

GIS, Cartography, and the Information Society

An Annotated Bibliography

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Preface

This paper is a collection of approximately one-hundred references collected by the compiler for specific use as support material at the NCGIA's Workshop "GIS and Society", held at the University of Washington's Friday Harbor Research Center, November 11th -14th, 1993. The citations herein are presented as solid, background material on the literature available on the topic of "GIS, Cartography, and the Information Society." This bibliography is by no means comprehensive, but attempts to provide good introductory references for published works addressing the interplay of GIS technology and society. The method used in collecting the references focused initially on papers relating specifically to GIS and society, including papers on the social meaning of GIS, maps, and cartography in general. After collecting a base of papers in that subject area, the topic was broadened to incorporate works dealing with the general impact of information technologies on society. Finally, some monographs of Geography were included as background material for the epistemology under which much of GIS technology has been developed.

I would like to thank all of the persons who contributed or assisted in this endeavor. Much of the assistance came in the form of advice and suggestions for new papers and direction in the collection. A considerable amount of support came from the Steering Committee for the "GIS and Society Workshop". Specifically, I would like to thank Michael Goodchild, Helen Couclelis, Nick Chrisman, Robert McMaster, Harlan Onsrud, Robert Rundstrom, and Tom Poiker for their individual advice and direction.

I would like to assure you that all the citations herein are correct and every possible effort has been made to ensure their accuracy and validity. However, due to human nature, there are almost certainly some inaccuracies that have gone unnoticed in the final proofing. I apologize to anyone who, while using this publication, might find an error that results in any inconvenience.

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Abler, Ronald F., 1988, "**Awards, Rewards, and Excellence: Keeping Geography Alive and Well.**", Professional Geographer, V40, N2, pp. 135-140.

In this paper, Abler discusses the benefits of rewarding excellence in the pursuit of geographic research by awarding NSF grants to fund research. He also mentions the early conceptual design of the NCGIA and his view of the future of GIS at the time of publication.

Baldwin, R., et al, 1989, "**Responses to J.B. Harley's Article, 'Deconstructing the Map'**", Cartographica, V26, N3&4, pp. 89-127.

A collection of eleven responses to J.B. Harley's "**Deconstructing the Map**" paper which appeared in the previous issue of Cartographica. The responses are from several different people with different, broad backgrounds. This collection inspired much of Harley's following paper, "**Cartography, Ethics, and Social Theory**".

Barquin, R.C., and Mead, G.P., eds., 1984, **Towards the Information Society**, Elsevier Science Publishers, Amsterdam, Netherlands, 164 pgs.

This work is a collection of the papers from the 1983 Hong Kong Computer Conference and provides insight on the adoption of computer and information technologies. The aim of the conference was to focus on the advances and impact of computers on different facets of economic and social activity.

Beaumont, J.R., 1992, "**The value of information: a personal commentary with regard to government databases.**", Environment and Planning A, V24, pp. 171-180.

In this article, Beaumont examines a series of questions that the consolidation of information in government databases raise. The issue of how valuable the information contained by a government database is addressed and how that information may translate directly into power. Some such serious problems which need to be reconciled before government databases should be universally implemented are: the management of information; the value of said information; a market-type analysis dealing with how the data collected will impact the economy and society.

Beazley, C.P., 1991, "**What Is This Thing Called Ethics and, Sometimes, The Code of Ethics?**", Photogrammetric Engineering and Remote Sensing, V57, N5, pp. 497-499.

In this paper, Beazley comments on the abuse of photogrammetry in contract work and the implications for the disciplines of remote sensing and photogrammetry. He uses real world examples of price gouging for imagery and contracts to illustrate that ethics need to be incorporated into the structure of the discipline to maintain its integrity. One of his key concerns is the adoption of certain 'life' ethics for everyone, layman and geographer alike.

Bernhardsen, T. and Tveitdal, S., 1986, "**Community Benefit of Digital Spatial Information.**", Proceedings of Auto-Carto London, V 1, pp. 1-4.

A joint Nordic project is set up for the purpose of computing (quantifying) the community benefit of large-scale digital maps that include associated data, i.e. a computer-based technical information system of spatial data for municipalities. The main purpose of the project is to develop economic methods for the calculation of the benefit derived from the introduction of digital spatial information system, to work out general information to be used by a switch-over to digital spatial information and to influence on Nordic policy this area in a constructive manner.*

Bie, Stein W., 1984, "**Organizational Needs for Technological Advancement.**", Cartographica, V21, N3, pp. 44-50.

Here, Bie examines the impact of digital cartographic techniques in Europe about the time widespread usage of digital data was becoming the norm. He asserts that the implementation of digital databases and techniques are secondary to the study of how an organization shall prepare both its workers and workspace for the coming revolution. Bie also points out there is a danger in assuming such a young technology can replace a time honored tradition, such as cartography, in the span of a few decades without some inherent aspect of the tradition being omitted.

Bond, Andrew, 1989, "**Soviet official admits to past policy of deliberate map distortion: calls for increased access to large-scale maps and images mount.**", Mapping Sciences and Remote Sensing, V26, N2, pp. 160 - 163.

* Author's Abstract Summary

Maps intended for public use in the Soviet Union were purposefully distorted relative to their scale. The implications for research and public use of that cartographic data is extremely important and may often be measured in terms of human pain and suffering. This paper examines the rationale for map distortion in the Soviet Union as part of its national security policy and how deeply it effected the Soviet economy in pre-glasnost times.

Brealey, Kenneth G., 1993, "**Networks of Power: Cartography as Ideology.**", *Western Geography*, N3, pp. 15-50.

Recent investigations into cartographic theory have broken with the traditional positivist approaches that for so long characterized the discipline. Inspired by the claims of post-modernism on the one hand, and the ethical questions posed by GIS on the other, cartography is now being acknowledged as a subjective human practice, a "way of spatial seeing" which is contextualized through the rhetoric, power relations, and truth claims of social formations from which it arises. A number of different epistemological strands, ranging from semiotics to hermeneutics to deconstruction, have been employed. This paper uses a 'revised' materialist methodology to consider cartography as institutionalized power discourse, constructed at an ideological level; and in so doing attempts to address some of the additional problems that these other newer approaches have generated. These considerations are illustrated by tying them into issues of territoriality and territorial claim discourse in general, and aboriginal land claims in Canada in particular.*

Bromley, Daniel, 1991, "**Environment and Economy: Property Rights and Public Policy.**", Basil Blackwell, Cambridge, MA, 247 pgs.

This book deals with the abiding policy issues that are faced in natural resource management in relation to property and property rights. In one particular chapter, Bromley refutes the "tragedy of the commons" metaphor that is evident among many environmental economists.

Chrisman, Nicholas R., 1987, "**Design of Geographic Information Systems Based on Social and Cultural Goals.**", **Photogrammetric Engineering and Remote Sensing**, V53, N10, pp. 1367-1370.

Design of geographic information systems has, to date, focused almost exclusively on technical efficiency. The fundamental organizing principles for an information system should not, however, derive solely from pure laws of geometry or from computing theory, because they must reject the basic goals of society. While social goals may seem nebulous, they can be described adequately to resolve some of the basic technical choices. Certain fundamentals can be determined by digging deeper into the reasons behind the establishment of an information system. Important social functions lead to mandates that provide the impetus for custodian agencies. Geographic information systems should be developed on the primary principle that they will ensure a fairer treatment of all those affected by the use of the information (equity). Certain solutions, though efficient in their use of computing, do not support the effective use of institutions or the equitable results of the analysis.*

Chrisman, Nicholas R., 1992, "**Ethics for the Practitioners of Geographic Information Systems Embedded in 'Real World' Constraints of Guilds, Professions and Institutional Sponsorship.**", *Proceedings of GISALIS*, V1, pp. 129-137.

