

# USING GIS FOR SPATIAL AND TEMPORAL ANALYSES IN PRINT CULTURE STUDIES: SOME OPPORTUNITIES AND CHALLENGES

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In the five centuries since Gutenberg introduced printing with moveable type, Western society has been infused thoroughly by print culture. This culture, a complex mosaic of numerous factors, has recently become the focus of extensive historical research. The history of print culture, frequently referred to as the “history of the book,” concerns those aspects of a society that relate to the production, distribution, and reception of printed materials, whether canonical works of literature or ephemeral items like newspapers and handbills. Authorship, publishing, regulation, bookselling, libraries, and reading are some of the aspects examined.<sup>1</sup> Because print culture permeates all of society, the study of its history has captured the interest of a wide range of researchers: an array of historians of various periods (e.g., social, labour, cultural and legal historians; historians of religion and ideas; and historians of science and technology), literary scholars (of various periods and genres), sociologists, information scientists and librarians, geographers, bibliographers, among others. As might be expected, scholars of this diversity bring a wide breadth of perspectives to the subject. Collectively these perspectives are needed in the face of the wealth of data that can be used to explain the complexity of print culture. Numerous aspects, such as the reading experiences of an individual, are qualitative in nature and cannot be “counted”

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easily. Still, many other aspects can be quantified and positioned in space and time, including for example, where and when an author's works were first printed, the time from the date of publication of a work to its arrival in particular locations, the political viewpoints of newspaper editors in different regions, literacy rates, and urban concentrations of the printing and allied trades.

While historians of print culture have made significant use of quantitative data, investigations of multiple variables have not been easily achieved, if at all. Geographic information systems (GIS) technology has arrived in historical circles at a time when a means of analyzing quantitative aspects of print culture through time and space is needed. In this article we address the types of opportunities involved in harnessing GIS technology at both micro and macro levels, and we look at some of the challenges involved in using existing print culture databases and in developing other relevant datasets.

Our interest in GIS stems in part from the current vibrant state of research in this interdisciplinary field. A manifestation of the recent surge of scholarship is a series of forthcoming multi-volume national "histories of the book" (see Gross 1997). When completed, *A History of the Book in America*, for example, will consist of five volumes.<sup>2</sup> Similar projects are underway in Canada, Scotland, Ireland, England, Australia, New Zealand, and numerous other countries.<sup>3</sup> In 1991 an international association, the Society for the History of Authorship, Reading, and Publishing (SHARP), was founded and it has hosted seven successful annual conferences. The Society has an active electronic conference (SHARP-L), a highly informative website, SHARP Web, and in 1998 the Society launched an award-winning new journal entitled *Book History*.<sup>4</sup>

Although these developments demonstrate substantial recent research, the history of the book is not a new field of study. There have been historians of the genre almost since the time of the first written records; studies have not been confined to the period of *printed* books, although the interest of many scholars does lie in the post-Gutenberg period. Nonetheless, in the last two decades increasing interest has been focussed on this field, and within the 1990s the topic became "hot" (Grafton 1997: 139). Bibliographies of the field show that earlier studies tended to be narrow in scope and often parochial; more recently an increasing number of inquiries that probe broader issues and cross national boundaries have appeared, possibly indicating a maturing of scholarship.<sup>5</sup>

It is for this maturing scholarly field that we discuss the perspective of

geography, which we believe can have a significant impact on research and understanding. We examine some of the issues involved in employing this viewpoint, drawing on experience with a pilot study of data in a GIS, and we propose avenues of future endeavour.

### **The Geography of the Book**

In their ground-breaking work on the history of print culture, *L'Apparition du livre*, Lucien Febvre and Henri-Jean Martin (1958: chap. 6) aptly described the early spread of printing as the "geography of the book"<sup>6</sup> The authors provide maps illustrating the spread of printing, by decade, to 1500 (ibid.: 178-79, 184-85), and in their text the seeds for analyses beyond the useful, but relatively static, "geography of the book" can be seen. In four sections (concerning the journeys of printers, places to set up business, geography and publishing and, the spread of printing to various parts of the world), Febvre and Martin comment on this theme. They explore a variety of reasons for the nomadic nature of printers' lives in the fifteenth century, along with the subsequent development of printing businesses in certain towns in the sixteenth century (ibid.: 168-80). Moreover, they refer to the myriad factors that influenced the locations of printing business and affected their success, among which were raw materials (such as steel, copper, lead and tin), technical specialists (such as engravers, typefounders and compositors) and consumers (for example, academics, clerics, lawyers and the military) (ibid.: 172-80).

In this manner, Febvre and Martin make clear that the spread of printing was no isolated proceeding; it depended on, and interacted with, the physical, political and socioeconomic world. It is clear that to go beyond developing an understanding of the spread of printing to tracing the wider history of the interplay of the many elements of print culture one faces a multidimensional task. This complexity can be illustrated from a model which has become one of the most frequently cited in the field. In "What is the History of Books?" Robert Darnton (1982), a historian of the French Revolutionary period, expounded his "Communications Circuit." His model has served as a framework for many other scholars and has also informed debate on the subject. The "circuit" has proven eminently useful even though not every scholar agrees with either the framework or the details.<sup>7</sup> He claimed that "printed books generally pass through roughly the same life cycle. It could be described as a communications circuit that runs from the author to the publisher (if the bookseller does not assume that role), the printer, the shipper, the bookseller, and the reader. The reader completes the circuit because he influences the author both before and

after the act of composition” (Darnton 1982: 67). Darnton (ibid.: 67) believes that the model “provides a way of envisaging the entire communication process. With minor adjustments it should apply to all periods in the history of the printed book...” (ibid: 67). In its outline, this model may seem relatively straight-forward; in the details, however, it describes highly complex environments, which include, as Darnton (ibid.: 67) notes, “economic, social, political, and cultural” relationships.” Understanding the interplay of these relationships, as well as the basic outline, is what motivates historians of print culture. Models such as Darnton’s may not fit all situations in all time periods, but they do encourage questions. In our view, the history of print culture has reached a stage to employ new methods to explore new questions. In conducting investigations arising from these questions, the application of GIS technology will prove to be of considerable benefit, particularly because multiple analyses are possible.<sup>8</sup>

The creation of print culture databases is now very feasible, and the need to create them, if GIS is to be used, is crucial. Even so, no rigorous research should begin by simply assuming the features under study. Scholars now have the ability and resources to create, or to draw upon, databases of detailed bibliographic, economic and demographic information that will permit examination of assumptions concerning print culture factors. Furthermore, it is now feasible to move from examining a relatively static “geography” of book production to researching a dynamic “spatial history” of the multi-faceted concept of print culture, by relating information about books and their production, dissemination and reception, to a potentially wide range of spatially-related historical information.

