

The Inhibition of Geographical Information in Digital Humanities Scholarship

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Abstract

Information about place and location is an essential part of research in the humanities. There are many ways that methods and tools for structuring, visualizing and analysing space, spatial behaviour, and spatial relationships can benefit humanities research but the use of spatial information in digital scholarship by humanists remains very limited. The developing role of the study of place and location through geographical information systems (GIS) and other digital tools is discussed briefly before examining the factors that are inhibiting the use of spatial data in our research. The influences of current research practice and the attitudes of scholarly institutions in the humanities are examined. This article will explore some of the potential research applications but, possibly more importantly; it will also examine why that potential is being developed so slowly and discuss a possible way forward for the community.

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1 Introduction

'People live, events occur, and artefacts are produced by human hand at specific locations. Much of what people do is spatially determined or leaves spatial signatures. Human feelings towards, and engagement with, place and landscape are continually changing they cannot be situated only in the present, for they contain and are referenced on what has gone before' (Bender, 2002).

Landscape has been likened to a palimpsest¹ as all past human activities have left their signature upon the land each partially overwriting whatever has gone before. In order to gain insight into human activity, past or present, the influences of geography and its interaction with society must be taken into account. Information about place should therefore be an essential part of research in the humanities. Although digital tools make powerful new

methodologies for exploring spatial data freely available at relatively low cost the new research opportunities offered by spatial and spatial-temporal data remain relatively unexplored. This article examines possible reasons for this and discusses ways forward for the digital humanities community.

Whenever mapping or digital research tools for spatial data are being discussed, attention frequently focuses immediately upon geographical information systems (GIS). In this context, GIS are often seen as mapping tools but the methodology they encapsulate is about much more than just digital cartography; it gives the researcher the ability to analyse and display data in a variety of maps, graphics, networks or hierarchy trees as well as extending database functionality to the investigation of spatial relationships. It must also be remembered that GIS is only one of the many digital tools for handling spatial data that are available to scholars.

For example, in the humanities, where historical maps and texts are replete with place names but precise spatial information is often limited, it is often good practice to conceive of the development of geographical information as beginning from place names (a gazetteer) rather than geometry (a GIS) (Mostern, 2006). The Geographical Information Science methods that underpin GIS were developed by earth scientists only later being adopted by the social sciences and from there permeating into social science history and thus into the humanities. Although many of the common basic spatial tools can be used by the digital humanist we also have one requirement that pushes beyond the implementation of Geographical Information Science present in existing software; namely, the handling of time. The need to represent and model time is leading humanities scholars to experiment with the emerging related methodologies of dynamic mapping, an approach that was difficult to implement before the advent of digital tools (Jessop, 2006).

It is over fifteen years since GIS software of reasonable functionality became available in a PC environment at a relatively low cost. There are many ways that methods and tools for structuring, visualizing and analysing space, spatial behaviour, and spatial relationships can benefit humanities research but the use of geographical information in digital scholarship by humanists remains very limited. This article will explore some of the potential but, possibly more importantly, it will also examine why that potential is being developed so slowly. The author believes there are many reasons why geographical information is under-used in humanities research; some reflect weaknesses in the methodology and the technologies that currently facilitate the study of geographical information but possibly the most significant concern our scholarly practices and institutions.

2 The Developing Role of GIS in Humanities Research

The use of geographical information in humanities research has passed through a sequence of phases of

development that are frequently seen during the adoption of computational methods in a new field. Initially, the technology was used to replicate pre-existing methodologies and styles of work as in projects such *An Atlas of Victorian Mortality* (Woods and Shelton, 1997). This project produced a printed publication comprising of largely standard graphs and cartographic representations gathered together in the form of an atlas of patterns of health and death in Victorian England and Wales. In many respects, it follows a tradition of social and cultural atlases that stretches back to explosion of atlas publication in the nineteenth Century (Wainer, 2005). In the next phase of development, the new methods made available by GIS software were applied to a variety of new disciplines. For example, 3D digital elevation models, traditionally the preserve of physical geographers, have been used to investigate how the effects of terrain, specifically the gradient of new railway routes, balanced by changing economics, influenced the development of railways in Victorian Britain (Schwartz, 2004). Further examples include the use of digital dynamic maps in projects such as the *Valley of the Shadow*² and *The Salem Witch Trial Documentary Archive*.³ Currently, the boundaries of the more rigorously quantitative methods are being pushed back as the use of 3D and 4D work is explored.