Ethics for practitioners of GIS, while a topic of significant current interest, cannot be developed as if the individual performed in isolation. Many competing structures of society interact to form the context within which ethics must serve. This paper asks questions about institutional sponsorship, about data ownership and about data quality, without answering them.*

Chrisman, Nicholas R., 1988, "**The Risks of Software Innovation: a Case Study of the Harvard Lab.**", *The American Cartographer*, V1 5, N3, pp. 291-300.

Innovation in cartography has come to depend on the design of the software. This essay recounts two cycles of software development at the Harvard Laboratory for Computer Graphics which used different models for intellectual control. In retrospect, each model had its successes, but in neither period were there enough new professionals trained to expand the field of digital cartography.*

Chrisman, Nicholas R. and Niemann, Bernard J., 1985, "**Alternative Routes to a Multipurpose Cadastre: Merging Institutional and Technical Reasoning.**", *Proceedings of Auto-Carto 7*, pp. 84-94.

The National Research Council report "Procedures and Standards for a Multipurpose Cadastre" sets admirable goals, but may not provide the most workable means to the ends. In the search for modernization, technical and institutional reasoning should be merged. Institutions can act as barriers to modernization, but they can also act in a more positive manner, shaping the

technical needs. This paper considers three topics related to construction of a multipurpose cadastre: incrementalism, basic unit, and compilation procedures. In each case, we present some dilemmas that deserve further interdisciplinary discussion.*

Clarke, K.C., 1992, "**Maps and Mapping Technologies of the Persian Gulf War.**", *Cartography and Geographic Information Systems*, V19, N2, pp. 80-87.

Assessing the recent Persian Gulf War from a cartographic standpoint is now possible. Unlike in previous wars, which established new technologies for postwar cartographic exploitation, the gulf war is unique in having presented a proving ground for electronic cartographic technology. An analysis is given of map coverage of the war by the media, especially magazines and newspapers, and from a military perspective. From a cartographic standpoint, the winners in the war include hand-held Global Positioning Systems (GPS) technology, geographic information systems (GIS), workstation-based image processing and cartographic map-production systems, and radar imaging from aircraft. More fully exploiting and building on the success of these technologies in peacetime seems to be a clear mandate for academic and professional cartography.*

Coppock, J.T., 1988, "**The Analogue to Digital Revolution: A View From an Unreconstructed Geographer.**", *The American Cartographer*, V15, N3, pp. 263-275.

This paper examines the impact of digital cartography primarily in the United Kingdom. It also reviews the historical development of the technology as it needed to be expanded to encapsulate more spatial analysis methods using CAMAP and SYMAP as early examples and continuing on through the digital revolution. Coppock concludes the paper with a reflection on the evolution of information systems and their adoption into traditional walkways for cartography.

Cronon, William, 1983, "**Changes in the Land: Indians, Colonists and the Ecology of New England.**", Hill and Wang, New York, NY., 241 pgs.

This work views the developmental framework of colonial New England in a context that considers the ecosystems of the land as well as the political and social constraints. The reorganization of society as New England shifted from Indian to European dominance is directly related to the effects upon the ecology of the land.* Deals more generally with conflicts in environmental perceptions.

Curry, Michael, 1986, "**Beyond Nuclear Winter: On the Limitations of Science in Political Debate.**", *Antipode*, V18, N3, pp. 244-267.

This article deals with the epistemological development of nuclear technology and its effects upon society as a whole. Curry draws interesting parallels of nuclear technology to previously developed technology to illustrate the issue of prior mistakes. The conclusion of this article addresses some contemporary issues in Geography by calling attention to the quantitative revolution and the need for geographers to maintain and practice socially responsible work.

Curry, Michael, 1985, "**In the wake of nuclear war - possible worlds in an age of scientific expertise.**", *Environment and Planning D: Society and Space*, V3, pp. 309-321.

Focusing mainly on the effects of a theoretical nuclear winter, this paper has some passages of insight that can be directly applied to technology out of control. In this regard, some of this paper is applicable to the debate of GIS in relation to society. The final portions of the paper also describe the typical interplay between two debating sides of a scientific question that may be appropriate for the GIS debate.

Dangermond, J. and Lowell, K.S., 1988, "**Geographic Information Systems and the Revolution in Cartography: The Nature of the Role Played by a Commercial Organization.**", *The American Cartographer*, V15, N3, pp. 301-310.

This is a subjective and informal essay about the kind of role that private, commercial organizations, working alongside academic institutions and governments, played in the development and use of Geographic Information Systems (GIS) in the last 20 years, and hence, their contribution to the overall revolution in cartography. To indicate the kind of role such organizations played this essay sketches several distinct periods in the history of one particular organization, Environmental Systems Research Institute (ESRI), founded in 1969. By sketching what went on at ESRI we hope to illuminate the role which such organizations played in the development of GIS technology and hence in the revolution in cartography.*

Dansby, Bishop, 1991, "**In Search of Privacy.**", *GIS World*, N2, pp. 108-111.

This article outlines different definitions for privacy in the information age. The Law of Informational Privacy is the most appropriate area of law that applies to issues of privacy and GIS databases according to Dansby. This article also introduces the author as a recurring columnist focusing on GIS and the Law in this publication.

Duncan, C.J. and Epps, W.R., 1993, "**GIS and the role of the state 'down under'.**" *Political Geography*, V12, N1, pp. 3-7.

This commentary offers a third perspective on the debate sparked by commentaries of Michael Goodchild and Peter Taylor in this publication and also by another set of commentaries by Stan Openshaw and Taylor within a different publication, *Environment and Planning A*. The view here is from the application of GIS technology in Australia. The authors review the major themes of the previous commentaries and, in turn, comment upon them using examples from Australia to illustrate their points.

Dunlop, C. and Kling, R., eds., 1991, **Computerization and Controversy**, Academic Press, San Diego, CA., 758 pgs.

This is a collection of over fifty essays introducing some of the major social controversies about the computerization of society. Its goal is to help students and professionals recognize some of the social processes that drive and shape computerization, and to identify some of the paradoxes and ironies of computerization These essays also point the reader to a large body of additional literature about the topics.*

Edney, M.H., 1992, "**J.B. Harley (1932 - 1991): Questioning Maps, Questioning Cartography, Questioning Cartographers.**", *Cartography and Geographic Information Systems*, V19, N3, pp. 175-178.

This article is a short biography of J.B. Harley and his works. The reviews the major cartographic contributions made by Harley and examines his work regarding social meaning and impact of map information in his final years.

Edney, M.H., 1993, **The Patronage of Science and the Creation of Imperial Space: The British Mapping of India, 1799-1843.**, *Cartographica*, V30, N1, pp. 61-67.

The social and cultural contexts of the mapping of India by the British East India Company early in the nineteenth century are explored. The focus is on the privileging of the geodetic triangulation (the Great Trigonometrical Survey, or GTS) at the expense of the detailed topographic and cadastral surveys that provided the actual information necessary to run the Company's empire. The patronage of science, especially the GTS, by the Company's officials defined a conceptual image of British rule in India as rational and liberal, an image that included the social hierarchy of rational British above (supposedly) mystical and irrational Indians. Moreover, the GTS created an imperial space, a territorial uniformity that obscured the cultural and political diversity of India and allowed India to be reconstructed as a coherent and singular territorial entity. The mapping process defined the conceptual and graphic images of empire that not only allowed the British to legitimate and justify their rule, they also defined the very nature of the empire.*

Eichelberger, Peirce, 1993, "**Maturing GIS.**", *Geo Info Systems*, V3, N5, pp. 29-38.