Increasing numbers of scholars are studying aspects of the production, distribution, and reception of printed materials, and many of these scholars are aware of the spatial nature of variables in their inquiries. Conference papers, articles, and monographs, that highlight geographic information, both synchronic and diachronic, have recently appeared, including research related to the book trade — for example, the spread of bookselling networks in Kent, England (Goulden 1998) — as well as studies giving attention to reception and literary elements (Constance-Hughes 1997). Further examples include the pioneering spatial analysis described by Gilmore (1998) in his study of books and readers in rural New England in the late eighteenth and early nineteenth centuries. Such volumes as *The Atlas of Literature* (Bradbury 1996), *The Reformation and the Book* (Gilmont 1998), and *Atlas of the European Novel, 1800-1900* (Moretti 1998) illustrate this point even further (see also Moretti

1994; Kerrigan 1998). However, it is important to point out that none of these authors took advantage of a GIS to facilitate analysis and while their informative reports are informative, they remain snapshots in time of the factors that were studied.

### **Print Culture History and GIS**

Activities in spatial dimensions are the grist of the GIS mill, and temporal dimensions are increasingly considered.<sup>9</sup> In social contexts both of these dimensions are very important. For example, in discussing migration, John Odland (1998: 238) stated: “A spatial and temporal framework is a prerequisite for analysing migration and mobility behavior because these behaviors are defined by occupation of a set of locations in some temporal sequence and can only be recognized by keeping track of the locations of individuals over time.” This framework has been demonstrated ably by the researchers at Queen Mary and Westfield College with their work on in and out migration data (Southall, Gilbert, and Gregory 1996).

For historians of the book, a spatial and temporal framework is also important due to the geographic growth of factors such as literacy through time, as well as the mobility of agents of print culture (printers, etc.). Scholars have examined the spread of print culture for some time, even though actual mapping of that expansion has often not been done.<sup>10</sup> However, geographic concepts have received increasing attention recently, as noted above,<sup>11</sup> and methodologically a number of writers have recommended giving particular attention to historical demography, social history, economic history, literary history, and other fields of scholarship.<sup>12</sup> Using the fundamental GIS principle of data layering, aspects of these fields that constitute the broader environment referred to by Darnton, can be considered for analysis. Figure 1 “Example of Some Data Layers in a Print Culture GIS”<sup>13</sup> illustrates examples of the variables which might be analysed. It is important to note, however, that such layers can only be created if the required information is available in database format. (See Appendix A and the Warwickshire Pilot Project section below for examples of existing databases that can be used in a GIS.) The recent release of some census information in database format greatly enhances the capability for incorporating demographic information, such as age, gender, religious affiliation, literacy, and occupation into a GIS exploring print culture history.

### **Print Culture in the Nineteenth Century and Potential GIS Applications**

The nineteenth century is a particularly appropriate historical period for

illustrating the benefits of employing GIS, due in part to the existence of book history-related databases and to the development and public release of some nineteenth-century census information in database format. Developments in printing technology had a major impact in the decades up to 1914. Simon Eliot (1994: 79) has identified “two revolutions in book production” in Britain from 1800 to the First World War, revolutions that were mirrored in other locations (Eliot 1994).<sup>14</sup>

The first, running from 1800-70, involved the shift from wooden to metal construction of printing machines, the move from manual to steam-powered printing...and the exploitation of the railway network after 1840 to distribute printed materials. The second revolution, from 1870-1914, saw the introduction of rotary printing machines...type-composition machines...and the progressive replacement...of steam power by electricity. Both had substantial but different impacts on the nature and size of print production in Britain.

Such developments in printing technology formed only one of several major influences on print culture during this period. Massive migrations of people, significant advancements in transportation (in North America and Europe principally related to railways), and major strides in education systems, with concomitant rise in literacy levels, are all characteristics of the nineteenth century. The inter-relationships are complex, and historians of print culture have up to the present attempted to build an understanding of the period by isolating factors and studying them individually—rarely in total.<sup>15</sup>

Two examples represent the tendency to simplify complex relationships that have a spatial component: one hints at the potential uses of GIS for book history at the micro level, while the other points to broader descriptive and analytical uses at the macro level. The first comes from Gilmore’s (1998) pioneering study of the communication system and the book trade in rural New England in the late eighteenth and early nineteenth century. In Figure 5-1 (“Upper Valley Permanent Print Centers, 1787-1830”), he employed a method for illustrating a single element, namely, the spread of printed materials from printing shops in New England’s Upper Valley region. Gilmore used two measures—regional (of which there is only one such centre, the town of Windsor, Vermont) and local (of which there are six examples). The element of time is noted only in the legend, not in the map itself. In figure 5-3 (“Upper Valley Bookstore Locations Through 1830”) Gilmore showed the same geographic region in the same time period, and illustrated the location and types of book store. In the text he discussed transportation, the unequal

distribution of elementary literacy, and so on, but at the time of his research in the 1980s, he had no means of placing these “intervening variables” in the dissemination of print within a more comprehensive analytical framework.

The second example is from Plate 51 in Volume 2 of the highly acclaimed *Historical Atlas of Canada* (Gentilcore 1993). The authors of this volume *did* make use of GIS technology, and this is the first example of which we are aware where print culture data was incorporated in a GIS. It is important to point out, however, that in this case the GIS was used for display and mapping rather than for analytical purposes. This plate, entitled “The Printed Word,” has several segments, one of which illustrates a single factor (location of public libraries, 1891), setting out the distribution of public libraries in 1891 and the number of volumes in each. Another segment (newspapers, 1891) suggests some of the potential for analysing the interconnections of several variables (see Figure 2, where newspapers in the three Maritime provinces are illustrated). Although this map concerns only one point in time, the year 1891, it shows both the sales of newspapers per issue and the political viewpoint of the papers' editors.

If the discrete categories of data from these separate segments (type and size of library, newspaper circulation, and political views) were reworked into GIS data layers, the combined information could be interrogated jointly, thereby adding considerable richness to the analysis that could be undertaken. Furthermore, adding demographic data from the 1891 census, as well as the numbers of eligible voters and rates of literacy, would augment the information in a way consistent with the goals of placing print culture data within a broader socio-economic context. In other words, incorporating various datasets, for 1891 and other years, into a GIS will allow “analysing and visualising long-term change” involving an array of demographic, economic and book history variables.<sup>16</sup> GIS supplies the means for examining more broadly some of the issues that concern book historians. In short, the study of print culture could be moved forward by the ability to pose queries relating to, for example, numbers of readers affecting the markets perceived by booksellers and publishers, and the spread of newspapers affecting political developments (and vice versa).

The questions set out in Table 1 illustrate how a GIS could be used to advantage. The first question is descriptive, concerning one or more factors in a single location or a region in a given time period, for example, the numbers of booksellers, the number and type of library, numbers of literates in the population, and so on. While analysis per se is not required by the the “what is

at” question, being able to search for such primary data by place is, in itself, of significance to print culture historians who are focussing on one particular factor (printing by women, for example) and need to discover contextual information for their location of study.