The majority of the humanities research performed with GIS has been quantitative in nature, but recently there has been an increased interest in the use of geographical information for more qualitative work. Examples of this style of work can be seen in projects at the *Perseus Digital Library* (Smith *et al.*, 2000), such as the *Edwin C Bolles Collection* and the *Boyle Papers*. These projects make use of traditional map materials and geographical information but in a more qualitative way. The *Perseus* project links together a number of different digital libraries using geographical information as an integration tool. This work covers a broad range of activities linking texts, images and numerical data to the places they describe via interactive maps to produce immersive learning environments.

Geographical information also has considerable potential for the discovery and delivery of information. It can provide an unambiguous method for

indexing and searching. Digital Library initiatives, such as the *Alexandria Digital Library*,⁴ are the focus of a great deal of work towards the development of digital gazetteers and temporal directories (Goodchild, 2004). These make it possible to trace the history of a named place, link multiple names for the same place, relate places to one another and plot locations on maps. Such tools are essential to humanist researchers who frequently have to span name changes; for example, the Russian city of Volgograd has changed its name from Tsaritsyn to Stalingrad to Volograd in less than a century; there are many border territories where there may be language variations as well as place name changes (Jessop, 2005). According to context, these tools may be map based (as GIS or interactive images) or place name based (as gazetteers). Recent work on map based front-ends to digital text and image collections has resulted in resource discovery tools that are more intuitive and less culturally specific than traditional textual indexing. Another important function of these projects is to provide a forum for the discussion and agreement of standards for the creation of new resources, such as digital gazetteers, and to ensure that information can be exchanged freely between them (Janée *et al.*, 2004). The *Alexandria Digital Library* has produced standards for gazetteer content (Hill, 2004), a feature type thesaurus, and a gazetteer service protocol (Janée and Hill, 2003). Place names are frequently problematic for archivists and organizations such as the National Council on Archives (NCA) in the UK have developed detailed rules to cope with them (NCA, 1997). The trend in the digital humanities is towards international inter-disciplinary projects but there is some debate about whether the differing requirements of each type of user means that a universal standard for digital gazetteers, equally useful to archivists, art historians and the general public, is achievable (Southall, 2006).

Aside from the more practical problems of creating digital resources of spatial data there are also significant philosophical problems. Humanists frequently work with diachronic data, which show many changes of not just names but also of boundaries. An example would be a theatre that moves location but retains the same name; this is a

simple case but hints at far more complex issues. When the boundaries or attributes of a place change over time when do two places that have occupied the same space cease to be the same place and become two different places, and how is this determined? An abundance of issues concerning space and place need to be addressed.

Location and spatial relationships also exist in data that does not have a geographical focus; for example, as used by art historians to manage restoration work on murals (Murariu and Petrescu, 1999) and other artefacts. Areas on the digital images of the artwork are associated with notes and images concerning the restoration work performed on them, and other relevant information; all this combined information is then managed using a GIS. There are now alternatives to using GIS for this style of work, for example *Pliny*⁵ (developed by John Bradley at CCH), which allows notes and annotations to be attached to digital objects such as images, pdf files and documents of various types. Bradley describes *Pliny* as ‘a tool to support widespread established (and non-digital) scholarly research practice. It focuses on the scholarly acts of: reading and reacting to that reading; and developing an interpretation, which arises from that reading. It aims to bring the benefits of computing to existing scholarly practice rather than requiring the user to adopt new strategies to benefit’⁶ The final remark typifies an underlying philosophy for the development of humanities computing tools; that they build upon existing scholarly practice rather than replace it. Moving away from physical space altogether it can be useful for information designers to introduce spatial relationships into situations where no geographical space exists so that distance acts as a proxy for strength of a relationship. By organizing concepts and propositions in an abstract visualization that shows non-intuitive spatial relationships between them, a diagram of shape and form is produced that allows new links (relationships) to be found or learning to be enhanced. The concept map is an example of this style of diagram; they are not only a powerful tool for capturing, representing and archiving knowledge of individuals, but also for creating new knowledge (Novak and Canas, 2006). Although somewhat

