles, a prominent critic of GIS. Collectively, the essayists expressed several concerns: technological design inevitably privileges certain conceptualizations of the world; GIS was a corporate product, designed to solve corporate problems, such as route logistics or market analysis; GIS employs a limited linear logic that is not adequate for understanding societal complexity, and as a consequence, it represents and perpetuates a particular view of political, economic, and social power.[8]

At its heart, the debate within geography rested on epistemological and ontological differences that have implications for the construction of a humanities-based GIS and GIScience. Epistemology is the branch of philosophy concerned with the theory of knowledge, or its nature and scope. Its central question—"What is knowledge?"—relates both to the essence of knowledge and to how it is produced. The latter is a methodological problem—"What is the perspective we will use to interpret entities and phenomena?"—and it is this meaning of epistemology that claims the attention of GIScientists. Ontology, the foundation of metaphysics, asks "What is real or what exists?" It studies being or existence and its basic categories and relationships. Epistemology and ontology are closely related and together they have powerful implications for our conceptions of reality. Ontology helps us classify spatial objects and relate them to each other, while epistemology provides the methodological lens we use to study the objects and their relationships. The entities we study, whether natural or man-made, exist independently of our classification, but how we identify them influences our view of reality. A pile of dirt and rock may be a mound or a mountain, and the name we give it suggests the obstacle it may pose to our movement. More significant are social

classifications: for instance, poverty is a relative condition; the category of being poor depends on where we draw the line between poor and not poor. Here is where epistemology becomes important. The method we choose to interpret poverty bears heavily on how we understand its essence, what it really is.[9]

Critics argued that GIS rested on a positivist epistemology. It assumed an objective reality that we can discover through scientific method, which in this theory is the path to true knowledge. Positivism stems from the work of Auguste Comte, the nineteenth-century French philosopher widely regarded as the father of sociology. Comte suggested that the scientific method was the key to progress. Through observation and testing we are able to understand how the world operates. We then can use this true or verifiable knowledge to make predictions about the world and thereby improve it: from science comes prediction; from prediction comes action. Several problems exist with this approach, proponents of what became known as Critical GIS argued. First, the world could not be measured so precisely as positivism assumed. Knowledge was always contingent upon the perspective of the observer. Even calculations of the material world depended upon cultural assumptions; not every society accepted or used the precepts of Euclidian geometry. But GIS privileged quantitative data, which it required to be precise. It did not accept uncertainty or fuzziness. It also favored official representations of the world, a result that was highly problematic because this view reflected the influence of money and power. For purposes of economic development, for instance, local government could draw neighborhood boundaries that bore little resemblance to the community identified by residents. Finally, its use of geometric space and Boolean logic ruled out the possibility of alternate, non-Western views of the world.[10]

In practice, critics claimed, evidence about the world depends upon the perspective of the observer, a distinction that GIS obscures. Two people who view the same object may interpret it quite differently because of their different assumptions and experiences. Consider a simple example: the same body of water flowing in a channel may be called a brook, stream, or creek, depending on the region where the observer grew up. Defenders of GIS responded that this difference does not matter because, regardless of name, the object remains the same. This position epistemologically is realism. It assumes that objects exist independently of the observer: the

nouns "creek," "stream," and "brook" may tell us something about the observer but they still refer to the same thing—and we can use formal rules to parse when different words refer to the same object. Supporters of the technology also rejected the charges that they were naïve in their use of GIS, arguing in turn that the software was continually evolving in an effort to solve these problems.

The early part of the twenty-first century witnessed a slackening of the debate within geography as the two camps joined under the banner of GIS and Society, forming an effort to confront the issues raised by Critical GIS. This rapprochement has led to a common acknowledgement of problems in the way GIS represents the world. GIS delineates space as a set of Cartesian coordinates with attributes attached to the identified location, a cartographic concept, rather than as relational space that maps interdependencies, a social concept. It also favors institutional or official databases as the primary source of information about the world. Both tendencies exclude non-Western conceptions of the world. Some American Indians, for example, defined the world as a set of interlinked phenomena, only some of which can be defined as geographic space.[11] It is easier to understand ancient Chinese dynasties when we see their definition of space as networks of places and actors rather than as prescribed jurisdictions with formal boundaries.[12] GIS currently has difficulty managing these different meanings of space. It remains, at heart, a tool for quantitative data, the type of evidence that admits at some level to a degree of measurement that can be replicated and verified. The precision that is necessary for statistical work does not admit readily the sort of evidence used by most humanists, and when it does, the result, usually in the form of maps, can be highly misleading, implying a certainty that the underlying evidence does not permit.