The level of complexity is increased in the second question in Table 1 since it concerns the capacity to match researcher-defined conditions by place. This type of information permits comparisons by single factors or a range of factors. The “where is” query will allow researchers to discover whether assumptions concerning relationships hold true for every place in the GIS. For example, a causal relationship between population density and the number of locally printed newspapers is plausible – but if a “where is” query produced hits on much smaller than expected urban areas for such a condition, the researcher would be led to examine the evidence for other possible causes.

Concerns about trends and changes over time are accounted for in the third question type. In this case, a GIS permits the researcher to pose complex queries for one or more locations. Searching for trends ties in with the second question type and could well lead a scholar to scrutinize assumptions about causes in more depth. Pattern questions are related to trend questions, and one of the principal goals of the pilot project described below is to explore this relationship. The ability to query multiple attribute databases regardless of time period has not hitherto been feasible for book historians, yet these types of questions are fundamental to a comprehensive understanding of the interrelationships of print culture factors and elements in the socio-economic environment. For example, while it is conceivable that religious affiliation had no relationship at all on availability of books by loan on a wide range of subjects — in some locations this might prove to be the case — being able to examine the correlation of these factors simultaneously would offer powerful analytical potential.

The capacity of a GIS to model the physical world has obvious benefits for the environmental sciences. Similarly, the fifth category of questions listed in Table 1, the “what if” questions of the projection or model type, will also aid historical enquiry. In this instance, a projected scenario is measured against the known situation, which leads to questions probing the reasons for any differences.

In addition to the categories of questions outlined in Table 1, a GIS can be used to test economic theories, such as the central place theory in retailing (Miller 1999). Applying this notion to print culture studies, theories and assumptions concerning the interconnections and causal relationships



between and among factors, like literacy rates and the size of circulating library stocks, can be examined. In addition, some of the broader concepts of book distribution at national and international levels, such as the centre-and-periphery model,<sup>17</sup> can be systematically tested for their application in specific regions or countries.

To summarize this discussion of Table 1, GIS technology, owing to its capacity to link information from disparate source databases, offers substantial potential for the examination of various print culture assumptions. One further example will illustrate this point. The influence of literate Scottish colonists, merchants and settlers in North America has become mythologised in some of the literature on book history. Several scholars have engaged in meticulous research on aspects of the Scottish influence in the print culture of the United States in the eighteenth century (for example McDougall 1990). Without similar analysis other researchers have assumed that the same situation held true in the Canadian colonies, which bore socio-economic similarities to the United States, in spite of political differences. Certainly large numbers of Scots emigrated to the Canadian colonies (Hornsby 1992). However, recent research has found that the Scottish impact on early print culture was much more subtle in Canada. This analysis is based on a number of micro studies that will be greatly enhanced through the application of a system incorporating migration data, census data, along with book trade data (see Black 1999: chap. 6). It is through this type of work that the immense labours of those involved in preparing the national histories of the book can be compared and analysed in fruitful ways. Moreover, many aspects of print culture, ranging from such straightforward matters as the spread of daily newspapers to more complex variables such as the business networks of colonial booksellers, lend themselves to trend analysis over the longer term. Trend analysis, though not spatially-related in a GIS, is exemplified for the nineteenth century, for example, in Eliot's (1994) analysis of British publishing.

The use of GIS to examine the expansion of various businesses and trades is already in evidence in the literature.<sup>18</sup> From a print culture perspective, papermaking was a crucial business for the spread of printing. The distribution of paper can be tracked, largely due to the tradition of watermarking (especially of handmade paper), which permits one to trace the paper in published items back to particular mill. Printed items of all types — from books to ephemera such as playbills and other advertising handbills — serve as evidence for historians of the paper industry. For example, this industry was just as international as that of the book trade in Canada in the

nineteenth century, since it was some considerable time after the introduction of printing in various colonial towns before indigenous paper mills were able to fill local demand. Paper historians worldwide are engaged in a variety of studies that pay attention to spatial factors. The International Association of Paper Historians has supported the development of a database of European watermarks, in addition to investigating the movement of paper from Asia to Europe (Shep 1998). The history of the paper industry is one example of a part of print culture that crosses the disciplinary boundaries of historical geography and industrial archaeology, and, partly for this reason, it is ripe for various types of spatial analysis.

No matter what type of question is being addressed, or what theory is under consideration, one analytical feature requires special emphasis: when looking for patterns and trends and interactions the researcher needs to remain aware of the possible “data space interactions,” including geographic elements only; time elements only; attribute elements only; geographic and time elements; geographic and attribute elements; time and attribute elements; or geographic, time, and attribute elements (Openshaw 1994: 88-89). One example concerns differences in particular print culture elements on either side of the North Atlantic: a researcher in this field must be aware that the element under consideration could have different manifestations solely due to the presence of the ocean.

### **Warwickshire Pilot Project and Its Implications for Research**

GIS will facilitate at least three types of research endeavour in book history: the “simple” mapping of individual factors; the analysis and subsequent mapping of inter-relationships between and among several factors from a single database; the analysis and report generation (with or without mapping) of information drawn from disparate source databases. To test the feasibility of using GIS to answer questions posed by historians of print culture, we have initiated a project using Autodesk software for the GIS and MapGuide for the user interface.<sup>19</sup> Our pilot study is the first attempt to link spatially related demographic data to specific information from book history datasets. The project’s goals are to provide a resource for England and Wales that will include access to census information, book trade occupation information (location, type, gender), library information (location, type, size) and a variety of other socio-economic factors such as literacy. At present the project has been established with data for one county only; Warwickshire was selected because the richest data, for the widest year range, in both of the principal source

databases was available. The layers of data in the GIS currently relate to Poor Law Registration District boundaries,<sup>20</sup> and our objective is to add all urban centres and communication routes (rivers, canals, roads, railways) when the project covers the whole of England and Wales.

Any GIS project must address five essential matters: data acquisition, preprocessing, data management, manipulation and analysis, and, finally, product generation. These activities are not always linear steps, since they are interdependent and may be iterative. No GIS project can ever be considered “finished,” and the pilot described here is in its earliest stages. A further goal of the pilot is to allow scholars to visualize interrelationships and changes through time. The wide array of descriptive and analytical tools within a GIS permit charting, graphing, and mapping in more or less conventional ways, but animated cartograms can be developed that can by themselves be revealing and encourage further questions.

At present the project draws from two large datasets related to print culture: the British Book Trade Index (BBTI) and the Library History Database (LHD) (see Appendix A for brief descriptions of these and other available datasets).

### ***British Book Trade Index***

The BBTI, “which operates under the aegis of the Robinson Library of the University of Newcastle upon Tyne, is a computerized index of the names and brief biographical and trade details of all those who worked in the book trade in...England and Wales, and who started work in the centuries before 1851” (Isaac 1995: 4). The index is designed to allow studies of the trade in context: that is, it includes not only “printers, publishers and booksellers, but also stationers, papermakers, engravers, auctioneers, ink-makers, pen and quill sellers, etc.” (ibid).