Following a plan created in 1986, the Orlando/Orange County, Florida, geographic information system (GIS) has developed into a multiparticipant project directly involving more than 20 agencies and as many as 500 users a day. This article describes the implementation of the GIS, the design of the data base architecture, and the effect of GIS technology on personnel and organizational structures, as well as applications for the system. Difficulties encountered along the way and direct benefits are also discussed.*

Epstein, E.F. and Roitman, H., 1990, "**Liability for information.**" in *Introductory Readings in GIS*, edited by D.J. Peuquet and D.F. Marble, Francis & Taylor, London, UK, pp. 364-371.

One of the first questions posed to lawyers by people in many areas these days is 'What is my liability?' The area of information systems is no exception. It is inevitable that there will be errors, in the data, programs, and outputs of any information system. Managers of these systems want to know what liability they may have and how they can avoid, or, at least, minimize their exposure. This seems particularly true at a time when many public information systems are looking to market and sell information and information products to a wider audience.

The concern is a real one. Although the specific case law is sketchy at best, there is no reason why liability for errors and omissions in information should not exist under the right (or wrong!) circumstances. Some of the legal theories which may apply to liability are examined, particularly contract and tort concepts. Potential pitfalls **under** these theories are identified.

Finally, some scenarios are discussed in which errors or omissions in information -- or the incorrect use of information by public officials -- may give rise to liability in life situations. Perhaps in examining such situations information professionals can begin to develop a concept of the standards and practices which users of information may legitimately expect.*

Freedman, Warren, 1987, "**The Right of Privacy in the Computer Age.**", Quorum Books, Westport, CN., 163 pgs.

Freedman's book covers a wide range of possible abuses and concerns about growing computer reliance and privacy in the information age. The work defines and expands on the types of databases that are collected and also contains a short section on the international aspects of rights to privacy.

Fischer, David H., 1987, **Albion's Seed: Four British Folkways in America**, Oxford University Press, New York, NY., 1989, 946 pgs.

This is the first in a series of works that is designed to comprise a cultural history of the United States. This volume deals with the problem of cultural origins and their effect on the development of society. This book focuses on the four perceived British folkways that gave rise to cultural regionalism in the United States during colonialism and how those roots remain the "most powerful determinant of a voluntary society in the United States."

Gandy, Oscar H., 1989, "**The Surveillance Society: Information Technology and Bureaucratic Social Control.**", *Journal of Communication*, V39, N3, pp. 61-76.

Advanced electronic technologies 'dramatically increase the bureaucratic advantage in the workplace, marketplace, and government by enabling -- and encouraging -- increasingly automatic methods of surveillance of the individual that the U.S. legal system cannot control. In this article an attempt is made to describe how communications and information technologies are being used to increase the reach and influence of bureaucratic surveillance.*

Gandy, Oscar H. and Simmons, Charles, 1986, "**Technology, Privacy and the Democratic Process.**", *Critical Studies in Mass Communication*, V3, N2, pp. 155-168.

This essay reviews accelerating trends in the development and distribution of information. It argues that the promises of the information age and the 'television of abundance' brings not the emancipation of diversity, but the rapid disintegration of an already weakened right to privacy that threatens the very foundations of participatory democracy. After reviewing emerging technologies for the delivery of information and entertainment, this article examines the dramatically improved technology for combining information from a variety of diverse sources to construct models of audience segments which are then used for the delivery of specialized propaganda. Contemporary privacy laws, as well as regulations agreed to as part of cable franchise agreements, are seen to be inadequate because of their limited scope. While the increase in public concern with privacy is portrayed as positive, the tendency of privacy protections to focus on 'individually identifiable information' is seen as ignoring trends in the commercial and political sectors.*

Gillespie, Andrew and Robins, Kevin, 1989, "**Geographical Inequalities: The Spatial Bias of the New Communications Technologies.**", *Journal of Communication*, V39, N3, pp. 7-18.

This paper reviews the impact of digital communications and the new forms of corporate integration that serve to reinforce the postmodern center-periphery effect on a global scale. The ability to bring information and power to previously relatively unaccessible portions of the globe has resulted in a vast restructuring of society and the global marketplace. New and improved information systems have the capability of bringing together large amounts of data which will inherently result in bias and an unequal distribution of power.

Goodchild, M.F., 1992, "**Geographical information science.**", *International Journal of Geographical Information Systems*, V6, N1, pp. 31-45.

Research papers at conferences such as EGIS and the International Symposia on Spatial Data Handling address a set of intellectual and scientific questions which go well beyond the limited technical capabilities of current technology in geographical information systems. This paper reviews the topics which might be included in a science of geographic information. Research on these fundamental issues is a better prospect for long-term survival and acceptance in the academy than the development of technical capabilities. This paper reviews the current state of research in a series of key areas and speculates on why progress has been so uneven. The final section of the paper looks to the future and to new areas of significant research potential.*

Goodchild, Michael F., 1991, "**Geographic information systems.**", *Progress in Human Geography*, V15, N2, pp. 194-200.

This article reviews the state of the trade and outlines the areas ripe for GIS research at the time. Within this context Goodchild reaffirms the position that GIS occupies in Geography, offering examples of how research on new methods in GIS can benefit the discipline as a whole. Treating GIS as a window through which many fields may be studied, Geography is one of the more logical and prevalent amongst these fields. Goodchild discusses many areas of Geographic research that are either wholly supported through GIS or possibly in part assisted with the use of GIS.

Goodchild, Michael F., 1991, "**Just the facts.**", *Political Geography Quarterly*, V10, N4, pp. 335-337.

This commentary is in reply to Peter Taylor's 1990 editorial comment in the same journal. In this paper, Goodchild maintains that GIS offer more to Geography than to function as mere tools. Goodchild gives examples of research opportunities that GIS make possible in Geography or in which GIS assist the traditional analysis methods already present in Geography. He also points out that GIS are able to provide new insight on traditionally old questions in Geography such as spatial perception and cognition.

Goodchild, Michael F., 1985, "**Questions, Tools or Paradigms: Scientific Geography in the 1980s.**", *Ontario Geographer*, V25, pp. 3-14.

Contemporary geography seems condemned to ever increasing proliferation of methodologies, techniques and subfields. It is argued that this is due ultimately to the dominance of the paradigm of explanation. Frustrated with their apparent inability to develop theories of the landscape itself, geographers have been driven increasingly to the study of the processes which affect landscape, and therefore into the domains of other disciplines. There are no obvious reasons in principle to expect a reversal of this process, and no evidence of a reversal in practice.

There is no difficulty in defining the subject matter of geography, but the existence of subject matter is not sufficient for the survival of a discipline. Survival will ultimately be determined by application, which is the unacknowledged paradigm of the majority of current activity, and which leads to a definable and limited set of tools and methodologies.*

Goodchild, Michael F., 1988, "**Stepping Over The Line: Technological Constraints and the New Cartography.**", *The American Cartographer*, V15, N3, pp. 311-319.

