Feminism, Maps and GIS

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Glossary

Cartographic Visualization or Geovisualization A set of techniques for representing spatial data for visual examination in a computerized environment.

Epistemology Part of social theory that establishes the relationship between the knower and the known or the subject and the object.

Feminist Geography Part of human geography inspired by feminist scholarship and focused on representing adequately women's worlds and transforming research practice in accordance with principles of feminist scholarship.

GIS (Geographic Information System) Computer-based technology for storage, management, display, and analysis of spatial information.

Visuality Use of visual information and images in production of knowledge and other social practices.

Introduction

Until recently, there was not much connection between feminism and cartography or GIS (geographic information science and/or system) but today they are increasingly intertwined. The oldest body of knowledge among the three, cartography, has a long and respected history as both the 'art and science' of mapmaking. It represents a unique way to communicate and understand spatial phenomena, relationships, and patterns. The meaning and purpose of mapping, however, have significantly changed in recent decades due to developments both within and outside the discipline of cartography. For example, the mapping process has become computerized, virtually all spatial information is now digital, and GIS has emerged as essential when working with spatial data. At the same time, women have increased their visibility and presence in science and technology and geospatial technologies play an increasingly important role in a variety of activist movements, including that of women. Finally, feminist scholarship has led to a profound rethinking of the practices of knowledge production in social science and geography, and it has come to inform and influence the fields of cartography and GIS.

The impact of feminist scholarship on mapping parallels its impact on knowledge production more generally. For centuries, women were missing from the practices of science as both its subjects and objects but in recent decades gendered economic, social, and cultural analyses have become more common. Furthermore, new approaches to research have developed rooted in feminist scholarship. In geography, too, women became more visible as objects of mapping and now as mapping subjects. Simultaneously, the rapidly growing field of GIS has had (as in other high tech fields) a contradictory impact on women. While presenting barriers to the entry of women into this field, GIS also provides feminist and other critical scholars with new opportunities for non-positivist mappings.

Feminists analysis of and impact on science occurred just as GIS (and computer cartography) displaced traditional cartography. Simultaneously, the humanities and social sciences experienced a 'spatial turn' expressed in the increased use of spatial and cartographic metaphors. These movements have allowed feminist scholars to address the intersections of GIS technology, mapping, and cartography in a number of fruitful ways. They have examined cartography's legacy in the production of authority through mapping people and territories from a position of power (e.g., colonial, state, surveillance, or military). They have addressed the role that GIS plays in the continuation of these practices. They have reflected upon the professional role of women in cartography and GIS. And they have begun creating feminist cartographies – both representational of the landscapes and metaphorical.

Below, the undervalued contribution of women to both cartography and GIS will be examined and major feminist critiques of these fields shall be presented. New developments that demonstrate an ongoing engagement of feminism with GIS and practices of mapping will then be highlighted. Feminist scholars working to reclaim the power of vision and mapping by creating a range of feminist cartographies that utilize mapping in non-hierarchical and non-objectifying ways will be shown. In the last section, the broader impacts of geospatial technologies on women's daily lives, an issue of concern for feminist scholars shall be discussed.

Women in Cartography and GIS

Cartography and, more recently, GIS remain male-dominated fields. Women's entry into these professions has been limited and, often, their contribution ignored. Yet, there is a history of women in cartography that, although unacknowledged, is significant and important to recount. According to scholars Alison Hudson (head of the map division of the New York Public Library) and

Mary Ritzlin, women have long worked in the map-making trades in North America. Initially they were involved mainly with printing (e.g., map engraving) or the map publishing businesses of their husbands, which they often ran after their husband's death. Because most women lacked training in the mathematics necessary to construct maps and could travel only in their husband's company, becoming explorers or surveyors themselves was difficult. However, women, as educators, are often the prominent disseminators of geographic knowledge. For example, in the nineteenth century, they authored many geography books, atlases, and histories for students and general readership. An ongoing history project that aims at recovering women's contribution to cartography in North America has identified as many as 300 such women.