This database, which is in dBase III software, now contains 70,000 records, and both spatial and temporal data are incorporated in fields for trade members' addresses (at street and building level when known), including migrations within and between towns, dates of operation, and kinship among members of the trade (when known). The BBTI is very useful, although its editors are aware of many gaps in coverage; some counties have dense data for certain periods and nothing at all for others. For incorporation into a GIS, the index facilitates searches at various geographic levels.

### ***Library History Database***

The LHD also has a British focus. Created by Robin Alston, it contains information on over 12,000 institutional and commercial libraries and over 5,700 private libraries in the British Isles in the period up to 1850. The database currently contains 30,000 records. For spatial analysis the database may be searched by place at various levels of detail from urban settlement to county, and also at the country level for all parts of Britain. The database includes temporal information in the “founding date” field, which can be used to map and analyse the development of certain types of library. Unfortunately, the sources used in the compilation did not make it easy to indicate the duration of the libraries, some of which only survived a few months (e.g., early commercial lending libraries in small towns), whereas others lasted for centuries right up to the present.

Data from selected fields were extracted from both databases including all date information as well as town names. County name was included in order to facilitate expansion of the system to include all counties in Britain. Any use of linked data sets in a GIS depends on the geographic resolution (or area referred to in the various databases) being comparable at some level of detail. The street address data from BBTI was included where found, but the LHD does not have spatial data at this level of detail. So, the comparable geographic units are urban centres.

The system may currently be queried by place and by date, and Figure 3 shows the type of report which the user may generate, having selected regions from the county map. Charts that indicate numbers of book trade members or libraries can also be created. These figures provide output for single elements, but the project already includes some preliminary literacy figures from the mid-nineteenth century that point to future possibilities for analysis, especially when census data<sup>21</sup> and transportation route information are also linked to the project, and the source tables of disparate data (book trades and libraries) are further enhanced to permit queries concerning ratios as well as basic numbers and locations.

Our goal with this pilot project is, eventually, to deal with more complex constructs. Undoubtedly, questions will arise concerning which variables to use as indicators of particular phenomena. For example, the relationship among the introduction of new paper making, composing, and printing technologies, the spread and distribution of newspapers, and their combined impact on the development of democratic principles is one of those puzzling constructs. GIS applications can aid in this sort of social analysis of print

culture. But the matter is indeed complex: requiring the underpinnings of social and political history, and one must also decide which indicator variables to use.

Additional elements that might be linked and compared with print culture variables include several of those analysed and displayed in the *Atlas of Industrializing Britain, 1780-1914*. These include services (occupations), retail patterns, popular institutions, languages and dialects, education and religion (Langton and Morris 1986). Although not in electronic form, this Atlas is a wonderful resource, displaying data from several censuses as well as a range of other sources. Relating the wealth of information it gleans from census data, and so on, to specific print culture data will be of immediate benefit to historians in this field. For example, the *Atlas's* information on the percentages of street addresses occupied by shops can be complemented by information from the British Book Trade Index to show the percentages of street addresses occupied by bookshops, libraries, or agents of print culture. Furthermore, the data from both could be used to answer the question, Was there any correlation between patterns of membership of Friendly Societies and the presence of libraries?

In any socioeconomic GIS, various levels of detail may be feasible, depending on the nature of the source databases.<sup>22</sup> The capacity to view the print culture situation at the micro or local level along with the broader regional level can deepen one's understanding of a contemporary situation. To illustrate this point, if one combines the British Book Trade Index with British census information relating to occupation and address, it is feasible to examine, at the individual street level, the range of occupations and the types of urban cohabitancy that were common in the nineteenth century and to analyse the changes through time. A search of the census for printers and bookbinders reveals that a surprising number of the latter (often female) lived in the same house as the former (often male), or close by. The family occupational networks in the printing and allied trades have long been familiar to book historians, and confirming information has recently become accessible from census databases without recourse to any specialized book history databases. However, through our pilot project we aim to encourage comparative and supplementary research on this topic using the British Book Trade Index, which includes detailed annual information from directories and thus permits analysis across yearly rather than decennial boundaries (available from the censuses). Both of these resources have spatial information at the individual dwelling level, facilitating studies of localized activities and patterns

which might either correspond to or differ from larger regional or national configurations. Whether local areas can be classified according to various typologies of print culture characteristics would be a valuable discovery.<sup>23</sup> Such an analysis would be an outcome of the “where is” question type discussed above.

In his study of the industrial revolution in England, John Langton (1984: 150) drew attention to the increasing regionalism of industrial activity and noted that “people in the country at large...were becoming conscious of [some of] these regional distinctions.” To determine whether his conclusions had wider application, perceptions of regional print culture characteristics (revealed in newspaper commentaries, diaries, etc.) could be analysed. In this type of inquiry both qualitative and quantitative book history methods must be employed. In nineteenth-century England, print culture was not homogeneous across all regions, in spite of a single national language and a well-developed, largely centralized national publishing industry. Regional variations were due to numerous variables, ranging from transportation routes and methods, to local dialects, local printing facility (if any), and so on. The mapping of languages and dialects by John Langton, along with the earlier research on dialect literature in northern industrial areas, warrants a spatial reexamination and comparison with other regions in the United Kingdom to investigate possible print culture determinants (see Langton and Morris 1989: 202-5; Vicinus 1974). Data from the *English Short Title Catalogue (ESTC)* can provide gross publishing figures at the urban level, and a fine-grained analysis can be carried out by examining the type of publishing (e.g., broadside versus book) along with demographic and occupational information from census records.

The experience we have gained from the pilot project points to research possibilities in other jurisdictions as well. One research avenue that a GIS spatial analysis would support is a study of regionalism in colonies around the world. Colonial mentality was informed both by word of mouth and daily mechanics of living in a relative cultural outpost and by reading books and serials, many of which were imported. The foundation for a study of the roots of a Canadian identity, for example, lies, therefore, in knowing what books and serials were available. Regionalism remains an integral part of Canadian identity today, as recent studies by Sandrine Ferré (1999) and Nancy Duxbury (1995) confirm. The cultural distinctiveness of Canada’s regions, and the country as a whole, compared to the United States is a recurring political theme in trade discussions between the two countries (Canada 1992). Thus, a spatial history of print culture factors would make an important contribution

to understanding current patterns and trends and would mirror modern market analyses. Some regional patterns are explained, for individual factors, in a report commissioned by the Association of Canadian Publishers in 1991.

### **Book History Data and Resource Discovery**

Before GIS investigations, particularly those on a large scale, can be undertaken, additional data sets of book history variables need to be constructed that then can be linked with other socio-economic factors. While it is true that the “better” (more authoritative and reliable) the data the better the findings will be, even with relatively messy and incomplete data, potentially large intellectual gains can be made by looking at that data and combining different data sets in new ways.