abstract, they do indicate the value of visualizing spatial relationships even in areas where its existence may not be immediately obvious or even absent altogether.

3 Factors Inhibiting the Use of Geographical Information in the Digital Humanities

It is clear that geographical information has immense potential for research and the delivery of data. It can provide an unambiguous method for indexing and searching information and offers the opportunity to build resource discovery tools that are more intuitive and less culturally specific than traditional textual indexing. Despite this it has had little effect in the digital humanities and the research potential of working with digital tools for handling spatial data has been explored in only very limited contexts.

The author believes that there are four factors affecting this inhibition of adoption of spatial methodology in humanities scholarship. The first and most fundamental concerns the use of data visualization and images *per se* in the discourse-based research methodology of the humanities. This is a very significant issue but will not be addressed here as it is beyond the focus of this article but will be the topic of further work by the author. The second aspect concerns the existing methods and tools for performing research with spatial data and their suitability for humanities research. The third relates to the data that humanists work with. These two items will be discussed briefly and mainly in the context of the final aspect which concerns current research practice and the scholarly institutions themselves.

4 Existing Methods and Tools

Current GIS methodology is deeply rooted in the research traditions of the earth scientists who originally designed GIS software. The research questions that they sought to answer with their new methodology concerned physical phenomena

that could be defined in scientific models of physical behaviour and studied using dense detailed datasets. These methods have value for some humanities research, for example in social history studies of demography, land use or ownership; however, we also need to consider how to represent the complexities and subtleties of other aspects of humanities research in visual form.

A major consideration, and one that is at the core of many humanities disciplines, is the importance of time. The need for temporal spatial data handling has been recognized since the early 1990s (Langren, 1992) but work has been concentrated in only a few centres and has only recently begun to filter into mainstream GIS software (very limited handling of time only being introduced by ESRITM into its ARC products in 2003). Current GIS software has very limited facilities for the handling of time and even these are based on the scientist's view of time as being linear and derived from the phenomenon under study. Humanists require a view of time that is determinative and that can work at different rates and scales moving backwards as well as forwards on a continuous scale. The work currently being conducted by historians to place temporal modelling in a historical context is likely to produce methods and tools that are applicable throughout the humanities. Most of this work has focused on time alone, for example the development of tools such as *TimeVis* (Jensen, 2006) and temporal modelling work (Drucker and Nowvskie, 2003). Visualization tools are needed that will produce interactive maps and timelines as well as allowing the use of multiple temporal and spatial scales and linkages between maps, timelines, texts, images, numeric data, sound and moving images. All this must be achieved in ways that satisfy scholarly criteria. Projects such as the *Electronic Cultural Atlas Initiative*⁷ are making considerable progress in these areas and in coordinating, promoting and building upon the work of researchers across of the world. This gives impetus to the development of spatial and temporal tools such as the temporal GIS software *Timemap*.⁸