Women's overall contribution is also undervalued because so few women have been in highly skilled or leadership positions in either the cartographic professions or GIS. There are complex reasons for this situation that range from having to face many challenges upon entering the field to the observed gender differences in spatial cognition and mapreading skills (now attributed to socialization rather than inherent ability). In most countries, women remain a minority while being trained in cartography at universities and other schools. They commonly face masculinist model of teaching that further intimidates female students. Later they see themselves as 'intruders' into the men's world of geospatial technologies. The conflict between personal aspirations (e.g., family) and the masculinist ethics of career-oriented professional jobs also plays a role.

Despite recent changes, GIS remains male-dominated in the US and Canada; it would seem that women face the same barriers to entry that exist in the information technology (IT) fields more generally. The impact of feminism on GIS, too, was limited in the past as feminist scholars initially felt the technology was not suited for feminist epistemologies. Today, the situation is changing. Both women in the workforce and feminist ideas more directly interact with geospatial technologies. Most obviously, women are entering the field as professionals in greater (although still small) numbers. Their very presence slowly transforms the profession because women's more complicated career trajectories do not follow men's linear career paths. Beyond this, however, is the profound change in the very practices of GIS, mapping, and related knowledge production. First, there is a growing group of academic geographers who use GIS and are inspired by feminism (both women and men). Second, feminist scholars outside geography increasingly use spatial and cartographic metaphors in their work; they seek to create new nonhierarchical and nonexploitive spaces, spaces transformed by feminist idea(l)s. Together with the growth of GIS-based feminist research, they constitute 'feminist cartographies'. Third, through access to information and communication technologies and the Internet, women who are not GIS specialists also gain access to geospatial technologies that change their daily lives. The sections below provide examples of these developments.

Feminist Critiques of Cartography and GIS

Inspired by feminist critiques of visuality and power to look in Western science by Donna Haraway and other theorists, feminist geographers began by examining the role of the masculine gaze in shaping modern geography and cartography. They also drew upon post-structuralist critiques of cartography as a medium of power/knowledge pioneered by Brian Harley. Geographer Gillian Rose argued that the privileging of sight and looking as a primary mode of observation – whether assisted by modern technology such as satellites or GIS or not – elevated visual examination of the landscape such that it dominated geographic fieldwork. Such visual observation is premised upon maintaining a distance between the observer and the observed (the subject and the object), the practice that produced the supposedly detached, disembodied, and objective scientist whose only passion is pursuit of knowledge. At the same time, nature and the unknown in the Western tradition have become associated with the feminine – both threatening and beautiful, to be tamed and adored, to be looked at and understood. Thus, a male geographer simultaneously experienced the exploration of new lands or cities as a rigorous scientist, a conquering hero, and a pleasure-seeking admirer. Therefore, Rose argues, modern geographic readings of the landscape not only express class or colonial power (as demonstrated by Marxist and postcolonial critiques) but are profoundly masculinist.

Furthermore, post-structuralist, postcolonial, and feminist scholars revealed a particular connection between cartography and European imperialism. Cartography sustained the imperial gaze through mapping colonized landscapes that, in the imperial imagination, were simultaneously equated with the feminine. In the words of Alison Blunt and Gillian Rose, "Maps are central to colonial and post-colonial projects." They are "graphic tools of colonization" serving to make sense of the colonized spaces that are perceived empty and without meaning. The power to inscribe colonized landscapes and people with meaning is the power to establish control. "Imperialist maps not only describe colonies: they also discipline them through the discursive grids of Western power/knowledge." This power was amplified by the feminization of colonized landscapes. In imperial discourses, indigenous women symbolized the

land and both women and the land became legitimate objects of colonization; both were seen as equally dangerous and seductive and in need to be controlled and taken care of.