While databases of many aspects of print culture will need to be developed, a number of significant data sets already exist and can be used in GIS applications (see Appendix A). Some, such as the *English Short Title Catalogue* (1640-1800), and the *Nineteenth-Century Short Title Catalogue* (1801-1914), are unique in their temporal and spatial coverage of print history. Others, like the Library History Database, while covering a national geographic space, have a much broader temporal range (beginnings to 1850).<sup>24</sup> Differences of this nature, when added to the specificity of available demographic data (such as censuses), define the types of spatial and temporal analyses that can be performed. Therefore, researchers need to decide on meaningful periods of time and spatial boundaries for print culture applications. On the one hand, this requirement may seem to be a limitation; however, the current status of print culture databases could provide an impetus for the creation and expansion already exist can learn to use them to best advantage, a point that relates to the function of “resource discovery.”

With the advent of the Internet and the Web, resource discovery in general has expanded exponentially. The potential for research is increased when the sought-after resources are themselves in electronic form. Unfortunately, many book historians are, to date, often unaware of resources other scholars have created which might be of use to them. As in other social science and humanities disciplines, scholarly papers and monographs are the traditional means of disseminating research findings in this field, and researcher-created resources are not identified. Nonetheless the Internet is having a significant impact on communication of research work. Book historians already use the Internet for many purposes and a union catalogue or inventory of print culture databases accessible from the Web will be a timely

research tool, especially if it is searchable by the topic of the dataset and also by geographic location. For such an inventory to be broadly useful over a long period, it must adhere to common standards and “best practice” guidelines. In this regard we have proposed using a standard form, drawing on pertinent elements from the Dublin Core Metadata Initiative (a cataloguing convention for electronic resources).<sup>25</sup> Our goal is to link the inventory of databases within a GIS to facilitate both resource discovery and database analysis by individual researchers.

The discovery function will be similar to that provided by the Electronic Cultural Atlas Initiative (ECAI), which aims to offer “a new dimension to academic research and international collaboration.”<sup>26</sup> Such a tool for resource discovery will be an effective clearinghouse and we expect it will evolve into an electronic atlas of book history by building on more localized privately-created databases combined with the cooperatively created tools, such as the *ESTC*.<sup>27</sup> The databases will be dispersed but will be searchable from a single electronic site. Several procedures are required in order to facilitate such resource discovery and ensure that the datasets accessible from the central site are useable for a wide range of scholarly inquiry.<sup>28</sup> Among these are clear specification and identification of the geographic range of coverage, date range, and level of geographic detail. In addition, if users are to have confidence in any atlas of book history, statements of source authority need to be made available along with guidelines for retrieval and manipulation of the data on the user’s system. Fields within the Dublin Core contain all of this information.

### **Challenges and Goals for the Adoption of GIS in Print Culture History**

Several challenges face print culture scholars who wish to take advantage of the robustness of GIS, including a general lack of familiarity with the technology; the need to develop appropriate source databases and the challenges inherent in defining and gathering data suitable for comparative studies; and the need for international collaboration and partnerships. Historians of print culture are no strangers to computer technologies, but many of them, like many other historians, are unfamiliar with quantitative methods, particularly in GIS applications.<sup>29</sup> The learning curve for competence with GIS is steep, and it is likely that only the most interested will turn to this technology initially. Once the benefits of GIS become more familiar, other historians of print culture will pursue this line of study. A primary goal of our website and pilot project is to encourage the application of GIS to print culture questions.



In order to proceed with questions that consider international movement of agents of the book trade, readers, printed materials, and ideas, it will be necessary to arrive at agreed-upon definitions for concepts and standards for data. To some extent historians of the book have already achieved this with machine readable catalogue records (MARC) for printed materials.

"[U]nfortunately however the solution in many cases is to ignore complex data sets where definitions will change over time or to use the data in highly aggregate form" (White et al. 1998). In the near future, historians of the book will need to address this problem, in order to achieve longer term objectives. Any information regarding location should, ideally, be standardized for use within a GIS. Current cataloguing initiatives to add geospatial data to a distinct field within a standard MARC catalogue record, will aid future researchers seeking spatial access points.<sup>30</sup> Depending upon the structure of the GIS, this data could be a place name rather than a referencing system such as latitude and longitude, which might be contained in a table separate from the database itself. However, while seemingly simple, place names for historical research are problematic due to their changes over time. Few book history databases contain normalized place names. The *ESTC* is a notable exception: it includes a distinct field for normalized names. Other similar union catalogue databases, which could be of considerable use in a GIS, do not currently contain standardized place names. For example, the Consortium of European Research Libraries (CERL) catalogue of books from the period of hand-press printing has no normalized place names, and freely available geographic thesauri are not yet thorough enough in their historical coverage of European names to enable this CERL database to be queried geographically with any confidence.<sup>31</sup>

Over the past two decades important initiatives, such as those of OCLC (Online Computer Library Center, Inc., based in Dublin, Ohio), have led to the creation of several large databases of holdings of hundreds of libraries. One of these, WorldCat, can be searched by place of publication although no "country of publication" field for broad searches or for limiting purposes is available.<sup>32</sup> Nevertheless, such catalogues, while incomplete in terms of spatial information, are significant for book historians interested in geographic patterns of availability as well as in patterns of production/publication.

Besides the datasets listed in Appendix A, more are required for a wide array of jurisdictions. However, as Livio Di Matteo and Peter J. George (1996: 54) point out, these projects have high costs "in terms of their effects on the progress of academic careers. Even with ample research funding, micro-data sets can take years to construct." Privately created databases may be sufficient

for micro studies; but they will not be adequate for comprehensive analyses such as those being undertaken for the national histories of the book. Thus, one of the large challenges facing those who wish to apply GIS to the history of print culture is the creation of relevant data sets that can be used in conjunction with census records and other historical databases already in existence. A related challenge is to make full use of the demographic information which is already available. There are few locations with demographic data sets as well developed as the Balsac Register for the Saquenay Project in the province of Quebec in Canada, which contains data on 600,000 individuals (140,000 couples) and 2.4 million events (e.g., births and deaths) or Le Programme de recherche en démographie historique (PRDH) at the Université de Montréal, where data on 400,000 individuals and about 750,000 events has been collected. This later database will eventually contain records on one million individuals living in Quebec from 1608 to 1850 (*ibid.*: 47-48). Nonetheless, census records for some Western countries have been and are being exploited in GIS applications in social and economic histories.<sup>33</sup> The well-developed Great Britain Historical GIS Programme at University of Portsmouth in the United Kingdom uses this type of data to notable advantage.<sup>34</sup>

While many aspects of print culture are national in perspective (thus the numerous national histories of the book), the boundaries of countries have not been, generally speaking, an impediment for the movement of printed materials. Localized data sets and projects, while important, are insufficient for projects that track the international impact of printed materials. For studies of the latter type, collaboration in building databases like the *ESTC* is necessary, and collaboration among scholars from varying academic fields is required. The knowledge and skills of historians of the book must be matched with experts in GIS, computer science, and so on., in order to build systems that ensure spatial resolution among print culture databases, social and economic databases and, and digitized map information. Through such venues as the annual conferences of the Society for Authorship, Reading, and Publishing, we have been promoting the idea of applying GIS to print culture questions of national and international character (Black 1997, Black and MacDonald 1998).