While geography grappled with the theoretical and social implications of GIS, humanists were (re)discovering space, yet the two groups took divergent paths with only occasional intersections. Although the Annales school, most notably Ferdinand Braudel, its chief practitioner, had urged scholars since the 1930s to pay attention to *géohistoire,* the linkage of geography and history, most humanists paid much less attention to the environmental context for human behavior and much more to the actions, associations, and attitudes that made a space particular, in short, a place. These places could even exist in imagined space or in memory.

The spaces of interest to the humanities also could be personal—emotional space or the body in space—and even metaphorical or fictional, a woman's place, for example, as in Virginia Woolf's story, "A Room of Her Own." Except for the *annalistes,* these spaces bore little relationship to GIS, with its emphasis on physical or geographical space. Only in two areas of the humanities—archaeology and history—did scholars begin to apply the new spatial technology and, in the process, discover its limits for their work.

Archaeologists came early to GIS, as well as to other spatial instruments such as Global Positioning Systems (GPS), in large measure because it provided a handy and more accurate toolkit for managing their research in familiar but speedier ways. Maps of uncovered human habitats, long a staple of the archaeologist, were easier to chart with the survey-based techniques of GIS. Artifacts bore a spatial relationship that was important in interpreting the past, but it was the ability to visualize past places, often in 3-D, that provided a new way to recreate past landscapes and cityscapes. Architects joined with archaeologists to create virtual worlds of ancient Rome, Jamestown in 1607, or medieval Welsh villages, for example, to test our understanding of form and function. Here, it was the ability of GIS to visualize a spatially accurate physical and manmade environment that proved the attraction. Seeing a lost landscape, reconstructing historical viewsheds, and traversing a highly detailed built environment provided insights and an experiential understanding previously unavailable as scholarship.

Historians also began to drift toward GIS, but without the intense visualization employed by archaeologists. Several early efforts centered on the development of what came to be known as spatial infrastructure, that is, the development of large quantitative data sets, such as censuses, for use within a GIS. National historical GIS projects emerged in Great Britain, Germany, the United States, China, and Russia, among others. None of these projects were inclusive of all historical periods, and many of them focused more on creating framework data for other scholars than addressing research problems. Other scholars, especially environmental historians, employed GIS to test standard interpretations by constructing a data landscape to tell a more complicated story than traditional methods allowed. Geoff Cunfer, for instance, used GIS to rebut the standard Dust Bowl narrative that blamed farmers in Oklahoma and Kansas in

the 1920s and '30s for using ruinous, ecologically insensitive agricultural practices, thus turning a pristine prairie into wasteland. By mapping dust storms across a wider period and a broader scale, he concluded that, in fact, they were part of a longer-term weather and environmental pattern rather than the result of short-term human errors.[13] In a more ambitious example, Michael McCormick re-mapped Europe from AD 300 to 900, showing the connection between developments in communication and transportation that scholars previously had studied in isolation.[14] Other historians took advantage of GIS to relate data of different formats based on their common location, at times using the Internet to bring spatial and archival evidence together and allow readers to explore the evidence afresh (e.g., Valley of the Shadow Project[15] or the Salem Witch Trials Project[16]). In these latter expressions, however, GIS was part of what might otherwise be called digital history rather than spatial history because the approach was fundamentally archival and textual rather than driven by questions about space or even by geographical information.

Historical GIS is still a young sub-discipline. One of its leading advocates has defined it as having the "elements of *geohistoire,* historical geography, and spatial and digital history" and as being identified more by its characteristics than any theoretical approach or body of scholarship. Among these characteristics are the dominance of geographical questions and geographical information in framing inquiries, usually fashioned as patterns of change over time, and the use of maps to present its results.[17] But even though it is gaining use, especially among younger scholars, most historians—indeed, most humanists—have not adopted GIS or, more fundamentally, found it helpful. What remains puzzling to its practitioners is why the technology is not finding its way into the toolkit of these scholars. After all, human activity is about time and space, and GIS provides a way to manage, relate, and query events, as well as to visualize them, that should be attractive to researchers.

