

Towards geographies of cyberspace

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Abstract: This article uses two cyberspatial technologies, namely, the Internet (the global network of connected computers), and its close cousins, intranets (closed, private corporate telematic networks), to illustrate the ways in which geographers have engaged, and could engage, with studies of cyberspace. Virtual reality technologies are not discussed explicitly as, in the main, they are still at an exploratory and experimental stage. The article has three central aims: first, to introduce cyberspace and its implications to a wider geographical audience; secondly, to provide a critical review of current empirical and theoretical work relating to cyberspatial technologies by geographers; and, thirdly, to introduce geographers to the current debates and empirical research of scholars from other disciplines and suggest how geographers can build upon and advance these studies. An agenda for future research is outlined and an approach in which to ground future studies is forwarded. It is argued that spatiality is central to understanding cyberspace.

Key words: space-time, urban-regional restructuring, culture, society, politics.

I Introduction

The term 'cyberspace' is a recent creation and attributed to William Gibson, a science fiction writer who first used the word in his 1984 novel *Neuromancer*. In *Neuromancer* cyberspace is a 'dataspace'; a vast 'world in the wires' (Shields, 1996) known as 'the matrix' where transnational companies trade in information in a visual, Cartesian and electronic space. Here, data reside in colourful architectural forms in a space the imagination enters and interacts with. Cyberspace, as Gibson describes it, is a network space connecting digital data stores which can be accessed and interacted with via a computer connected to the network. Such spaces already exist. In this article, two of these spaces (the Internet and intranets) are used to illustrate the ways in which geographers have engaged, and could engage, with studies of cyberspace.

The Internet is a vast collection of computers linked to networks within larger networks spanning the globe. All the computers and networks are linked through common communication protocols (ways of exchanging information) creating 'a new network of virtual sites ... superimposed on the world of places' (Shields, 1996: 1). Anyone with a computer, a modem and a telephone can connect to a network and thus

the whole Internet. At present, the Internet offers users a range of interactions, allowing them to explore the world beyond their home. Users can browse information stored on other computers, exchange electronic mail, participate in discussion groups on a variety of topics, transfer files, search databases, take part in real-time conferences and games, and run software on distant computers. It is estimated that over 35 million people¹ are already connected to the Internet and, given that in advanced industrial societies nearly every home has a telephone connection, and that personal computers are becoming ever more ubiquitous, the growth in cyberspace users is likely to continue at a rapid pace (some analysts estimate a growth of 20% per month (Stix, 1993; Batty and Barr, 1994) and that 50% of all homes in the USA will have a modem by the year 2000 (Alter, 1995)).

Intranets are private, corporate networks that link the office, production and distribution sites of a company around the world. These are closed networks, using specific communication links leased from telecommunication providers, with no, or very limited, public access (Langdale, 1989). For example, most banks and financial institutions have (inter)national, closed intranets which connect all their branches, offices and ATMs (automatic teller machines) to central databased facilities which monitor financial transactions. Other systems might monitor orders and bookings, allow email to be sent between different sites and facilitate teleconferencing.

II Why geography matters

Analysts have developed three main theses to explain why cyberspatial developments are significant, transformative technologies. First, cyberspatial communication is seen to be challenging both our traditional ideas concerning mass communication and forms of communication (combining words, images and sound into a metamedia). Secondly, some analysts suggest cyberspatial interaction blurs modernistic dualisms, such as virtuality with reality and technology with nature, thus illustrating the dawning of the new postmodern era. Thirdly, and for geographers most importantly, it is argued that cyberspace is transforming space-time relations and creating new social spaces that lack the formal qualities of geographic spaces.

While cyberspace undoubtedly has geographical implications the nature and extent of these are contested. Two main positions are forwarded. In the first position, it is argued that spatial relations are being radically transformed – geography is being reconfigured and its importance lessened. For example, Harvey (1989) argues that there have been a collapse of spatial and temporal boundaries leading to radical space-time compression. He suggests that whereas innovations such as the railway reduced communication times substantially, telecommunications makes them near instantaneous. Not only have the effects of spatial separation been negated but also expenditure on delivery substantially reduced in real terms. The increasing efficiency of communication is translating into greater and more efficient productivity. The ‘wiring of the world’ is leading to a corporate decentralization and globalization. In addition, cyberspace is also seen to be providing a new social space (Morley and Robins, 1995); a place where people can meet and interact; a place with a new unchartered virtual geography which bears little resemblance to geography outside the wires (Batty, 1996). For example, MUDs (online adventure games), discussion lists and IRC (Internet relay chat) are online social spaces. However, their rules of engagement differ from real-world spaces. Cyberspace provides social spaces that are purportedly free of the constraints of the body; you are accepted on