Those researchers who opt to use the GIS software approach to perform research with spatial data face two very significant obstacles; cost and

a steep learning curve at the very beginning of their project. Although the cost of GIS software is still high it no longer requires a high specification computer to run; a standard desktop machine is perfectly adequate. The new knowledge and skills that are required to make effective use of the tools and methods are more problematic. However, the production of maps is not synonymous with the use of a GIS. It may be that a GIS is unnecessary; maps can be produced much more easily with many standard drawing applications. New projects at the Centre for Computing in the Humanities (CCH) at King's College London frequently have a component of spatial data as a small part of a much larger project. The model we have adopted is to have a spatial data specialist working on a number of projects simultaneously as part of a collaborative team. The spatial data tools are built by CCH staff working in close partnership with scholars to ensure that the work satisfies the criteria set by each of the participants. In a department that is as large as CCH, there is an 'economy of scale' that allows us to dedicate staff to roles that may be uneconomic in other organizations. This is also the reason why the development of methodologies, and possible tools, for use throughout the community is an important part of our work. The development of web-based spatial tools appears to offer considerable potential. At CCH, we are experimenting with the *Google Maps* and ESRITM's freely downloadable *ARCexplorerTM*. By building a project around such technologies a research tool can be developed that can be made available to a wide community and which does not require scholars to learn how to create and manage a GIS; they are left free to pursue their research interests after acquiring only minimal new knowledge or skills and without any additional financial outlay. The close collaboration with scholars in the fields of study represented in the work also ensures that a viable scholarly resource or tool is produced. It can also help reduce problems with another important set of issues concerning copyright permissions and intellectual property rights as each of the collaborating parties feel a sense of participation and ownership.

The current trend towards establishing national historical GIS's (HGIS) such as the *Great Britain*

Historical GIS and *Netherlands Historical GIS* provides many useful case studies that indicate the types and styles of tools that are desirable. It is interesting to note how the design philosophies of successive projects have changed in the light of the experiences gained from those that have preceded them. It is significant that the first national historical GIS's to be established used a 'data provider' model. In these resources, historical data and map data were provided in fixed pre-determined ways; users could not upload their own data or perform their own analyses on data that was already available there. Some of the early projects did not produce output in a form that could be used in publications, thereby severely limiting their research value. Later projects overcame these limitations but still placed restrictions on the data and maps that could be used and the analysis that can be performed, their output essentially being merely for illustration. This has been likened to allowing scholars only to read a book when what they want to do is to write one, or to look at pictures when they really want to make their own. It is useful to reflect on the design philosophies of one of the most recent HGIS, the *Netherlands HGIS*. Their plan is to provide a tool (web-based GIS software) together with map boundary data but no numerical data. The software together with its documentation and a well-designed interface will allow users to upload their own data, combine it with the maps available online, perform their own analyses and to output them in a variety of formats that can be downloaded directly into research papers. This represents the final stage of a transition from the severely limited functionality of early HGISs to a valuable open scholarly digital tool. This approach completely frees scholars from any additional costs for hardware or software as the tools are available centrally over the web. It also reduces the problems of the steep learning curve associated with building one's own GIS by concentrating the need for that expertise in a single national organization.

The greater use of geographical information could allow us to experience a view of the past that is highly experiential, providing a fusion of qualitative and quantitative information that can be accessed by both naive and knowledgeable alike. However, this approach does require careful thought.

Text is a very effective means of communication that we are highly adept at using. While it is true that location can be used in information navigation and finding aids that are language and culture independent, it does not mean that we always find such aids easy to use. The National Library of Scotland's usability study of their online presentation of map material (Fleet, 2006) highlights the weaknesses of some map-based interfaces. The library found that even when the content being searched is itself map material, users find a text-based search of place names preferable to a graphical navigation system based on maps. The study concluded that many people do not 'think graphically'; in the case of maps, this is compounded by the fact that it is estimated that within the UK 60% of people cannot read maps (Peterson, 2003, p. 306). Digital gazetteers are one alternative approach but whatever the solution; the methods, tools, and interfaces that are developed must be simple, imaginative, intuitive and encourage exploration of different viewpoints or agendas in a variety of ways, sometimes being hybrids of two or more existing approaches.