Significantly, the standard characterizations of historical GIS, as offered above, suggests the limits about the limits of GIS in history and the humanities, at least as currently practiced. GIS fundamentally is about what happens in geographic space. It relies heavily on quantitative information for its representations and analyses and views its results as geographical maps. There is no question that this calculus is valid and valuable, and it forces attention to important considerations, such as scale

and proximity, that too often are absent from humanities scholarship. But it also is not the way humanists do their work. Quantitative humanists exist, of course, but the quantitative revolution forecast during the 1960s and 1970s as computers became less expensive and more powerful never materialized, or at least it never entered the mainstream of humanities scholarship. Humanists are drawn to questions and evidence that cannot be reduced easily to zeroes and ones. Yet the promise of GIS is so powerful—and the technology is becoming so ubiquitous—that we are loathe to abandon it too soon. Perhaps we have been asking the wrong question. Instead of musing about how we can get humanists to adopt GIS, it would be more fruitful to discover how to make GIS a helpmeet for humanists. Much of the work being done now fits neatly into what GIS was created to do. The real question is how do we as humanists make GIS do what it was not intended to do, namely, represent the world as culture and not simply mapped locations?

Currently, the problems with GIS as a platform for humanities research are well recognized. Spatial technologies in general, and especially GIS, are expensive, complex, and cumbersome, despite recent advances that have driven down costs and simplified the user experience. They require significant investments in time to learn both the language and techniques of the toolsets they employ. GIS and its cousins are literal technologies: they favor precise data that can be managed and parsed within a highly structured tabular database. Ambiguity, uncertainty, nuance, and uniqueness, all embedded in the evidence typically available to humanists, do not admit readily to such routinization. GIS also has difficulty managing time, which is a major problem in disciplines that orient their study to periods and epochs. Time is merely an attribute of space within a GIS, but it is a much more complicated concept for humanists, who well understand T.S. Eliot's sense of

> Time present and time past
> Are both perhaps present in time future
> And time future in time past.[18]

More important, the use of GIS requires humanists to be alert to issues that are not part of their training or culture. Humanists, for instance, are logo-centric. We find words, with their halos of meaning, better suited for describing the complexity, ambiguity, and uncertainty we see in our

subjects, yet GIS relies heavily on visualization to display its results. It demands the use of spatial questions, whereas most humanists think rarely about geographical space and often do not understand how to frame a spatial query. It requires collaboration between technical and domain experts, thereby putting humanists, who work in isolation and are inept in the lingo, at a two-fold disadvantage. Finally, for many humanities scholars, GIS appears reductionist in its epistemology. It forces data into categories; it defines space in limited and literal ways instead of the metaphorical frames that are equally reflective of human experience; and, while managing complexity within its data structures, it too often simplifies its mapped results in ways that obscure rather than illuminate.[19]

Even if we were fluent in GIS, until recently the technology has had only limited ability to move us beyond a map of geographical space into a richer, more evocative world of imagery based on history and memory. But increasingly—and rapidly—it offers capabilities that we could employ with profit, although on the whole we have not. Over the past few years, GIScientists have made advances in spatial multimedia, in GIS-enabled Web services, geovisualization, cyber geography, and virtual reality that provide capabilities far exceeding the abilities of GIS on its own. This convergence of technologies has the potential to revolutionize the role of space and place in the humanities by allowing us to move far beyond the static map, to shift from two dimensions to multidimensional representations, to develop interactive systems, and to explore space and place dynamically—in effect, to create virtual worlds embodying what we know about space and place.

Seeking to fuse GIS with the humanities is challenging in the extreme, but already we have glimpses of what this technology can produce when applied to the problems in our disciplines. Within the field of cultural heritage, archaeologists have used GIS and computer animations to reconstruct the Roman Forum, for example, creating a 3-D world that allows users to walk through buildings that no longer exist, except as ruins. We can experience these spaces at various times of the day and seasons of the year. We see more clearly a structure's mass and how it clustered with other forms to mold a dense urban space. In this virtual environment we gain an immediate, intuitive feel for proximity and power. This constructed memory of a lost space helps us recapture a sense of place that informs and enriches our understanding of ancient Rome (Digital Roman

Forum Project).[20] In similar fashion, historians and material culturists have joined with archaeologists to fashion Virtual Jamestown. This project, in turn, is seedbed for an even more ambitious attempt to push the technology toward the humanities by placing Jamestown at one vertex of Atlantic World encounters. Its goal is to re-populate a virtual world with the sense of possibilities embedded in the past, what Paul Carter has called "intentional history."[21] Viewed within the spatial context for their actions, which includes the presence of proximate cultures, whether indigenous tribes, Spanish, Africans, or Dutch, we then can understand better how contingencies became lost as they butted against the encountered realities within the space the English claimed in 1607.