Beyond the need for common standards, the related problem of different definitions becomes evident in studies where a factor, such as literacy, is compared among countries. Levels of literacy can be determined from a variety of sources, such as census records and other data (Bouchard 1993). Because definitions and methods of collecting statistical data vary among countries (or

even within a country), researchers pursuing comparative studies must deal with cultural differences in the data before launching a true comparison.

### **The Next Step**

We wish to avoid being preoccupied with methodological questions at the expense of conceptual understanding. Nevertheless, as historians of print culture accumulate increasing masses of quantitative data, it is becoming clear that much more can be done by way of analysis. As Michael Goodchild (1995: 46) has recently written: "[S]ome of the more interesting applications of GIS in social science are emerging in history...[and other disciplines], in which spatial thinking has played a very minor role in the past."

Here are some questions that all book historians considering GIS applications should address: Is spatial analysis required and/or potentially beneficial? Are other outputs desired, such as maps, cartograms, graphs and charts? Who will be the end-users of the resource, and what questions will they pose of it? Emphasizing quantitative data over qualitative information leads to an incomplete understanding of a phenomenon as complex as print culture. If quantitative data is privileged, facts rather than understanding may dominate. Yet quantitative data can serve as significant reference points from which qualitative information may be understood. One should not, as John Pickles (1995: 5) has argued, "see the new informational databases as merely efficient counting machines...[but as] new technologies and tools...[for] accounting, recording, archiving, overlaying, cross-referencing, and mapping information."

Given the challenges, the first projects to utilise GIS in studies of the history of print culture will apply the technology at the micro level, that is, inquiries based on relatively narrow geographic areas and time periods. Our own pilot study is based on data for one county in England. On a larger scale, although limited to one major city in one century is the recently announced project at Oxford University, which will examine spatially the book trade of London in the eighteenth century (Raven 1998). Macro studies examining whole countries or analyses of the interplay of print culture factors in an international context will emerge when there are data sets of sufficient quantity and size to make it feasible to employ GIS. The numerous History of the Book projects mentioned earlier will form a very solid basis for further national and international studies. In the Canadian case, analyses employing GIS are being built into the research agenda of the project.

Until recently historians of the book have tended to revel in the "fascination of...individual cases" rather than "the larger rhythms of historical

and cultural development.” They have found it difficult to survey the “terrain of book history as a whole” and have, in Anthony Grafton's (1997: 143) terms, been “truffle-hunter[s] by disposition.” But this pattern is changing in this “hot” field of enquiry, driven in part by the large national history of the book projects, which require searching out the larger rhythms with new methods of study.

### **Appendix A. Examples of Book History Datasets**

*English Short Title Catalogue ESTC*, formerly *Eighteenth-Century Short Title Catalogue*([www.thames.rlg.org/estc.html](http://www.thames.rlg.org/estc.html) [fee-based]). Also available on CD-ROM.

- single record for each identifiable edition of a book published from 1640 to 1800
- more than 1,000 contributing libraries (mostly in the United Kingdom and United States)
- conforms to the International Standard Book Description (ISBD) and international cataloging conventions based on machine-readable cataloging (MARC)
- spatial information in “publication” field; temporal information in “date” field
- all “place of publication” data (often multiple locations) is extractable
- place-names on title pages are “normalized” as well as given as they appear, e.g., Dunedin and Edimbourg are also recorded as Edinburgh
- “country of publication” field included
- no subject classification information

*Nineteenth-Century Short Title Catalogue (NSTC)*. Available on CD-ROM.

- published as a series of CD-ROMs (the post-1870 period not yet complete)
- spatial information in “publication” field; temporal information in “date” field
- all editions of a single title, no matter where published, are consolidated in a single record, making temporal and spatial analysis difficult
- each record has subject classification information

*British Book Trade Index (BBTI)*. Not currently available via remote access.

- based at Robinson Library of the University of Newcastle upon Tyne
- index of the names and brief biographical and trade details of those in the book trade (printers, publishers, booksellers, stationers, papermakers,

engravers, etc.) in England and Wales before 1851

- 70,000 records in dBase III database software
- ongoing project with some notable gaps in data (some counties have dense data for certain periods and none at all for others)
- spatial and temporal data are incorporated in fields for addresses and dates of operation

*Scottish Book Trade Index (SBTI)* ([www.nls.ac.uk/catalogues/sbti/intro.htm](http://www.nls.ac.uk/catalogues/sbti/intro.htm))

- based at the National Library of Scotland
- coverage is up to 1850 (currently the pre-1801 period offers the most comprehensive coverage)
- at present the SBTI is an index rather than a searchable database
- spatial and temporal data are incorporated in fields for addresses and dates of operation

*Reading Experience Database (RED)* ([www.open.ack.uk/Arts/RED/](http://www.open.ack.uk/Arts/RED/))

- a new database
- a joint project of the British Library and the Open University
- records documentary evidence of reading experience in the British Isles, and of those born in the British Isles, from 1450 to 1914
- includes spatial and temporal information as well as types of materials read, demographic factors concerning readers, etc.

*Biography Database 1680–1830*. Available on CD-ROM.

- contains all of the records from British and American directories (national, town, and trade) to 1830; all U.K. and U.S. book subscription lists to 1830; all birth, marriage, death, promotional, and bankruptcy records in the *Gentleman's Magazine* and similar journals to 1870; and all U.K. and U.S. society membership lists to 1830
- contains several hundred thousand individual and institutional names
- both spatial (addresses) and temporal (date) information is included; but limitations within the source data (e.g., some records do not have addresses) require additional verification by the researcher

*Library History Database* ([www.r-alston.co.uk/contents.htm](http://www.r-alston.co.uk/contents.htm))

- contains information on over 12,000 institutional and commercial libraries and over 5,700 private libraries in the British Isles up to 1850
- currently contains about 30,000 records

- various levels of detail for spatial analysis (e.g., urban settlement to county)
- temporal data in the “founding date” field
- Web version is an index rather than a searchable database

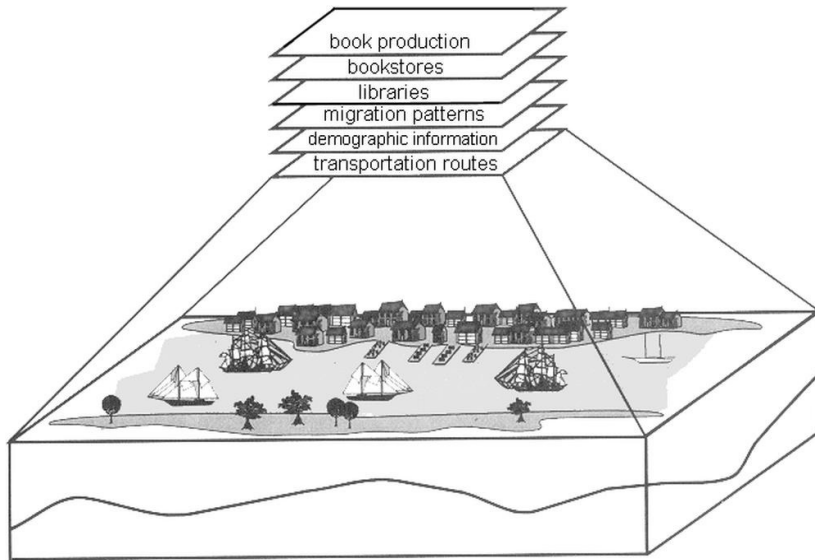
The Orlando Project ([www.ualberta.ca/ORLANDO/](http://www.ualberta.ca/ORLANDO/))

- subtitled “An Integrated History of Women’s Writing in the British Isles”
- “rich SGML coding” will permit spatial and temporal analysis: where women lived when they wrote, whether they moved within the British Isles or the colonies, what places they wrote about, with whom they corresponded, etc.