Traditional cartography is seen as an optimal response to a highly constrained technology based largely on pen and paper. Although many of the conventions of manual cartography appear to be intelligent choices, they have nevertheless been made in an extremely restricted environment which imposes a limited view of reality. Early digital technology did little to broaden the constraints, and led cartography, map analysis and spatial analysis in different directions. More recent hardware and the results of intensive research have produced a digital cartography which can successfully emulate its analogue parent. However, its true potential lies in less conventional methods of analysis and display and in the degree to which it can escape its traditional constraints.*

Guile, B., ed., 1985, **Information Technologies and Social Transformation**, National Academy of Engineering, Washington, D.C., 173 pgs.

Six papers presented at the second Symposia on Technology and Social Priorities (1984), titled **Information Technologies and Social Transformation**, make up this volume. The symposium brought together scholars of technology and society with technologists, social scientists, and others to discuss the interaction of information technology with social institutions.

Harley, J.13., 1991, "**Can There Be a Cartographic Ethics?**", *Cartographic Perspectives*, NIO, pp. 9-16.

In this paper, Harley addressess the title question, "Can There Be a Cartographic Ethics?", and the ability of cartography to develop an internal code of ethics as opposed to using transcendental morals and norms applied to cartography. The ability to develop sound moral and ethical judgements applicable to particular cartographic circumstances is of utmost importance to develop an internal basis for an ethically informed cartography. Harley concludes by stating that he believes that an internal set of ethics may evolve, but explains that such a development will be as much a part of social policy as it would be a matter of agreement amongst cartographers. The issue of morals and ethics in cartography must be desired by many cartographers before any resolution can possibly take place.

Harley, J.13., 1990, "**Cartography, Ethics, and Social Theory.**", *Cartographica*, V27, N2, pp. 1-23.

'**Cartography, Ethics, and Social Theory**' is a sequel to '**Deconstructing the Map**' and to the 'Responses' to that paper. It is argued that the absence of a social dimension in cartographic theory has led to a neglect of social issues in the content of maps and that together these deficiencies constitute a crisis of representation. The dilemma of cartographic ethics -- and the profession's response to it -- is discussed in the context of the technological transformation in official topographical mapping being induced by the invention of Geographical Information Systems. A case is made for the retention of topographical maps in their present published form on the grounds that they can offer a democratic and humanistic form of geographical knowledge.*

Harley, J.13., 1989, "**Deconstructing the Map.**", *Cartographica*, V26, N2, pp. 1-20.

The paper draws on ideas in postmodern thinking to redefine the nature of maps as representations of power. The traditional rules of cartography -- long rooted in a scientific epistemology of the map as an objective form of knowledge -- will first be reviewed as an object of deconstruction. Second, a deconstructionist argument will explore the textuality of maps, including their metaphorical and rhetorical nature. Third, the paper will examine the dimensions both of external power and of the omnipresence of internal power in the cartographic representation of place.*

Harley, J.13., 1989, "**Historical geography and the cartographic illusion.**", *Journal of Historical Geography*, V15, N1, pp. 80-91.

The cartographic representation of historical sources, epitomized in H.C. Darby's *Domesday Geography* and becoming a classic hallmark of British historical geography, remains a largely unexamined aspect of our discourse. This essay links the emphasis on maps to a perception of their objectivity shared by academic cartography. It proposes that we treat such maps as a text rather than as a mirror of reality so that we can understand how their rhetoric has narrowed the practice of historical geography. Such a deconstruction opens the way to reintegrate cartography more fully as a part of humanistic historical geography.*

Harley, J.B., 1988, "**Silences and Secrecy: the Hidden Agenda of Cartography in Early Modern Europe.**", *Imago Mundi*, V40, pp. 57-76.

A work on the historical documentation of map making and manipulation by cartographers. Harley refers to "silences" as blank areas within maps that are blank due to political, cultural, or social pressures on the map makers. These silences represent direct subjectivity, according to Harley, and need to be examined to correctly interpret the historical context of most maps. Embedded within this critique of the utilization of silences is a historical review of how and why map makers have used their talents and power to selectively represent reality. Harley closes by pointing out that the representation of reality on a map reinforces that particular depiction of reality onto the user's conception of reality.

Harley, J.B.. and Woodward, David, 1989, "**Why Cartography Needs Its History.** *The American Cartographer*, V16, N1, pp. 5-15.

As the new discipline of cartography emerges ("cartography" used here in the broadest sense of the mapping technologies), so does the need for a more explicit recognition and integration of its own history. Grounded in the history and philosophy of science, this would trace the growth of ideas and practice in the field. We review historical studies within cartography, make an intellectual justification for cartographic history and describe its educational uses. We argue that the subject raises cultural literacy among students and leads to an appreciation of the human consequences of mapping. The paper also stresses practical uses in interpreting historical evidence, in formulating public policy and in preserving cartographic records. Above all we stress the humanistic importance of learning to act within the continuous framework of the past, present and future, as map making continues to undergo a profound series of technical revolutions.*

Harvey, David, 1989, **The Condition of Postmodernity**, Basil Blackwell Ltd, Oxford, UK, 378 pgs.

This work looks at the effect of postmodern thinking and design upon the political structure of the late twentieth century. It also deals with changing concept of space in light of new technologies associated with postmodern production.

Harvey, David, 1969, **Explanation in Geography**, Butler and Tanner Ltd, London, UK, 521 pgs.

This book, widely regarded as a monograph in Geography, is about the ways in which geographical knowledge and inquiry can be approached to ensure that the method of explanation is theoretically sound and reasonable; largely written in response to Geography's 11 quantitative revolution."

Harvey, David, 1974, "**What kind of geography for what kind of public policy?**", *Transactions of the Institute of British Geographers*, N63, pp. 18-24.

Before geographers commit themselves to public policy, they need to pose two questions: what kind of geography and what kind of public policy? The evolution of the discipline, in terms both of its aims and its professional organization, must be seen as an adaptation to external conditions, particularly to the development of the corporate state with its emphasis on the 'national interest'. The corporate state forces education to be seen purely as investment in manpower and academic research becomes subservient to the state and is used to preserve and strengthen the status quo.

There is here a political conflict with the academic's sense of moral obligation, but in practice the conflict is resolved by the parochialism and elitism of the humanistic tradition. To help to move away from the corporate state and towards the incorporated state in which men can control the social conditions of their own existence, geographers need to address their efforts towards understanding the tension between the humanistic tradition and the pervasive needs of the corporate state and thereby to learn how to exploit the contradictions within the corporate state itself.*

Helgerson, Richard, 1993, **Nation or Estate: Ideological Conflict in the Early Modern Mapping of England.**, *Cartographica*, V30, N1, pp. 68-74.

The reign of Queen Elizabeth produced the first two county-by-county cartographic surveys of England and Wales: Christopher Saxton's atlas (1579) and John Norden's unfinished *Speculum Britanniae* (1592-1604). This paper explores the relationship between the work Saxton and especially Norden did on these national projects and their work as estate surveyors, for by the 1590s significant ideological conflict had developed between these two activities. Norden's maps thus represent opposing sets of interests and values, whose effects are registered as well in early modern paintings and poems.*

Hepworth, Mark E., 1987, "**Information technology as spatial systems.**", *Progress in Human Geography*, VI 1, N2, pp. 157-180.

The spatial and economic aspects of computer networks as they relate to geographic research and function as information technology is the theme of this paper. Hepworth attempts to reinforce the need to study computer networks, an information technology, as spatially distributed systems and the implications of such study. The examples reviewed range from the London Stock Exchange to prototype telecommunication systems to international corporate information services. The effect that space has upon the design and implementation of these systems has been understated and needs to be revisited. These systems constitute a new geographic phenomena which should be studied with geographic analysis to understand the innovations. The result is that true understanding of the impact of new information technologies across economic, political, and geographic scales can only be done by adopting the computer network model for technological change.