More generally, and reflecting upon the use of images in the text dominated arena of humanities scholarship as a whole, we need to consider what it means to 'visualize' and 'think visually'. What is it that we wish to visualize; why are we doing it and how should it be done? How does what we are doing differ from the scientific approach and how are these differences embodied in existing methodologies and software? Following on from this, we should ask what it means to 'think spatially' and how we can represent the complex phenomena at work in the humanities graphically.

The great strength of GIS software to earth scientists and social scientists (contemporary or historical) is the analytical techniques that it makes available. But many of these are irrelevant or cannot be applied to the sparse fuzzy data typically available to humanists. We need to decide whether this matters and what analytical tools are possible, or indeed actually needed. Digital tools for processing and manipulating spatial data can be used to integrate multiple perspectives of the past allowing them to be visualized at various scales. They can

create dynamic representations of time and place within culture. Ultimately, the most significant contribution of GIS to humanities scholarship may not be as a positivist tool but as a reflexive one.

5 Humanities Data

Factors affecting the nature and collection of data in the humanities disciplines have considerable bearing on the development of spatial methods in our research. The capture of spatial data is a major task in many projects and thus the scale of effort and cost of creating digital datasets make some groups reluctant to share them without charge, this is a factor that has held back work in this area. There is also a greater need for multilingual data in the humanities, but in general, the role of spatial data in this discussion raises issues that fall into two categories; those that concern the content and those that concern resource discovery and management.

The fundamental difference between the scientific methodologies that have shaped the development of GIS software and those of the humanist lies in the nature of the data. The earth scientists who developed current GIS software had a tradition of working with high density rich data sources and so produced software that is ill-equipped to cope with the sparse and fuzzy data so frequently used by humanities scholars. The locations found in such data may be uncertain, that is to say imprecise or ambiguous, have two or more possible locations, or be both ambiguous and imprecise at the same time. However, the high levels of precision that are desired by a scientist may not be of interest to a humanist who is seeking more to visualize data rather than analyse it numerically to high degrees of precision. However, software will analyse and display data to high levels of precision even if the data are known to be imprecise and therefore a means of depicting uncertainty needs to be developed. There are ways of compensating for the fuzziness or even processing it away using geo-statistical techniques but it is very often the case that it is this ambiguity and uncertainty that is of interest to the humanities scholar. It is not a nuisance factor to be eliminated; it is a valuable aspect of the data and the focus of much study.

The same uncertainty and fuzziness that is characteristic of the location data used in humanities research is also present in our temporal data. We therefore have the challenge of finding methods for recording, representing and processing uncertainty in time as well as space.

Despite these problems the number of digital datasets is growing rapidly and any given dataset may be of interest to researchers in fields other than the often highly specialized one for which the data was originally compiled. How does one define metadata that will allow researchers in other areas to find what they need or other data that may also be of interest? A great deal of work goes into producing a dataset and they need to be preserved and disseminated by the national repositories that are now being established. However, if the dataset cannot be found by all types of researcher who may wish to use it may as well not exist. We need directories of spatial data complete with metadata that allow effective resource discovery. To make these directories more effective, we also need to consider what kinds of contextual and identification data are needed to make a useful multi-purpose searchable database for collections. There is a requirement for more central archives and a metadata schema that would allow these resources to be discovered and shared across archives. The metadata schemas need to be developed by all interested parties and require collaboration across many disciplines; this is an issue that I will return to later. Archivists could act as a community hub for encouraging and implementing the use of spatial content into their retrieval models thus providing a further means of linking different items of evidence in ways that conform to appropriate standards. As discussed earlier, the work of bodies such as the *Alexandria Digital Library* and *National Council of Archives* is pivotal in this endeavour.

6 Current Research Practice and the Scholarly Institutions

Ambitious work with spatial data requires a high level of expertise and usually has a high threshold

of usability. In many cases, the complexity of the tools that are currently available is a deterring factor: those scholars that adopt them may find that the characteristics of the tools and the nature of the work previously done with them are shaping their own research agenda. The first question that researchers need to ask is not ‘How do I use geographical information in my project?’ but ‘Why should I use geographical information?’ followed by ‘What type of question *can* it I ask of it?’ and then ‘What type of questions do I *want* to ask?’