The advent of GIS and automated cartography led to the rapid integration of mapping with other geospatial technologies and digital information (e.g., Global Positioning System (GPS), remote sensing, tracking devices, cellphones, digital databases, and the Internet). It soon became clear that, together, such contemporary technologies could also support structures of power, imperial ambition, and unrestricted surveillance practices. In addition, feminist scholars exposed the gendered nature of GIS and examined the visual power of this mapping technology.

Donna Haraway has argued that satellites and other technological devices enhance the power of modern science by extending the limits of visual observation thereby making it seem more objective and disembodied. A similar observation applies to GIS. The computer enables the user to quickly access, display, and manipulate images of places and the visual excitement of GIS is magnified by the illusion of possession. As the fulfillment of the quantitative and spatial science revolution and its dreams of rational control, some have suggested that GIS may be incompatible with nonpositivist and feminist scholarship. Critics thought that 'as is' GIS was only good for supporting corporate and state interests as well as global imperial ambitions.

Reclaiming GIS as a Research Tool for Feminist Geographies

Despite the initial powerful critiques, feminist geographers are now rethinking GIS instead of rejecting it entirely. A feminist geographer Susan Hanson argues that, as with quantitative methods, GIS should be reconceptualized as a technology that, despite its limitations, can be used by women and in feminist research. Indeed, Nadine Schuurman and Gerry Pratt suggest that rather than use social theory (e.g., feminism) to distance GIS, construct it as "other," we should develop mutual knowledge and "care for the subject." Further, Nadine Schuurman and Mei-Po Kwan argued that although the social theorists have productively applied feminist critiques of visual technologies to GIS, they overlooked Donna Haraway's point that technologies are not inherently masculinist but constructed as such, and feminists should learn to use them in an emancipatory manner. Warning that technological determinism may prevent critical scholars from using GIS, Kwan put forth arguments that GIS-based visualization may be reconstructed as a feminist method. In her 'A cyborg manifesto for GIS', Nadine Schuurman called for greater involvement of women in GIS. Sara McLafferty looked for the ways to link the dynamic but separate worlds of GIS and feminist geography by combining reflexive feminist methodologies with layered GIS representation of the world. Marianna Pavlovskaya demonstrated that contrary to common perceptions, GIS functionality is no more quantitative than it is qualitative, and critical geographers, including feminists, should seek new strategies to integrate nonquantitative information and employ the visual power of GIS to advance socially responsible research agendas.

Although relatively new, theses developments have made a significant contribution to both the fields of GIS and feminist geography. Sara McLafferty even talks about the ongoing 'feminization of GIS'. In her view, its gendered construction is changing toward a greater affinity with feminist practices of knowledge production. This involves a shift from feminist critiques of GIS to feminist analyses of its impacts on gendered social relations that involve gendered identities, spaces of everyday life, and women's activism.

Feminist Cartographies

Feminist engagement with cartography and GIS can be traced to several locations. First, cartography and mapping have become important metaphors in the humanities. They allow feminist artists and scholars to examine and rethink social practices and experiences in important ways. The South Asian Muslim artist Zarina works with maps to create prints of borders she crossed and that divide people (e.g., between India and Pakistan). She also creates prints of places destroyed by war. In another instance, a feminist artist Ursula Biemann overlays satellite images with personal stories of women recruited into world sex trade to visualize 'female geobodies' – hidden global flows of female bodies from Southeast Asian or Eastern European countries to the countries of consumption in Europe and North America. The Irish artist Kathy Prendergast creates maps of the female body in ways that are similar to how people map the land. Her work invokes representations of Ireland as feminine in popular, nationalistic, and scientific discourses. While reminiscent of control and exploitation, these mappings also – as the artist attempts to do – suggest nonpatriarchal representations of both women and the land. Feminist artists also use nonpossessive mappings of the male body which subvert the primacy of the masculine gaze and re-inscribe mapping practices as nonhierarchical. In so doing, they reclaim vision and mapping and reconstructs them as nonmasculinist practices.