the basis of your written words, not what you look or sound like, or where you live – cyberspaces are ‘social spaces in which people still meet face-to-face, but under new definitions of both “meet” and “face”’ (Stone, 1991). The collapse of space-time relations and the development of new ‘spaceless, placeless’ social spaces have led some commentators, such as Benedikt (1991: 10), to question the ‘significance of geographical location at all scales’. For Benedikt (1991: 10), ‘we are turned into nomads ... who are always in touch’ with the ‘spatial dynamics of the whole world collaps[ing] to those of a pinhead’ (Robins and Hepworth, 1988) – ‘geography and time are no longer boundaries’ (Hauben, 1995). As Mitchell (1995: 8–9, emphasis in original) states:

Cyberspace is profoundly *antispacial* ... You cannot say where it is or describe its memorable shape and proportions or tell a stranger how to get there. But you can find things in it without knowing where they are. The Net is ambient – nowhere in particular but everywhere at once. You do not *go to it*; you *log in* from wherever you physically happen to be ... the Net’s despatialization of interaction destroys the geocode’s key.

In contrast to this radical position, where the Internet and intranets are seen as space-time destroyers, shrinking distance and time to zero, others suggest that while cyberspace does have a significant influence concerning space-time relations, geography and time continue to matter.

Space and time remain significant for three main reasons. First, cyberspatial connections and bandwidth (how fast a communication connection is) are unequally distributed both within and between western countries, and in comparison to developing countries. Globalization is not an egalitarian process aimed at creating an equitable distribution, it is designed to reproduce capital most effectively. Secondly, whilst information on-line might seem geographically dislocated, information is only as useful at the locale within which the body resides. For example, a gay person who lives physically in an area of homophobia or where homosexual practice is illegal will still be unable to act openly on his or her desires, regardless of the information gathered on the Internet (Critical Art Ensemble, 1995). Thirdly, cyberspace depends on real-world spatial fixity – the points of access, the physicality and materiality of wires. There is a world outside the wires in the form of other infrastructures, and local and global markets. Location does not become irrelevant because cyberspace does not annihilate all the other determinates of commercial location, such as face-to-face social networks, a skilled workforce and access to materials and markets. Paradoxically, globalization is thus exerting the simultaneous pressures of unity and fragmentation (Griswold, 1994). Far from eliminating variances between places, cyberspatial technologies actually permit the exploitation of differences between places by capitalizing on cheap wages, reduced standards of work conditions, cheap sites, etc.

Castells (1996), for example, while acknowledging some of the decentralizing tendencies of informational technologies, argues that geography currently remains paramount. In many cases, information technologies reinforce centralizing tendencies as they are tied to the telecommunication infrastructure and social milieu of large metropolitan areas. Similarly, those services that can be decentralized have to locate in areas of suitable skilled labour and conventional transport links. As such, the local is not insignificant. Castells (1996) suggests that we are witnessing a division of spatial logic into two distinct forms. A new ‘space of flows’ is emerging to dominate the old ‘space of places’. The ‘space of flows’ is the fluid, rapid communicative space of managerial élites and the dominant interests in society. This ‘space of flows’ overlies the ‘space of places’. As such, real space is merely being overlain by a virtual space in a symbiotic fashion (Tomas, 1991), allowing organizations to be more flexible in relation to real-space geographies.

The relationship between cyberspace and space is important and there is a real need to understand, map² and deconstruct the complex spatiality of cyberspace. This article discusses current, potential and possible geographies of cyberspace. The discussion is divided into four sections. In the first and second sections, economic geographies and social/cultural/political geographies are discussed respectively. In the third section, an agenda for future research is outlined. Finally, an approach in which to ground future studies of cyberspace is outlined.

III Economic geographies of cyberspace

In the main, geographic contributions to cyberspatial studies have concentrated upon the emerging information economy and its effect upon employment patterns, economic performance and urban-regional development. In particular, attention has focused upon the intranet connections and telematic networks (computer-mediated telecommunications) of transnational companies that are significantly reshaping the economic and social landscape, accelerating recent trends such as globalization, office automation, regional and suburban back-offices and the slow rise in telework. It has been argued that these trends have led to significant organizational and employment restructuring and urban-regional reconfiguration as companies, cities and regions seek to gain competitive advantage.