Heywood, I., 1990, "**Geographic information systems in the social sciences.**", *Environment and Planning A*, V22, pp. 849-854.

In this commentary, Heywood addresses issues surrounding the status of GIS in the spatial sciences and Geography. After reviewing the definitions of GIS and how that definition changes depending on who is defining, the article turns to the critique the ability of GIS to achieve 'spatial glasnost' or to integrate the fragmented portions of Geography under a common banner. Heywood concludes with personal reflections on the relationship between GIS and Geography, maintaining that GIS is a tool that has been long sought in Geography for education and simulated research.

Hinloopen, E., Nijkamp, P., and Rietveld, P., 1984, "**International Comparison of Regional Planning and Information Systems.** ", in *Information Systems for Integrated Regional Planning*, P. Nijkamp and P. Rietveld, eds, Elsevier Science Publishing Co. Inc, New York, NY., 458 pgs.

This piece is a review of the preceding chapters in this book containing reports on regional planning and information systems in six different countries. In this chapter the review leads to comparison of those systems in the respective countries and the problems encountered while trying to compare them.

Jackson, Peter, 1989, **Maps of Meaning**, Unwin Hyman, Ltd, London, UK, 213 pgs.

This book introduces notions of space and place, exploring culture's geographies as well as the geography of culture. It outlines the field of cultural politics, employing concepts of ideology, hegemony and resistance to show how dominant ideologies are contested through unequal relations of power.*

Jones, Kelvyn, 1991, "**Specifying and estimating multi-level models for geographical research.**", *Transactions of the Institute of British Geographers*, N16, pp. 148-160.

It is argued that multi-level models based on shrinkage estimators represent a considerable improvement over single-level models estimated by ordinary-least squares. In substantive terms, the MIL models allow relationships to vary in time and space according to context. Shrinkage estimators make very efficient use of the information contained in the hierarchical data sets

that are estimated by MIL models. A number of MIL models for house-price variation are specified in terms of fixed and random, allowed-to-vary, effects. Empirical illustrations of some of these MIL models are given for house-price variation in Southampton.*

Jones, Kelvyn, 1990, "**What's hiding behind statistical maps?**", Society of University Cartographers's Bulletin, V24, N1, pp. 23-30.

Considerable attention has been expended on how poor design can lead to inappropriate representation on statistical maps. It is the contention of this paper that similar attention must be given to the statistical requirements of map presentation. Casting the argument within the framework of the generalized linear multi-level model, and using maps of disease, health care and educational attainment, it is shown that maps can hide statistical problems as well as reveal them.*

Jones, Kelvyn and Moon, G., 1990, "**A multi-level model approach to immunisation uptake.**", Area, V22, N3, pp. 264-271.

Geographical studies have traditionally employed generalized linear models to investigate the determinants of immunisation uptake. The effectiveness of this approach is questioned and an alternative approach using multi-level modelling is outlined.*

Jones, Kelvyn and Moon, G., 1991, "**Medical geography: multilevel perspectives.**", Progress in Human Geography, V15, N4, pp. 437-443.

This paper is the first of three annual reviews of medical geography. The aim is to indicate the growth and development of the subject by focusing not on papers published since some arbitrary annual cut-off, but by selecting a small number of topics of current interest. Inevitably any such review has to confront the 'dual nature' of medical geography with its concern for both disease and health care. Our intention, however, is to consider broad issues which span this divide. In this spirit, the focus for this review is the two great equations of disease/environment and provision/need. These are explored in the context of the developing quantitative framework of multilevel modelling.*

King, J.L., and Kraemer, K.L., 1993, "**Models, Facts, and the Policy Process: The Political Ecology of Estimated Truth.**", in Environmental Modeling with GIS, edited by M.F. Goodchild, Bradley O. Parks, and Louis T. Steyaert, Oxford University, New York, NY., pp. 353-360.

This chapter deals with the why modeling has achieved the success it has enjoyed in the United States and the implications of that success for the advancement of GIS. The authors examine why information and information systems occupy such a place of high esteem in the United States government as opposed to the rest of the technologically advanced world. In large part, the adoption of these systems is an artifact of the recent political debating techniques and the common usage of modeling in congressional hearings. The authors review how the modeling was used in debate realizing that accurate models, while desirable, were more often than not impossible. Thus the models were used to avoid potentially bad policy situations rather than to find good solutions. The authors then turn to why this tradition of modeling, given that it is largely a political sparring tool, should be continued. The process of modeling results in at least three very beneficial outcomes: 1) it forces policy makers to define their entities in very exacting and specific terms; 2) it can reflect the inadequacies of other components of analysis by showing sensitivity to manipulation; 3) it may provide good "advice" on poor policy decisions. GIS are particularly well situated to be included in political debate because of the geographic component of almost all objects of such debate. The GIS industry might well learn from the development of these preceding models and overcome the drawbacks experienced by other, less scientific information technology.

Laudon, K.C., 1977, "**Communications Technology and Democratic Participation.**", Praeger Publishers, New York, NY., 116 pgs.

This book addresses two questions: How ought citizen technology be designed and organized to strengthen democracy?; How is it likely to be used given the nature of U.S. society? The answers are sought in four different ways in the book arriving at organizing technology to fit the nature of democracy and not vice versa.*

Laudon, K.C., 1986, "**Dossier Society: Value Choices in the Design of National Information Systems.**", Columbia University Press, New York, NY, 421 pgs.

The central question raised in this research is: how can national information systems operating in the 1980s with the most advanced information technology be held politically and socially accountable? In doing so, two questions arise: How are the designers and operators of national information systems striking a balance between individual freedom and domestic security as old systems are rebuilt and entirely new systems are planned?; How adequate are the concepts and mechanisms information policy--the law of privacy--developed in the 1970s to the task of controlling national systems in the 1980s?*

Lawson, H. and Appignanesi, L., eds., 1989, **Dismantling Truth: Reality in the Post-modern World**, St. Martin's Press, New York, NY., 180 pgs.

This work is devoted to the post-modern interpretation of truth and knowledge and is the fruition of work that began at the 'Dismantling Truth: Objectivity and Science' held at the Institute of Contemporary Arts, 1986.

Livingstone, David, 1990, "**Geography, tradition and the Scientific Revolution: an interpretative essay.**", Transactions of the Institute of British Geographers, V15, pp. 359-373.

This essay examines the relationship geography sustained with traditional sources of knowledge during the period of the Scientific Revolution of the sixteenth and seventeenth centuries. Even while confirming traditional beliefs derived from magic and astrology, geography challenged traditional dogma by its anti-authoritarian emphasis on experience. In due course geography came to adopt and to advance the new epistemological tradition of the nascent scientific culture -- classical foundationalism. This examination of geography's 'pre-modern' and 'modern' encounter with the methods and context of scientific knowledge has important historiographical and philosophical implications for the contemporary practice of geography in its 'post-modern' phase.*

Matthews, W., ed., 1980, **Monster or Messiah: The Computer's Impact on Society**, University of Mississippi Press, Jackson, MS., 222 pgs.

This book places the development of computers in a historical context and expands on the idea of values in computer usage. Each chapter's author comments on their perception of the advantages and disadvantages for computer users and society.

Meyrowitz, Joshua, 1985, **No Sense of Place: The Impact of Electronic Media on Social Behavior**, Oxford University Press, New York, NY., 416 pgs.