A paradigm project underway at West Virginia University aims to go even further by combining immersive technologies with GIS to re-create a sense of nineteenth-century Morgantown. Working from digitized Sanborn maps and extant photographs of buildings and streets, users enter a CAVE, a projection-based virtual reality system, and find themselves in another time and place, with the ability to navigate through an environment in which they now are a part. Soon they will be able to enter and explore a building, moving from room to room and examining the material objects within it. By adding sounds, smells, and touch, all within the capability of existing technology, this virtual reconstruction would engage four primary senses, making the experience even more real for participants. Once expensive, the costs of immersive environments are dropping rapidly, but, in fact, a CAVE is not essential for making an immersive environment open to humanists. As any parent of school-age children knows—or as any devotee of Second Life can testify—gaming technology already allows us to explore virtual worlds with a high degree both of verisimilitude and agency.

Even if it is becoming possible to imagine new, technology-based ways of exploring questions of heritage and culture, how do we make space, place, and memory dynamic and vital within them? With few exceptions, we have incorporated these elements into our Web sites and other digital products in much the same way we engage them in traditional scholarship, as part of an expert narrative. The primary evidence we use in each instance—documents, images, maps, material objects—represents personal and cultural memories that serve as mediators between us and the worlds they represent. We select and interpret these

cultural artifacts to frame our understanding of the past and present. We use them within a book, an essay, or a Web site to structure a universe and make an argument. In this sense, technology makes more facile the process of knowledge creation we have always employed, but the difference we see most often is one of degree, not kind. We have not enabled our understanding of culture to be as dynamic as the act of creating culture itself, and it is to this end that we must direct technology if it is to help us open the past to the multiple perspectives and contingencies we know existed in the past.

The structuring of memory is especially problematic for GIS and other new technologies. Memory is essential for our identity, whether as individuals or as a society, but it remains troublesome as evidence because it always is informed by what has happened in the interim between an event and the act of recall. This condition makes memory dynamic, malleable, and contested. Except, perhaps, for intensely emotional events that remain fresh for us, we are remembering the last time we remembered. With each instance of recall, we remove even more of the contingency or sense of possibility that once existed. Through this process we construct the stories of ourselves, and in this way we create the various narratives that recount our communal history. But unlike personal memory, which seeks to reconcile or hide our interior conflicts, communal memory becomes contested public space. The stakes of this struggle are high because the outcome confers legitimacy, yet we also know that memory privileges what we want or need to believe. As a society, it means that we have often removed from our public memory the voices of dissent, and we have expunged from our physical and cultural landscape the "shadowed ground" that reflects our shame.[22]

How then do we attempt to recover the unrecoverable and find our way through memory to identity and culture? Of course, we cannot, and it is futile to try. We live only in the moment poised precariously between past and future, conscious of the influence of both. But what we can do is inform the present more fully with the artifacts of social memory, the evidence of recall from various times and various perspectives. One means to this end is through "deep mapping," an avant-garde technique first urged by the Situationist International in 1950s France. Popularized by author William Least Heat-Moon in *PrairyErth (a deep map)*,[23] the approach "attempts to record and represent the grain and patina of place through

juxtapositions and interpenetrations of the historical and the contemporary, the political and the poetic, the discursive and the sensual...."[24] In its methods deep mapping conflates oral testimony, anthology, memoir, biography, images, natural history and everything you might ever want to say about a place, resulting in an eclectic work akin to eighteenth and early nineteenth-century gazetteers and travel accounts. Its best form results in a subtle and multilayered view of a small area of the earth.

Described as a new creative space, deep maps have several qualities well-suited to a fresh conceptualization of humanities GIS. They are meant to be visual, time-based, and structurally open. They are genuinely multimedia and multilayered. They do not seek authority or objectivity but involve negotiation between insiders and outsiders, experts and contributors, over what is represented and how. Framed as a conversation and not a statement, deep maps are inherently unstable, continually unfolding and changing in response to new data, new perspectives, and new insights.