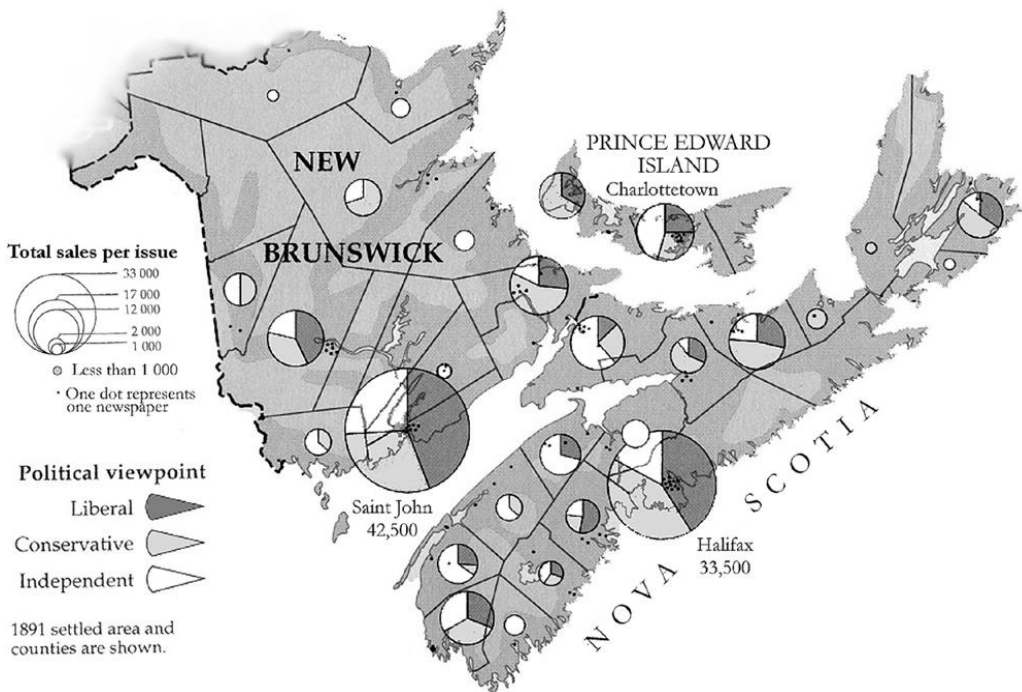
**Table 1. Types of query supported by GIS technology**

Name	Query	Definition	Example
Location	What is at....?	Determines the attributes of a given place or region	How many booksellers were in New York and surrounding area in 1850?
Condition	Where is...?	Seeks locations fulfilling certain conditions	What towns in Britain had more than one newspaper in 1890?
Trend	What has changed since....?	Determines changes in place attributes over time	What was the increase in the literacy rate in Lunenburg County, Nova Scotia between 1800 and 1850?
Pattern	What is the spatial distribution of...?	Investigates the spatial distribution of some phenomenon	Were there more specialist bookshops in colonial towns with higher proportions of Protestant or Catholic immigrants?
Projection or Model	What if...?	Explores potential patterns based on past data	Based on book export figures from Scottish ports to North America from 1750 to 1800, what would the figures have been in the first decade of the century if the same trend had continued? What were the actual figures in that decade?

**Figure 1. Example of some data layers in a print culture GIS**

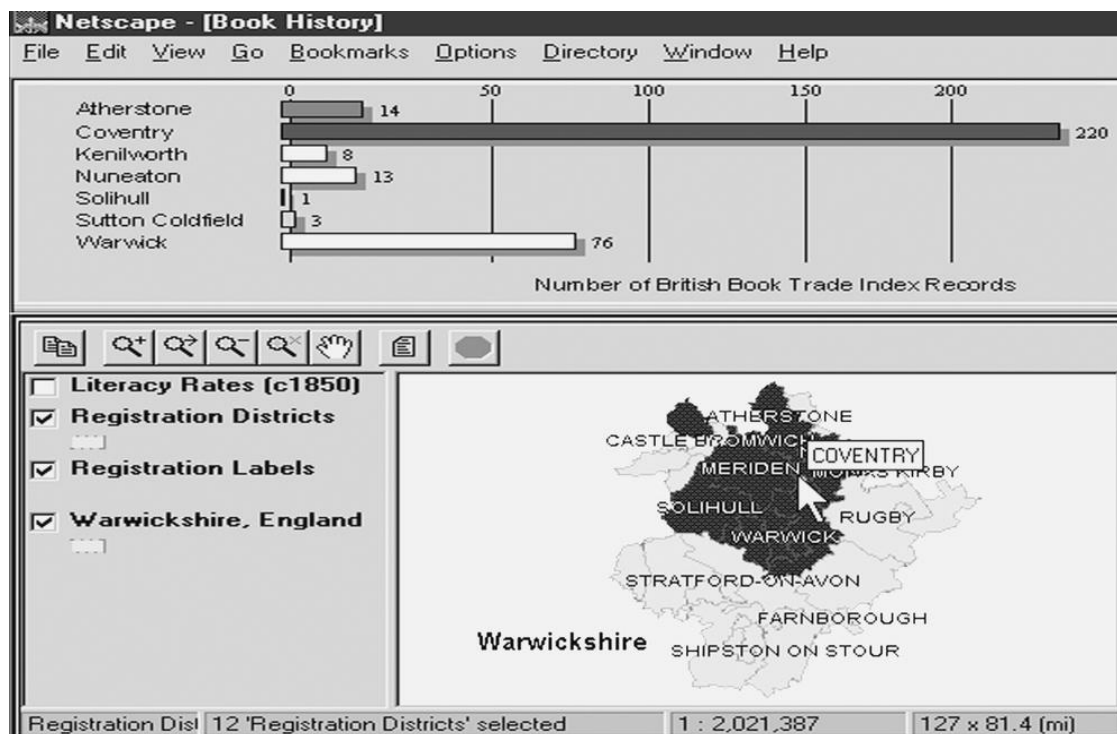


**Figure 2. Newspapers in Canada's Maritime provinces, 1891**





**Figure 3. Example of chart from pilot project**



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## Notes

1. Grafton (1997: 139) recently wrote about the last aspect: "The history of reading is hot. Historians, literary critics, and practitioners of cultural studies devote books to it; interdisciplinary conferences stage discussions of it; graduate and undergraduate courses cover it. At least one infallible sign, moreover, shows that this subdiscipline has really started to bubble: it has become the site of scholarly warfare." See also, "In electronic age, scholars are drawn to study of print" (1993).
2. The first volume of the projected five is now complete; *The Colonial Book in the Atlantic World* will be published by Cambridge University Press in 1999. David Hall is the general editor of this project, which is supported by the American Antiquarian Society. Several conferences have been held as part of this endeavour, and are noted in selected issues of *The Book*. For a general overview see, "The collaborative history" (1993).