Second, feminist geographers have turned to mapping and cartography as a way to reveal gendered experiences

at various scales. Traditionally, maps hide women's worlds behind general population indicators but new research (and new maps) reflects their experience as well as the differences between experiences of women and men. To do this, feminist scholars use spatial data, statistics, and spatial analysis to construct social, economic, cultural, and political landscapes that make these gendered experiences visible. The most comprehensive example of such feminist cartography is *The Penguin Atlas of Women in the World* by Joni Seager, now in its revised third edition. Similar to other world atlases, it provides a global overview of various socioeconomic indicators by country but in this case international statistics are compiled to show phenomena that specifically affect women in different parts of the world. It presents maps which reflect the state of women's equality, health, political involvement, domestic violence, lesbian rights, employment, body politics, and the other dimensions of their lives. **Figure 1** is an example of a map that shows the unequal opportunities of women across the globe.

In addition, mapping and GIS-based analysis focusing on women and gender have recently emerged in many disciplines including health-related research. Examples include using distance as a factor in calculating the effects of prenatal exposure to pollutants from the World Trade Center disaster; modeling the distribution of rates of HIV infection among rural pregnant women in a region of South Africa in relation to the geography of the local road network that supports male migration; and examining a relationship between access to childcare and women's labor force participation in the Netherlands. In this latter case, mothers living in areas with a higher number of daycare slots per 100 children were more likely to be employed. **Figure 2** illustrates the very uneven geography of childcare availability mapped by the researchers. Visualizing such social landscapes that shape women's labor market experiences would not be possible without the computing power of GIS or the theoretical insights of feminism and its commitment to gender equality.

Third, a group of scholars has emerged that engages both GIS and feminist social theory. To the analysis of gendered experiences, they added a feminist rethinking of the role of GIS in knowledge production. In their research, social and feminist theory directly intersects with the analytical and visual power of geospatial technologies opening new possibilities for both feminist scholarship and GIS. For example, Mei-Po Kwan has pioneered the modeling of gendered time–space geographies in a GIS environment. Drawing on Hagerstrand's ideas, she combined datasets that included street networks and the distribution of urban opportunities with data from travel diaries completed by individual women. Kwan analyzed these data using a dedicated algorithm that enabled her to