Support for the thesis of an emerging information economy, including endorsement from geographic analysts (e.g. Langdale, 1989; Warf, 1995; Castells, 1988; 1996), has been growing in strength. To some, knowledge and information are in the process of replacing labour and capital as the central variables of the western economy: the processes of production, consumption and management are becoming increasingly reliant on knowledge generation, information exchanges and information handling. Cyberspatial technologies are seen as fundamental 'agents of change' in the restructuring of the economic landscape with some commentators suggesting that the telematic infrastructure currently being created will be as important for today's economy as the railways were for the age of industrialization, and automobiles in the postwar boom (Goddard *et al.*, 1985). The central, underlying bases for this changing economy are the spatial and temporal fluidity afforded to sites of production and consumption, through the spatial transformation of social relations gained through instantaneous communication networks (Kitchin, 1997). It is argued that this fluidity is evident in a number of recent trends.

1 Globalization of trade

For many, since the 1970s the world has been involved in a vast restructuring process of the capitalist base that underlies and constitutes much of the world's social system. The emergence of new informational technologies is seen to be at the heart of this restructuring, leading to a new mode of sociotechnical organization (Castells, 1988). Accompanied by deregulatory changes, which introduced new competition, investment and a desire to expand to capture a larger market share, cyberspatial technologies are seen to be facilitating the internationalization of production (Langdale, 1989), international networking, crosscultural contacts, the internationalization of financial markets, and increased international co-operation, joint ventures, strategic alliances and mergers (Robinson, 1991). Here, informational technologies are being used to increase

the scale of production, as driven by the logic of accumulation, and to increase the scale of consumption, as driven by the logic of commodification (Waters, 1995). Transnational companies thus take on a new, greater power through the effective management of their structure, using information transfer to gain competitive advantage over smaller operations. Rather than a company having a series of largely autonomous sites/plants serving a specific region, these operations can be effectively linked to form one giant system incorporating R&D, marketing, finance, production and the co-ordination of distribution. For example, IBM products are designed, marketed and sold on a world-wide basis, relying on a comprehensive, integrated intranet system to integrate information from several global sites (Langdale, 1989).

2 Office automation and back-offices

Explicitly tied into this process of globalization is the trend towards office automation and the shift to distributed back-office operations. Increasingly, manual office work is being replaced by automated computer-processing operations. Such a process of automation, accompanied by the ability to transmit and receive digital information, has led to the growth in back-office operations as companies use the Internet, and in particular Intranets, to increase their global productivity. Here, documents and files are shipped around the world to take advantage of a global 24-hour workforce. Teledefined businesses such as consumer service centres, telephone operators, telemarketing and market research, and teletransacted businesses, such as airline reservations, banking, insurance and administration, have all been quick to explore the possibilities of decentralization to back-offices (Graham and Marvin, 1996). For example, Ireland offers highly skilled, English language data-processing for American and European firms who send the files at the end of the day and then receive back the updated files when they relog on the next morning. Lower-skilled clerical and data-entry work, involving the processing and digitizing of vast amounts of documentation, is being farmed out to offshore back-offices in places such as southeast Asia, the Indian subcontinent and the Caribbean. For example, British Airways bookings are processed in India, and American Airlines in Barbados. The benefits to transnational companies can be significant. For example, Graham and Marvin (1996) report that wages are typically 20% of those in the west, staff turnover levels are extremely low at 1–2% per annum (turnover 35% in North America), reducing training costs, and military-type discipline ensures high levels of accuracy. Moreover, the world financial corporations are now using offshore banking operations to maximize profits by exploiting the favourable tax laws in certain areas of the world.

3 Teleworking, telecottages and teleports

In addition to back-offices, the potential decentralization associated with telecommunication and cyberspatial technologies has led many to explore the possibilities of widespread teleworking. Teleworking refers to the home use of telecommunication services, allowing employees the ability to conduct their everyday working practices from their home, rather than having to commute to a place of work. Although figures are difficult to predict accurately, estimates put the current number of teleworkers in the EU at between 1.25 and 4.6 million (0.8–2.8% of the labour force) (Handy and Mokhtarian, 1996). In the main, telework has been forwarded as a positive outcome of the new

'information society', allowing great flexibility to both the worker and company. However, several commentators have suggested that any positive effects are counterbalanced by the negative effects of isolation, insecurity, the blurring of the site of leisure with site of work, the break down of worker cohesion and the threat to trade unions. The positive and negative effects associated with telework largely mirror the social divisions between telework employees. Teleworkers can be divided into two groups. First, there are the well educated professionals with satisfying and demanding jobs that frequently require entrepreneurial and specialized skills. Secondly, there are less well educated workers generally performing less rewarding roles in the form of low-level, menial tasks like typing or data entry (Weijers *et al.*, 1992).