The most effective way of facilitating this style of work is through collaboration with researchers and practitioners with backgrounds in fields such as geography, history, humanities computing (or information science and computer science), graphic design and so on. This marks a move away from scholars working independently to a model that necessitates team working, which in turn raises further problems. The teams required for this style of collaborative work will be composed of people with very different backgrounds and credentials. There is therefore a strong need to transmit research traditions between disciplines which may have very different agendas and ways of working. This raises issues concerning how the contributions of each member of the team can be acknowledged; for example, for those whose technical work requires considerable expert knowledge far beyond ‘technical support’ but is fundamentally different from the traditional academic content of the journals and review boards where the published works will be assessed in research assessment exercises, such those in the UK. It also raises the issue of how best to prepare students for work in an interdisciplinary team (whether in academia or elsewhere) after graduation.

Many of the issues outlined earlier require changes to research practice that can only occur over a long period. A more pragmatic solution that could be provided in the short term is a ‘one stop’ source of information to increase awareness of what can be achieved and to assist researchers in their formulation of research questions. It would also provide resources to assist researchers to formulate research questions, guiding them in their choice of appropriate methods, and minimizing the steep

learning curve at the beginning of a project. It would need to provide;

- A clear statement of the advantages of GIS and the study of spatial data expressed in terms of *research outcomes in humanities disciplines*.
- A set of exemplars showing existing research work and discussing how the methodology can be transmitted between disciplines.
- A set of exemplars of a variety of research tools explaining different approaches to using geographical and spatial information in humanities research.
- The exemplars should be chosen so that they encourage creative thinking about geographical and spatial information and how it can be used, for example, in prosopographies, historical itineraries, art history, interdisciplinary teaching, etc.
- Illustrations of how to overcome the expense, time and steep learning curve involved in adopting GIS methodology. For example, 'I need a map' does not mean 'I need to use a GIS'. These need to be supported by accounts of the experiences of humanities researchers describing the choices that they faced and explaining the basis for their subsequent decisions.
- Links to data sources.
- Links to sources of self study material and training courses.
- Links to further sources of information and relevant organizations.

The penultimate item on the list above is a significant issue. The training required here reflects the nature of humanities computing in that it covers a wide range of topics and disciplines. As a minimum it should include;

- Training programmes and workshops on digitization, principles of cartography, methodology, appropriate software and the *interpretation* of results in the context of humanities research.
- Training and educational resources for researchers who wish to either use digital geographical and spatial information in their teaching or to teach spatial visualization methods.
- Training in collaborative/team working. This is perhaps more of a 'human resources' topic but it

is still essential if a research team working in this area is to be successful.

- Training in visual thinking and the *interpretation* of visualizations. This will assist in the interpretation of the results obtained from existing methods and also encourage thought that could lead to improved methods.
- Training in Spatial thinking. Thinking about spatial information is unfamiliar to many; what sort of relationships are there between objects, what do they mean? As stated earlier, this would also involve interpretive skills and creative thought about developing improved methods.

While the 'one stop shop' would be a practical start to tackling some of the challenges the more fundamental issues of finding a mechanism for transmitting research traditions between disciplines and encouraging cross-discipline alliances to ensure a common set of standards and tools will require sustained effort over a prolonged period. Some organizations are now being established to encourage this; for example, the AHRC *ICT Methods Network*⁹ in the UK.

We can learn from those humanists who have been 'early adopters' of methods and tools for exploring spatial data. Historians have been using geographical information for some time and the use of GIS is extremely well represented in conferences such as those of the *Social Science History Association* (SSHA) in the US, but it is notable that this is not so in the equivalent European organizations. We need to build upon what has been done by the SSHA and extend it into humanities disciplines other than social history at an international level. There is also a need to move away from the emphasis on GIS; there are many ways of using spatial data without recourse to GIS, or even maps.