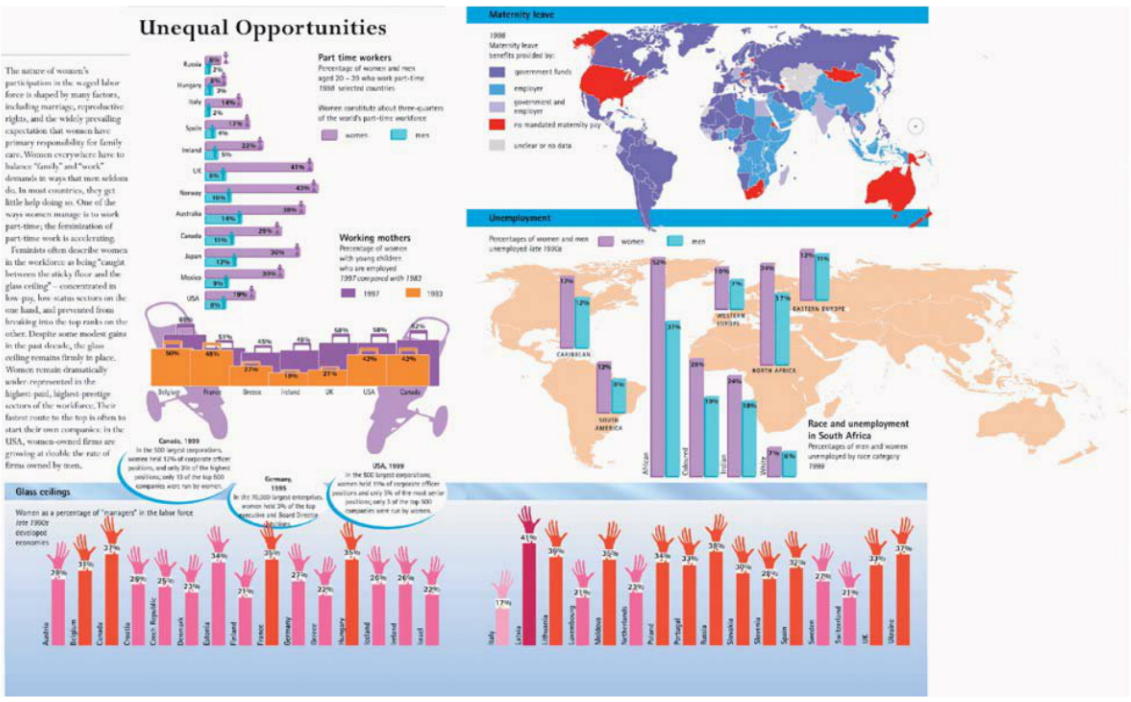

Figure 1 Unequal opportunities. From Myriad Editions and Seager, J. (2003). *The Penguin Atlas of Women in the World* (revised 3rd edn.). New York: Penguin Books. Reprinted with permission.

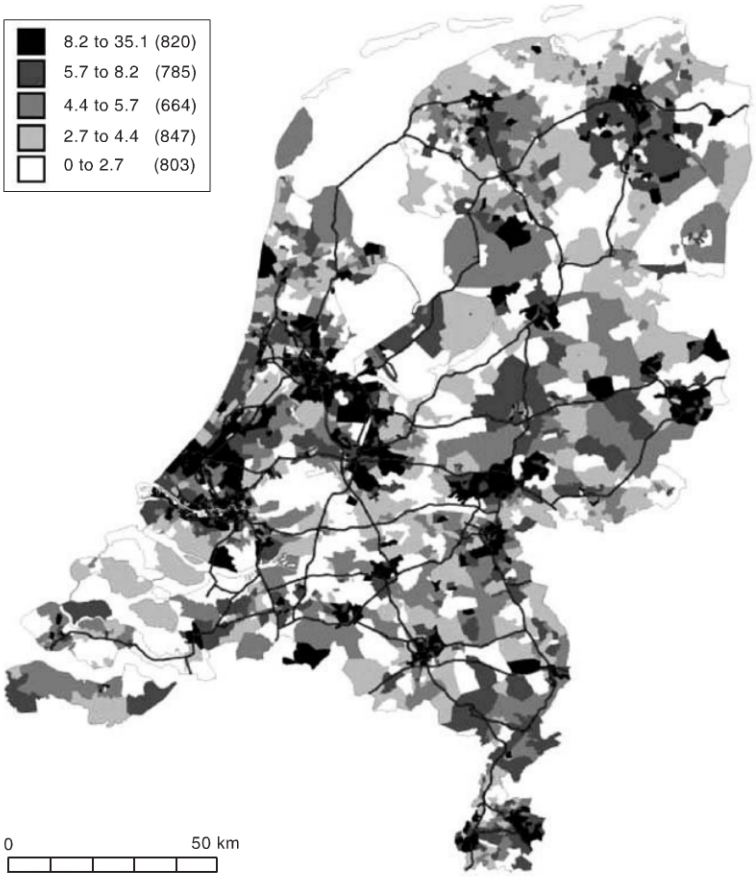

Figure 2 Geographical access to childcare within 10 minutes (slots per 100 children). Calculations using data from Monitoring Agency Childcare Provision (NUK 2001). From van Ham, M. and Mulder, C. H. (2005). Geographical access to childcare and mothers' labour-force participation. *Tijdschrift Voor Economische En Sociale Geografie* 96(1), 63–74. Reprinted with permission.

model the life paths of women as embodied experience. In particular, her three-dimensional (3-D) visualization of women's daily movement through urban space takes into account the multiple stops they make (as opposed to the home–work commute of most men) and makes clear the gendering of access to urban opportunities. Furthermore, Kwan was able to account not only for the differences in uses of urban space between men and women but for differences between groups of women as well. In particular, her visualization has eloquently demonstrated that the life paths of African-American women are more constrained compared to other women due to their relative economic disempowerment manifested in lower access to automobiles.