3. The Canadian project is headed by Patricia Fleming, University of Toronto, and Yvan Lamonde, McGill University. For further details see, [www.hbic.library.utoronto.ca](http://www.hbic.library.utoronto.ca). Many of the other projects maintain websites. For example, the History of the Book in Scotland (General Editors: Bill Bell, and Jonquil Bevan) will be published in four volumes ([www.ed.ac.uk/englit/research/histbook/index.htm](http://www.ed.ac.uk/englit/research/histbook/index.htm)); the History of the Book in Australia, will be published in three volumes ([jun.itsc.adfa.edu.au/HOBA.html](http://jun.itsc.adfa.edu.au/HOBA.html)); and the History of the Irish Book (General Editors: Robert Welch and Brian Walker) will be brought out in five volumes.
4. SHARP Web may be reached at: [www.indiana.edu/~sharp/](http://www.indiana.edu/~sharp/). The newsletter, *SHARP News*, currently edited by David Finkelstein of Napier University, has been published quarterly since 1992. *Book History*, edited by Ezra Greenspan and Jonathan Rose, is published by Pennsylvania State University Press.
5. The *Annual Bibliography of the History of the Printed Book and Libraries* (Dordrecht: Kluwer Academic Publications, 1970- ) tracks publications internationally. Two more focussed, national bibliographies include one for Canada and another for New Zealand (see Bartlett et al. 1993 and Griffith et al. 1997).
6. Febvre and Martin 1958: chapter 6. See also Febvre and Martin 1990. More recently Martin has returned to this theme (Martin, 1994: especially chapter 5).
7. For example, Adams and Barker proposed an alternative model by inverting Darnton's circuit to focus attention more on books than on the people or agents involved in the creation, distribution, and use of print materials (Adams and Barker 1993). More recently, Peter McDonald has suggested the need to define the agents involved in Darnton's communications circuit vertically, in terms of their status, as well as horizontally, in terms of their function (McDonald 1997: 11).
8. See Black et al. 1998.
9. See, for example, Egenhofer and Golledge 1998.
10. One example of such studies is Mitchell's analysis of "place of publication" in one of the fields of the now extensive database, *English Short-Title Catalogue* (Mitchell 1987). Another, which examined the nineteenth century, is Eliot 1997.
11. For example, this theme is addressed by Scottish scholar, Bill Bell (Bell 1998). Geography is an important element in Fraser's analysis of the London publisher John Murray and his series, "Colonial and Home Library" (Fraser 1997).
12. For example, two decades ago Birn recommended borrowing techniques of research from "developing disciplines such as applied linguistics, historical demography, and computer science." (Birn 1976: 287-288). More recently Tanselle has discussed this topic in "Printing history and other history" (Tanselle 1985).
13. Figure first published in Black et al. 1998.

- 14 . For a description of the situation in Canada see Parker 1985.
- 15 . Recently, Johns has argued that it took three centuries after Gutenberg before "book-shaped" society was created (Johns 1998).
- 16 . This phrase is from the title of a paper by White et al. 1998.
- 17 . For England, the centre and periphery model has been articulated by John Feather (Feather 1985).
- 18 . An interesting Canadian example is the work of St.-Hilaire who is investigating the historical spread of the dairy industry in north-eastern North America (St.-Hilaire 1997).
- 19 . The pilot study is contained in our password controlled website, which is currently being evaluated by scholars in several countries. Our pilot is an example of the utility of partnerships between print historians and those with GIS expertise. Ian Gregory of the Great Britain Historical GIS Programme was of great aid in preparing the basic technical data which forms our pilot project. Mike Schlosser of Kanotech Regina Ltd., is currently a sponsor of the pilot site.
- 20 . Poor Law Registration Districts are not inherently useful for print culture – they are included in our pilot as they were the boundaries available to us via the Great Britain Historical GIS.
- 21 . For example 1851 British Census (Devon, Norfolk, and Warwick only) 1997.
- 22 . Martin 1996:163-184.
- 23 . Classification of neighbourhood types in socioeconomic GIS applications is described in Martin 1996: 163-184.
- 24 . The Library History Database is available at [www.r-alston.dircon.co.uk/contents.htm](http://www.r-alston.dircon.co.uk/contents.htm)
- 25 . The draft form can be viewed online at [www.rpl.regina.sk.ca/~fblack/gisbkh.htm](http://www.rpl.regina.sk.ca/~fblack/gisbkh.htm)
- 26 . See the Electronic Cultural Atlas Initiative mission statement at [www.ecai.org/](http://www.ecai.org/)
- 27 . Research work for the multi-volume national histories of the book is also leading to the development of databases. A few of these databases have been described in print (see, for example, Ford 1997). Other "private" databases are being compiled, such as John Crawford's work on extant private library catalogues for Scottish circulating libraries.
- 28 . The steps described here have been developed in part from five steps provided in Panel on Distributed Geolibraries 1999: 67-68.

29 . On this point Di Matteo and George have written that studies “conducted by historians in general still are not as technical as those done by economists, but they often are much more sophisticated in drawing on supportive historical literature and materials” (Di Matteo and George 1996: 52). For further discussion on historians and quantitative methods see Gagan 1994.

30 . An example of spatial information in MARC records is that of the Florida Environments Online database which uses geospatial information from the Geographic Names Information Service. Our thanks to Elaine Yontz of the University of South Florida for bringing this database to our attention.

31 . The Getty Thesaurus of Geographic Names is a vastly useful tool and may eventually be sufficiently comprehensive to aid CERL researchers. The thesaurus may be searched at [shiva.pub.getty.edu/tgn\\_browser/](http://shiva.pub.getty.edu/tgn_browser/)

32 . WorldCat is available via subscription from a wide array of libraries. One access point is [fscat.altip.oclc.org/html/](http://fscat.altip.oclc.org/html/)

33 . The Family History Library has begun to publish census data on CD-ROM. Compilation of such census data has been published or is planned for the U.K., U.S., and Canada. An example is 1851 British Census (Devon, Norfolk, and Warwick Only) 1997.

34 . Details on this project are available at [www.geog.qmw.ac.uk/gbhgis](http://www.geog.qmw.ac.uk/gbhgis).