It is not necessary to adhere to hazy theories of psychogeography or to the neo-Romanticism of the British idea of "spirit of place" to find an analog between the deep map and advanced spatial technologies. Geographic information systems operate as a series of layers, each representing a different theme and tied to a specific location on planet earth. These layers are transparent, although the user can make any layer or combination of layers opaque while leaving others visible. In the environmental sciences, for example, one layer might be rivers and streams, another wetlands, a third floodplains, a fourth population, a fifth roads and bridges, a sixth utility lines, and so forth. By using information about rainfall amounts and rates within a predictive model, we can turn on and off layers to see what areas and which populations, habitats, and infrastructure will be affected most quickly by flooding and how best to plan for relief and recovery. We can view these layers in the sequence predicted by the model or we can view only the layers that most immediately affect human health and safety.

A deep map of heritage and culture, centered on memory and place, ideally would work in a similar fashion. Each artifact—a letter, memoir, photograph, painting, oral account, video, and so forth—would constitute a separate record anchored in time and space, thus allowing us to keep them in relationship, and each layer would contain the unique view

over time—the dynamic memory—of an individual or a social unit. The layers could incorporate active and passive cultural artifacts, such as memories generated by intentional recall as well as memories left to us in some fixed or material form. They also might contain accounts from the natural world, such as found in meteorological and geological records. The layers of a deep map need not be restricted to a known or discoverable documentary record but could be opened, wiki-like, to anyone with a memory or artifact to contribute. However structured, these layers would operate as do other layers within a GIS, viewed individually or collectively as a whole or within groups, but all tied to time and space as perspectives on the places that interest us.

The deep map is meant to be visual and experiential, immersing users in a virtual world in which uncertainty, ambiguity, and contingency are ever-present, influenced by what was known (or believed) about the past and what was hoped for or feared in the future. It is here that traditional GIS faces its sternest test: it cannot yet create such a rich visual environment, much less work with such imprecision and fluidity as the nature of humanities questions and evidence demands. But the rapid convergence of GIS with other technologies, especially multimedia and gaming tools, suggests that we are not far from the point when it will be possible to construct deep maps and landscapes of culture for any place where people leave records of their experiences.[25]

When this happens, what will it mean for us as humanists? Assuming continued progress in making the technology more complete and easier to use, it is possible to construct at least two views of a GIS-based landscape of culture and place. In the first scenario, humanities GIS is a powerful tool in the management and analysis of evidence, contributing primarily by locating historical and cultural exegesis more explicitly in space and time. It aids but does not replace expert narrative: it finds patterns, facilitates comparisons, enhances perspective, and illustrates data, among other benefits, but its results ultimately find expression primarily in the vetted forms accepted by our disciplines. In this view, GIS provides geographical context and depth to an expert interpretation of the past. It represents, at heart, a maturing of our current use of GIS.

In the second scenario, the technology offers the potential for an open, unique postmodern scholarship, an alternate construction of history and culture that embraces multiplicity, simultaneity, complexity, and

subjectivity. Postmodernist scholarship has sharply challenged the concept of objectivity in history, which has been the lodestar of so-called scientific history since the late nineteenth century. It rejects the supremacy of empiricism, an Enlightenment concept, in favor of knowledge based on all the senses. Postmodernism also has called into question the primacy of texts and logic as the foundation of knowledge. In its epistemology, history is not a grand narrative—an authoritative story of a society's past—but instead a fragmented, provisional, contingent understanding framed by multiple voices and multiple stories, mini-narratives of small events and practices, each conditioned by the unique experiences and local cultures that gave rise to them.

A humanities GIS-facilitated understanding of society and culture may ultimately make its contribution in this way, by embracing a new, reflexive epistemology that integrates the multiple voices, views, and memories of our past, allowing them to be seen and examined at various scales; by creating the simultaneous context that we accept as real but unobtainable by words alone; by reducing the distance between the observer and the observed; by permitting the past to be as dynamic and contingent as the present. In sum, it promises an alternate view of history and culture through the dynamic representation of memory and place, a view that is visual and experiential, fusing qualitative and quantitative data within real and conceptual space. It stands alongside—but does not replace—traditional interpretive narratives, and it invites participation by the naïve and knowledgeable alike. We are not yet at this point, but some day we could be. It is a vision worth pursuing.

## NOTES

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