Marianna Pavlovskaya has used GIS to visualize the multiple economies of the daily lives of Moscow households based on qualitative interview data. The economic landscape revealed by the interviews included not only commonly analyzed formal and monetized economic activities such as paid employment but also informal and unpaid economic practices such as work for cash, domestic work, childcare, and exchanges of goods and services via social networks. W Pavlovskaya's analysis showed that contrary to mainstream economic theories, such informal economic practices persist and, moreover, underpin the everyday lives of households in modern socialist and post-socialist 'capitalist' economies. She has argued for the greater use of GIS in critical geographic research to advance social theorizing based upon innovative visualization techniques, the incorporation of primary data that captures human worlds not reflected in standard datasets, and the merging of qualitative data with GIS.

Fourth, feminist GIS scholars have conducted research on women's activism that involves geospatial technologies and they also have provided GIS-based scientific expertise for women's community groups. For example, Sara McLafferty worked with a group of activists from Long Island to map in a GIS the distribution of breast cancer occurrences in their communities. The

data was collected by women themselves to make a case for the need to study the potential environmental causes of this disease as opposed to the dominant focus on individual risk factors. As a result, substantial government funding was secured for this research.

Geospatial Technologies and Women's Lives

Finally, there is the issue of the impact of geospatial technologies on women's everyday lives. Broadly defined, they include not only GIS but also the Internet, location-based services such as cellphones, navigation tools, and other types of communication technologies. In particular, patterns of Internet (which is an immense source of geographic information) and technology use are gendered and the evidence suggests that the impact of geographic information accessed through these means is also gendered; although at this point little is known about how this unrestricted information is used. Furthermore, these technologies have radically transformed the everyday lives of people and the effect on women, in particular, needs further investigation. For example, these technologies change the way we work, as in the case of telecommuting and the way we look for jobs, which lead to new types of gendered employment. Also, shopping and other household chores – typically the work of women – are increasingly done using the Internet. In addition to these individual uses, the Internet has become an important means for establishing and maintaining social networks beyond local communities and extending across national boundaries. These networks continue to serve as important sources of information for women in many domains of life, including prenatal care. The communities also extend to the virtual 'bridgespace' that supports flows of people, capital, information, and goods between, for example, North America and South Asia by facilitating the identification of marriage partners as shown by Paul Adams and Rhina Ghose.

The Internet, geospatial technologies, and information technologies in general, however, have uneven and controversial impacts on women. The combined effects of class, gender, age, and race perpetuate the digital divide and large groups of low income, elderly, and women of color do not have access to such technologies and, therefore, are increasingly marginalized in terms of employment, consumption options, health outcomes, and political empowerment. The Internet also plays a crucial role in the sexual exploitation and trafficking of women and children and enables global flows of women's bodies from Third World countries and Eastern Europe to Western Europe and North America.

Another issue generated by geospatial technologies is that of privacy and surveillance in many domains including the relationship between the state and its citizens, corporations and their employees, producers and consumers, and individuals in their own private lives. The research suggests that these impacts are also gendered as they follow already established patriarchal patterns. For example, women are more likely to be targeted by advertisers owing to their greater role in consumption for their households or have their movements monitored by tracking devices installed by their partners.

Conclusion

In conclusion, the use of geospatial technologies and geographic information has rapidly grown in the last two decades. It is used by academics and scholars including those with a feminist sensibility, by professionals in many fields, and in the everyday lives of men and women. Digital maps and other types of geographic information are increasingly accessible to those outside the fields of cartography and GIS, including women in different professions and of different economic status, ethnic and racial identity, as well as geographic location. Feminism continues to make important impacts on mapping, GIS, and geospatial technologies more generally, but more work awaits ahead.

See also: Critical Cartography; Critical GIS; Geovisualization; GIScience and Systems.

Further Reading

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