This work examines the reorganization of society due to the influence of electronic media. Leading to the conclusion that with this new electronic media structure in society, people develop new ideas of social behavior and interaction.

McHaffie, P.H., 1993, **The Public Cartographic Labor Process in the United States: Rationalization Then and Now.**, Cartographica, V30, N1, pp. 55-60.

The cartographic labor process has remained relatively unexamined by cartographic historians. The entry of 'scientific management' into the realm of public cartographic production under the auspices of the U.S. Geological Survey presents a striking illustration of the rationalization of production procedures as the result of technological change. In particular, the adoption of contours as a method of representing terrain and the introduction of aerial photography and photogrammetry into the labor process shed light on the technological restructuring of the 1970's and 1980's.*

Miller, Roger P., 1992, "**Beyond Method, Beyond Ethics: Integrating Social Theory into GIS and GIS into Social Theory.**", Proceedings of GIS/LIS, V2, pp. 585-593.

Those who work in technical fields such as GIS often assume that disciplinary debates centering on social theoretical questions are irrelevant, and focus instead on issues of data integrity, system structure and performance, and improving presentation of data to end users. Questions of how the results of GIS may be used and misused, ways in which choices of variables for inclusion or exclusion may affect the kinds of questions that can be asked, and how reliance on technologically sophisticated analysis systems privileges certain individuals while excluding others from decision-making processes are ignored. An awareness of the major debates in the social sciences, centering on theories of deconstruction, post-modernism, and the agency/structure debate have serious implications for GIS practitioners. The influence need not be one-way, however. Informed use of GIS can make significant contributions to the development of social theory, as well.*

Mitchell, Bruce and Draper, Dianne, 1982, **Relevance and ethics in Geography**, Longman Group Limited, London, UK, 222 pgs.

Designed to raise consciousness of geographers pertaining to ethical issues, this work devotes a fair portion of material to ethics in the pursuit of geographic research. It also provides an introduction to clarify the terms of ethical and philosophical debate.

Monmonier, Mark, 1982, "**Cartography, Geographic Information, and Public Policy.**", Journal of Geography in Higher Education, V6, N2, pp. 99-107.

Cartography is as much a policy science as it is a graphic art and science. The inevitable demise of the paper map as the principle medium of geographic communication and the increasing concentration of mapping activities and geographic data base development in large public-sector agencies argue in favor of replacing the current emphasis on map production with one involving policy. A focus on mapping policy will reverse the unfortunate split between cartography and geography.*

Monmonier, Mark, 1991, "**How to Lie with Maps.**", University of Chicago Press, Chicago, IL., 176 pgs.

Monmonier begins his book with a review of some of the elementary components of maps, their form and function: map scale, map projection, map symbols. Monmonier's point through this examination is that the cartographer must, by the nature of the trade, explicitly represent reality in a fashion that is both informative and communicative. Thus, by virtue of that fiat, the cartographer is forced to not only abbreviate the reality depicted, but also transform that reality by generalization, simplification, and aggregation. Each chapter contains representative historical examples of a particular type of abuse. The issue of what a map actually represents and how a map may be used to deceive the user is crucial in the argument that maps can be used (and regularly are) to lie or mislead.

Monmonier, Mark, 1985, "**Technological Transitions in Cartography.**", University of Wisconsin Press, Madison, WI., 282 pgs.

In addition to reviewing changes in Cartography, this book contains concise sections relating to possible public policy problems in the advent of digital map making techniques and security in the digital data age.

Muehrcke, Phillip, 1981, "**Maps in Geography.**", Cartographica, V 18, pp. 1-41.

This essay describes how the form and function of maps has changed within Geography over the course of recent history. As the quantitative revolution progressed, maps slowly yielded ground to new geographic techniques that served to redefine not only map design, but map interpretation as well. After the initial review of map metamorphosis, Muehrcke engages in an examination of the mentality, attitudes, and creativity in Geography that has led to the declining role of maps. The ability of contemporary geography students to be creative and productive is discussed. The formational processes, from initial conceptual design to final hard copy output, are reviewed and elaborated upon in context of the previous discourse. Ultimately, Muehrcke's goal is to reassert the value of maps into Geography by pointing out the benefits of having studied the traditional cartographic methods in relation to the new era of geographic techniques.

Muehrcke, Phillip, 1974, "**Map Reading and Abuse.**", The Journal of Geography, V73, N5, pp. 11-23.

The various advantages and limitations of geographical mapping known to map users can be functionally related to the few basic principles which constitute the very nature of the cartographic technique. Numerous map interpretation errors may be traced in large part to a common failure on the part of map users to grasp and effectively deal with these same mapping principles. Since it is possible to identify situations in environmental decision making and planning where the misuse of maps, or the outright map reading abuses, could lead to adverse human and environmental impact, the problem is indeed serious. Strategies for minimizing the misuse or abuse of geographical maps appear to rely most heavily on a thorough understanding of basic mapping principles.*

Olsson, Gunnar, 1991, "**Lines of Power / Limits of Language.**", University of Minnesota Press, Minneapolis, MN., 229 pgs.

This work by Olsson utilizes a unique approach to discuss the issue of how symbology and graphic constructions communicate with people and the power inherent in that communication. Olsson makes the point that socialization is highly instrumental in this process.

Okun, Arthur M., 1975, "**Equality and Efficiency: The Big Tradeoff.**", The Brookings Institution, Washington, D.C., 123 pgs.

A revised and expanded version of the Godkin Lectures presented at the John F. Kennedy School at Harvard University in April, 1974. Okun explores the conflicts that arise when society's desire to reduce inequality would impair the economic efficiency, confronting policymakers with "the big tradeoff."

Openshaw, S., 1991, "**A view on the GIS crisis in geography, or, using GIS to put Humpty-Dumpty back together again.**", Environment and Planning A, V2, pp. 621-628.

This commentary is the first of a series between Openshaw and Peter Taylor in this publication. Herein, Openshaw argues the case that GIS provide a common meeting place and connecting technology for the pieces of fragmented Geography. Openshaw displays an interesting amount of zeal for GIS as he reviews and gives examples of the contribution to Geography that he sees

GIS having provided. As much a defense of GIS, this article also serves to redefine Geography in Openshaw's terms. Openshaw states that the interface of the juxtaposed parts of Geography will not occur through philosophical debate. Rather, Openshaw calls for the field to look for new methods to resolve the issue. Openshaw's comments, in general, represent a portion of the technical geographer's defense to the interdisciplinary debate of how GIS fit within Geography.

Openshaw, S., 1992, "**Further thoughts on geography and GIS: a reply.**", Environment and Planning A, V24, pp. 463-466.

The third article in the Openshaw-Taylor exchange in this publication. In this reply Openshaw defends the position he assumed in his earlier **A view on the GIS crisis in geography, or, using GIS to put Humpty-Dumpty back together again.** The bulk of this paper is written in response and refuting the claims of Taylor's "**Further thoughts on geography and GIS: A preemptive strike?**"

Openshaw, S., 1993, "**GIS 'crime' and GIS 'criminality'.**", Environment and Planning A, V25, pp. 451-458.

This commentary is a follow-up to the previous exchange between the author and Peter Taylor. Openshaw discusses issues raised against the safety of using GIS and outlines four types of 'crime' of which GIS or GIS users may be accused: application failure; misuse resulting in harm to others; failure to use GIS when it is needed; inactivity in academic GIS settings for doing GIS research. This final point is emphasized using the NCGIA as an example of a collector of information that may prematurely close work on initiatives, thus hindering other researchers from obtaining funds to pursue research in work areas covered by those initiatives which may not be complete. Openshaw's concludes by reflecting on how GIS crime might be identified, monitored, and regulated. Should it be from within the discipline or without?