7 The Scholarly Institutions and their Perception of Geographical Information Science and Digital Visualization

The innovative style of work associated with the use of spatial data is often seen as 'dangerous' and can

be viewed as posing a career risk for new academics who are trying to establish themselves in an environment where successful research assessment is critical. There are limited opportunities for publishing this style of work and as there are relatively few people with relevant experience at the top of the profession there can also be problems with peer review. A mechanism for raising awareness through research results is required. Work involving spatial data in 'traditional' humanities disciplines also needs to be seen to be obtaining high research ratings. Allied to this is the fact that as research assessment frequently involves the assessment of publication records there need to be more venues for publication. This style of work is new and is evolving rapidly so a publication mechanism that is faster than those currently available is required; the obvious choice is an electronic journal. An e-journal also has the advantage that the digital tools used to study spatial data frequently produce digital output, which is ideally suited to electronic publication, especially in the case of output such as animations and dynamic maps. Another significant advantage of an electronic journal is that it satisfies a further aim, that of reaching a wider audience and encouraging greater participation.

Current funding mechanisms could also be an inhibiting factor because the scale of work that is being attempted often requires sustained funding over a number of years and produces digital resources that will require on-going maintenance after the completion of the project. These two funding requirements can pose problems in the current research and funding environments of the humanities as models for more sustained funding are required.

The highly interdisciplinary work associated with the use of geographical information in humanities research is typical of the majority of humanities computing projects and as such highlights many challenges that are common to work throughout the digital humanities. Many of these have been mentioned in the section describing the 'one stop shop'. One extension of what has already been said is the need to recognize each individual's contribution to collaborative work. A failure to do so is perhaps symptomatic of a wider problem of not

fully coming to terms with the nature of interdisciplinarity and project partners not understanding the differing needs, goals and research culture of project partners from other disciplines. This is reflected in research cultures and publication agendas that are sometimes inhibiting the acceptance and wider awareness of digital humanities work.

8 Conclusions

In order to encourage the greater use of geographical and other spatial information in humanities research, we need a clear statement of the advantages of GIS and spatial information generally, expressed in terms of research outcomes. This should be supported by a set of exemplar projects and be made available through a 'one stop' source of information. Such a resource could also encourage creative thinking about geographical and spatial information and how it can be used in original ways. The fact that humanists are used to working primarily with textual sources may be an inhibiting factor. Many claims are made for the value of GIS as a visualization tool but it may be that some training is needed in thinking visually and, importantly, in the interpretation of the results of visualization. This raises an important general point that goes beyond geographic or spatial information but encompasses many aspects of its use; there are fundamental issues concerning the status and function of images in humanities scholarship, this includes the images produced by digital visualization tools. Humanists are used to expressing themselves, and assessing the work of others, through the medium of prose. There is a belief that the visual cannot be as rigorous as the written. It is seen as, at best, a supplement to the written word and stands in a subordinate position. There are historical reasons for this mistrust of visual sense perception which have their roots in philosophy and, more practically, in the sheer difficulty until recently of printing accurately reproducible images. In many respects, these beliefs are being reinforced in contemporary publishing and mass media. An examination of modern educational texts for schools will reveal that the majority of images are

used to aid concentration by breaking up the prose. They are intended to catch the attention of the reader who would otherwise be bored by long sections of text. In Robert Lucky's words, 'we have been well trained on the need for a constant flow of diversionary pictures' (Lucky, 1989). Our own educational experiences, especially those of the 'next generation', include very few instances where the visual is treated on an equal pedagogical footing with the written. We have been given little cause to value images over words and based on the bulk of the evidence scholars have every reason to treat visualization as an inferior form of thought and communication. We need to counter this view with evidence of the results of genuine scholarly inquiry using not just geographical information but also digital visualization as a whole. This is why I believe that the 'one stop shop' described earlier is so important.