Orlove, Benjamin, 1993, **The Ethnography of Maps: The Cultural Social Contexts of Cartographic Representation in Peru.**, Cartographica, V30, N1, pp.29-46.

An examination of five contemporary maps of Lake Titicaca, Peru, three drawn by government officials and two drawn by peasants, reveals profound differences in the depiction of the natural landscape and social groups. To understand these differences, and to explain why neither government officials nor peasants are conscious of them, two techniques of map study are presented: the analysis of form and the analysis of practice, the latter consisting of an 'ethnography of viewing' and an examination of culturally specific map categories. The general implications of such incommensurabilities of mapmaking and map-viewing traditions are discussed.*

Ormeling Ferjan, 1992, "**Brian Harley's Influence on Modern Cartography.**", edited by E. Dahl, Cartographica, V29, N2, pp. 62-65.

This article briefly reviews the recent contributions of J.B. Harley to cartography with particular focus on the social meaning of his work. Ormeling reviews the recent works Harley published before his death and comments on Harley's personal interpretation of his work. Ormeling also reiterates Harley's notion of the 'power game' in which both the employer and cartographer must participate as it applies to cartographic output.

Perrolle, Judith A., 1987, **Computers and Social Change**, Wadsworth Publishing, Belmont, CA., 297 pgs.

This text provides a broad historical background for the study of information technology, integrating current research in sociology, psychology, and ergonomics with trends in computer applications. It focuses particularly on the impact that changes in the production and distribution of information have on social interaction in homes, schools, organizations, and governments.*

Pickles, John, 1991, "**Geography, G.I.S, and the Surveillant Society.**" Papers and Proceedings of the Applied Geography Conference, V 14, 80-9 1.

This paper challenges the GIS community to defend GIS as a democratic technology, a legitimate research field, and as an integral part of Geography. The very question of the goals of GIS usage is raised and commented upon. Pickles argues that GIS serve to alienate people from power and can be used as a invasive, overbearing technology to exploit those without its benefit. In doing so Pickles examines the very epistemology of GIS and the roots of their growth. Pickles points out some of the ethically questionable uses of GIS and charges that Geography has played a willing part in the development of a technology that may be used to subjugate the common person.

Poiker, Tom, ed., 1993, **Geographic Information and Society: A Workshop.**, papers presented at the National Center for Geographic Information and Analysis's workshop "GIS and Society", Friday Harbor, Washington, Nov. 11-14.

This is a collection of twenty-three papers that were presented to at the NCGIA's workshop "GIS and Society". Most of the papers are position papers by the participants on the subject of the workshop and vary widely in emphasis. Many of the papers are draft versions which will be completed and published outside of the proceedings of the workshop. This collection had a distribution number limited to the participants of the meeting.

Poster, Mark, 1990, **The Mode of Information**, Polity Press, Cambridge, UK, 179 pgs.

This book deals with a broad array of issues related to information and its social context. Poster reviews many technologies that are becoming more widely used in society and their impact. Michel Foucault's ideas are reflected upon heavily by the text.

Rhind, David, 1992, "**Data access, charging and copyright and their implications for geographical information systems.** ", International Journal of Geographical Info Systems, V6, N1, pp. 13-30.

Few geographical information systems generate all their own data. As geographical or spatial data are the fuel of such systems, the availability, access, and price of data sets held by others becomes a matter of considerable importance. In this context, geographical information systems form not only a special case of information systems in general, but geographical data are increasingly part of the national and international information economy. This paper examines the current situation with respect to topographic and remotely sensed data in terms of availability, pricing and restrictions placed on the use of the data by their owners; although it is based primarily on European experience, the very different situation in the U.S.A. and the experience in Australia and New Zealand are taken into account. An attempt is made to examine how the value of data may be quantified and how it is likely to decline with time. The price elasticity of geographical information is examined using an example from New Zealand and the legal liabilities which may be incurred through the sale of geographical data are outlined. It is concluded that no satisfactory, non-arbitrary solution has yet been found to the pricing of geographical data or information and that the highly varied international practices will have important effects on the development of geographical information systems.*

Rothman, Stanley and Mosmann, Charles, 1972, **Computers and Society: The Technology and It's Social Implications**, Science Research Associates, Inc, Chicago, IL., 423 pgs.

The second edition of this text updates its earlier print by focusing on the implications for security and privacy raised by the coming advent of computers. The idea for publishing this work is related to a serious concern for a situation that may turn in either of two unacceptable directions: A powerful threat to freedom that may go uncontrolled; a major tool of progress may needlessly be suppressed.* Thus this book is aimed at enlightening the uniformed citizenry and press to the technical, political, and moral issues surrounding computers.

Roszak, T., 1986, **The Cult of Information**, Pantheon Books, New York, NY., 238 pgs.

In this work Roszak criticizes the trend in technology oriented towards information rather than structured toward the development of ideas. His work represents a classic argument against 'technophilia' and applicable to the concern for GIS propagation without academic responsibility.

Rubinyi, Robert M., 1989, "**Computers and Community: The Organizational Impact.**", Journal of Communication, V39, N3, pp. 110-123.

A study of 72 small nonprofit organizations shows that, even among these relatively resource-poor groups, those who were better off were able to take advantage of the computer for internal office tasks and group networking.* This paper is a description of the study and a discourse on possible reasons for the improvement in efficiency using computers in organizations.

Rundstrom, Robert A., 1990, **A Cultural Interpretation of Inuit Map Accuracy.**, Geographical Review, V80, N2, pp. 156-168.

Cartographers can broaden their field by developing methods to understand cultural processes in historical and contemporary maps. Inuit maps have been noted for their high level of accuracy. A cultural interpretation of this characteristic accounts for implied linkages between mapping and other forms of Inuit environmental behavior and thought. Inuit maps as acts rather than as artifacts are one form of environmental mimicry. The act of making accurate maps reinforced the value of mimicry in traditional Inuit Society.*

Rundstrom, Robert A., 1993, **The Role of Ethics, Mapping, and the Meaning of Place in Relations Between Indians and Whites in the United States.**, Cartographica, V30, N1, pp.21-28.

Some current government and private-sector mapping practices continue the long history of assimilationist policy toward American Indians living in the United States. I use examples of recently mapped Zuni, Hopi, and Cheyenne lands, two of which involve GIS, to demonstrate the roles cultural myths and map technology play in ongoing skirmishes over the meaning of land, language, and religion. A cross-cultural glimpse into Indian ethno-geography is offered as a means to understanding the need for re-thinking the mapping process. Finally, I urge today's cartographic elites to broaden the now-limited ethical debate, and suggest practical methods by which mapping/GIS projects in Indian Country might proceed according to a different standard.*

Sherman, Barrie, 1985, **The New Revolution: The Impact of Computers on Society**. John Wiley & Sons, New York, NY., 404 pgs.

This book looks at the impact of computers on society, especially industrialized societies, and asks some vital, but hitherto unanswered questions--who, for example, controls the computers and the systems, who benefits, who should adapt--society or the system, and finally, the fundamental question, are they a force for good or evil?*

Smith, Neil, 1992, "**History and philosophy of geography: real wars, theory wars.**" *Progress in Human Geography*, V 16, N2, pp. 257-271.