There are concerns over the legitimacy of digital artefacts, whether GIS or other visualizations, as scholarly publications. Scholars need to decide on the criteria for assessing the intellectual rigor of such work. The use of 3D visualization in the research and communication of cultural heritage is currently being examined in this context and guidelines published in The London Charter¹⁰ will provide a valuable framework for the assessment of other digital objects such as GIS. It is also necessary to develop evaluative standards for assessing the credibility, reliability and legitimacy of the publication venues that display such work. In our own field, the newly established *Digital Humanities Quarterly*¹¹ will prove to be a valuable testing ground for many of these questions and their possible solutions.

Within the humanities, historians and archaeologists are already taking the established methodologies of Geographic Information Science and developing a new methodology for the examination of the human use of space, which is perhaps best described as *Geographical and Social Information Science* (GSIS). This is likely to be adopted and developed by an increasing number and range of humanities scholars as awareness of the possibilities spreads through the community. The study of the human use of space also finds expression through the discipline of *space syntax*,¹² which originated in

the fields of architecture and urban design to assess the social effects of their designs (Hillier and Hanson, 1986). In recent years, it has been applied by archaeologists and anthropologists, among others, and is pertinent to another aspect of the study of spatial data. These enhanced methodologies are of great value but they still approach geographical and spatial information in a fundamentally scientific way and although we usually think of GIS as a positivist tool its greatest contribution to the humanities, as noted earlier, may be not as an analytical or information presentation tool but as a reflexive one. Geographical information can be used to integrate disparate information from multiple perspectives of the past. Relationships between people, places and events can be explored and if necessary visualized at various scales of space and time via more 'traditional' GIS methodology. Ultimately, the greater, and more imaginative, use of geographical and spatial information could create a dynamic representation of time and place within culture. Future use of geographical information in humanities scholarship will result in a view of the past that is highly experiential, providing a fusion of qualitative and quantitative information that can be accessed by both naive and knowledgeable alike.

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Notes

- 1 A palimpsest is a manuscript page that has been written on, the writing later scraped off, and the writing surface used again.
- 2 Valley of the Shadow <http://valley.vcdh.virginia.edu/> (accessed 30 January 2007).
- 3 Salem Witch Trials Documentary Archive <http://etext.virginia.edu/salem/witchcraft/> (accessed 30 January 2007).
- 4 Alexandria Digital Library <http://www.alexandria.ucsb.edu/> (accessed 30 January 2007).

- 5 Pliny website at <http://pliny.cch.kcl.ac.uk> (accessed 30 August 2007).
- 6 Pliny website document see <http://pliny.cch.kcl.ac.uk/whatAndWhy.html> (accessed 30 August 2007).
- 7 Electronic Cultural Atlas Initiative <http://www.ecai.org/> (accessed 30 January 2007).
- 8 Timemap <http://www.timemap.net/> (accessed 30 January 2007).
- 9 AHRC ICT Methods Network <http://www.methods.network.ac.uk/> (accessed 30 January 2007).
- 10 The London Charter web site <http://www.londoncharter.org/> (accessed 6 February 2007).
- 11 Humanities Quarterly <http://www.digitalhumanities.org/dhq/> (accessed 06/02/2007).
- 12 The space syntax laboratory at University College London describes Space syntax as 'a set of techniques for the analysis of spatial configurations of all

kinds, especially where spatial configuration seems to be a significant aspect of human affairs, as it is in buildings and cities. Originally conceived by Professor Bill Hillier and his colleagues at The Bartlett, UCL in the 1980s as a tool to help architects simulate the likely effects of their designs, it has since grown to become a tool used around the world in a variety of research areas and design applications. It has been extensively applied in the fields of architecture, urban design, planning, transportation and interior design. Over the past decade, space syntax techniques have also been used for research in fields as diverse as archaeology, information technology, urban and human geography, and anthropology'. See <http://www.spacesyntax.org/introduction/index.asp> (accessed 30 August 2007).