Here Neil Smith reflects upon a number of growing internal debates in Geography which are somewhat independent of each other. He begins his paper with a scathing commentary on the position of GIS in Geography. Smith argues that GIS are inherently a surveillant technology which is widely used for military purposes which are not considered by the academia who develop the systems. He reinforces his argument with a discourse of the dynamics of technology and warfare citing examples from the recent Persian Gulf conflict. His paper then attempts to review Geography and how GIS grew to the prominent role it now occupies in many Universities across the country today. Before closing, Smith also discusses the role of women in Geography across the United States and how there is quite a disproportionate amount of men versus women in the discipline. Equal portions of the paper are given to these topics and Smith treats each in turn.

Soja, Edward W, 1989, **Postmodern Geographies**, Bookcraft Ltd, London, UK.

A collection of author's essays on postmodern geographies. Each essay, while having a unique perspective, is unified by a central theme: the reassertion of a critical spatial perspective in contemporary social theory and analysis. Each of the nine essays contained may be read as an attempt to compose a new critical human geography, attuned to the contemporary political and theoretical challenges. Contained is an examination of the ontological spatiality which places the human subject in a formative geography and justifies the need for a radical reconceptualization of epistemology, theory construction, and empirical analysis.*

Taylor, D.R.F., 1991, "**A Conceptual Basis for Cartography / New Directions for the Information Era.**", *Cartographica*, V28, N4, pp. 1-8.

Taylor discusses the effect that GIS and automated mapping techniques have had upon Cartography since their inception. He examines the relationship of maps to the real world and the possible misconception of cartographers as they might lose sight of **the selectivity of their work A comparison between the art of cartography and the methods of GIS and AM follows this review** and the social benefits that maps have to offer, such as navigation tools and aggregation of many types of information. Then Taylor turns to how people learn and interpret both analog maps and their digital counterparts by discussing human cognition, communication, and formalism. These three aspects, according to Taylor, result in the ability of people to visualize a map. Both analog and digital maps have advantages in some of these areas over the others. Taylor brings all of his topics together in the conclusion where he predicts a bright future for cartography as it increasingly occupies the border between art, science, and ingenuity.

Taylor, Peter J., 1990, "**GKS.**", *Political Geography Quarterly*, V9, N3, pp. 211-212.

This paper asserts that GIS in Geography places too much emphasis on the acquisition of facts (information) rather than knowledge. Taylor argues that Geography should concentrate more on theory and relationships between facts rather than simply inventorying facts. Indeed, Taylor feels that if Geography departments focus too much on GIS that they begin instead practicing "anti-geography".*

Taylor, P.J. and Overton, M., 1991, "**Further thoughts on geography and GIS: A preemptive strike?**", Environment and Planning A, V23, pp. 1087-1094.

In reply to Stan Openshaw's "**A view on the GIS crisis in geography, or, using GIS to put Humpty-Dumpty back together again**", this commentary is a direct rebuttal to Openshaw's proposition that GIS is able to bring together all aspects of Geography. Taylor and Overton refute the philosophical underpinnings of Openshaw and dissect representative pieces from his article to illustrate their points. Geography at present is in an exciting, crucial stage of development. The zeal, as Openshaw exhibits, with which it reacts to the possibilities might serve to disturb the true course of this evolution by raising unnecessary internal conflicts. The authors suggest that, rather than asserting the universal connective ability of any one part of Geography, that, taken in perspective, the fragmented portions of the discipline might find a common meeting ground for informed and productive discussion.

Tomlinson, R.F., 1988, "**The Impact of the Transition From Analogue to Digital Cartographic Representation.**", The American Cartographer, V15, N3, pp. 249-261.

As an introduction editorial for this particular issue of The American Cartographer, Tomlinson reviews the development of digital technology from its roots and gives his opinion on how cartography will benefit from this transition. This paper is a concise personal history of Tomlinson's relationship to digital technology dating from the 1950's and the advent of widespread computer usage since. He details how the technology has impacted the discipline for the better and worse.

Tufte, Edward R., 1983, **The Visual Display of Quantitative Information**, Graphics Pres, Cheshire, CT, 197 pgs.

Contains a chapter on aesthetics and techniques in Data Graphical Design that is meaningful when applied to the representation of digital data. Also covers the concepts of graphical excellence, integrity, and sources that present insight on the manipulation of digital data.

Vasiliev, L, et al., 1990, "**What is a map?**", The Cartographic Journal, V27, pp. 119-123.

This paper attempts to make explicit the characteristics data must have to be considered a map. With the many facets of cartography employing a vast range of data sources, it raises the question, what can truly be considered a map? The authors review some popular map definitions and terms that are often applied to maps trying to distil the common elements that the majority of people agree upon as characteristic of all maps. This leads to five distinct categories: 1) vertical perspective of the image; 2) surface subject matter; 3) correspondence with geographic reality; 4) 'flatness' of the depicted object(s); and 5) images represented at a 'geographic' scale rather than a larger scale (i.e. a house plan). The importance of this study is to clarify what cartographers mean when they talk about maps and what elements they can expect the public to recognize as map elements.

Visvalingam, M., 1989, "**Cartography, GIS, and Maps in Perspective.**", The Cartographic Journal, V26, pp. 26-32.

The intent of this paper is to call attention to a need to redefine cartography and maps, thereby provoking discussion in the field and encouraging others to contribute to the literature available on this topic. The author maintains that the 1973 ICA definition of cartography needs revision because it is vague and does not accommodate the recent technological advances made in the field. Visvalingam address the effect GIS has made upon cartography and examines the relationship between the two. The question of how cartography and GIS interrelate in a relevant topic for further pursuit and clarification, but no conclusive advice is offered.

Waters, Nigel, 1989, "**Do you sincerely want to be a GIS Analyst?**", The Operational Geographer, V7, N4, pp. 30-35.

Questions regarding the usage of GIS are addressed in this article by Nigel Waters. Specifically they are: 1) Why are GIS used? and 2) What use is made of the results of the analysis? Waters points out that GIS is quite positivist and therefore there is hardly any exchange between practitioners of GIS and humanists or the structuralist paradigms in Geography. Contemporary problems with GIS analysis, including knowledge categorization, lack of analysis methods, weighting of variables, and others, are discussed and elaborated upon. In his conclusion, Waters calls for reconciliation of research methods utilized by the majority of human geographers so that their agenda might more closely resembles traditional geographic inquiry would have more to contribute to GIS research than their present tactics which are more closely aligned with psychology and sociology in his opinion.

Wood, Dennis, 1993, **Maps and Mapmaking**, Cartographica, V30, N1, pp.1-9.

In much discourse about maps and mapmaking, confusion reigns between the undoubted and universal human ability to navigate and to store and represent routes and/or other information in conventional form, and mapmaking, that is, the regular social and taken-for-granted (if not universal) production of conventional artifacts -'maps' embodying such knowledge. Of the enormous number of human societies, only a few have been mapmaking and of these most have matured during the past five hundred years. That it is not 'traditional' but modern 'advanced' societies that are mapmaking reflects not differential abilities at any fundamental level, but different aims and goals. It is the territorial ambitions of modern states and their protostate predecessors, and the implicit resource exploitation and long-distance trade that preeminently call mapmaking into being. The development of science in general and cartography in particular occurs in these rapidly developing societies to further their goals and ambitions.*

Wood, Dennis, 1992, **The Power of Maps**, Guilford Press, New York, NY., 248 pgs.

This book is an examination of the ability of maps to show history through selective thematic windows, opened at certain times on specific places. Wood's work focuses on the content of maps and the manner in which map makers depict their values and interests to the user. The impact of maps not only affects the contemporary users, but it has profound effects upon the psyche and values of the generations that follow publication.