A related idea to telework is the telecottage. These have been promoted as community ventures to link (often isolated) communities to the 'information superhighway', to provide a training base for IT skills and a place from which to telework. In these ventures, the cost of equipment can be shared along with expertise and advice. Telecottage projects are growing in popularity, especially in rural unemployment blackspots where they are seen as a potential way to boost the local economy. For example, in the UK telecottage numbers have risen from 5 in 1989 to 140 in 1995, with nearly all these situated in rural areas (Selby, 1995). A related concept, the electronic village hall (EVH), providing community-based information and communication technologies to remote rural locations and inner-city community groups, has also been developed (Ducatel and Halfpenny, 1993). EVHs were originally developed in Scandinavia and were seen as a potential way to overcome problems of rural isolation. In inner-city areas, such as the scheme in Manchester, UK, EVHs are seen as a way to develop and strengthen community ties. In both cases, EVHs were seen as a way to promote cyberdemocracy at the same time as trying to help modernize the local economy by providing a low-cost and low-risk means of learning about and applying telematic technologies.

A more sophisticated urban equivalent to the telecottage, and one aimed more towards small to medium-sized companies, is the teleport. The teleport is essentially a high-tech office park offering advanced telecommunications links via satellite and fibre-optic connections (Warf, 1995). By centralizing the facilities, teleports provide significant scales of economy to small users who cannot afford private intranet connections. Teleports are seen as the new 'harbour depots' of the information age performing the same role as harbours in the age of shipping. As such, they provide their users and the host area with a competitive, economic advantage over other places. Teleport projects are currently appearing in many countries, including some developing nations (e.g., Jamaica and Nigeria) (Warf, 1995).

4 Organizational and employment restructuring

The combined trends of globalization, back-offices and telework have led to significant effects upon organizational and employment structures. Clearly, the role of information handling and exchange has grown significantly. For example, Johnston (1993) estimates that 50% of all jobs in Europe are in information-based services and 80% of all new jobs are in this sector. However, many analysts have noted that the relationship between information/communication technologies and employment is complex, with arguments concerning the quantity (automation reducing jobs) and the quality (automation leading to the deskilling of workers/automation providing greater autonomy in decision-making and the gaining of more generic skills) of jobs. It is clear that information technologies are

feeding into the processes of corporate streamlining and large-scale redundancies. However, whereas automation in the factories displaced the shopfloor workers, information technology is aiding the wide-scale displacement of skilled clerical workers and middle-level managers. Between 1980 and 1993, the 500 largest transnational corporations in the USA shed some 4.4 million jobs, many of which were professional and technical posts (Davis, 1993). In only a few cases has labour restructuring within these companies been offset by job creation caused by a higher demand for an improved, cheaper service/product. Contrary to many people's fears, however, communication and information technologies are having a negligible effect on aggregate levels of unemployment (Castells, 1988). Rather they are fostering productivity, economic growth and expanding employment outside the high-tech information industries. As a result, although there is some growth in high-skill professional, engineer and technician employment, the overwhelming growth is in low-skill, low-paid, part-time casual and menial employment. For example, Kumar (1995) reports that 13 million jobs were created in the USA between 1973 and 1980, 70% of which were low-level posts in the service and retail sector, predominantly part time or temporary and occupied by women. Consequently, these technologies are helping to foster an increasingly skewed and polarized occupational structure that is becoming common across western nations.

Within the remaining transnational workforce it is predicted that this wholesale removal of one level of the corporate structure will be accompanied by one of two scenarios. In the first instance, Robins and Webster (1989) foresee a Taylorist process of automation, leading to white-collar deskilling. Here, professional and highly skilled technicians, such as architects, bank managers and print typesetters, are having their work 'simplified' and made 'easier' as computer programs undertake all the mental calculations and even decide and implement the best course of action. This in turn will lead to a company with a skewed, hour-glass-shaped workforce, with a few executives at the top, no middle management and a wide base of clerks and operatives at the bottom (Kumar, 1995).

In contrast to this position, some suggest that, with the growing amount of internal and external information to be processed, traditional hierarchical structures will not be able to cope. As a result, it is increasingly expected that staff across a company will become more skilled, with powers to synthesize, to act upon new information and to make low-level decisions rather than all decisions being channelled up the management-hierarchical structure (Cronin, 1994). This, it is argued, will lead to power being more evenly distributed across the workforce, as employees become more mobile and companies take on adhocracy rather than hierarchical structures in an effort to speed up 'information metabolism' (Malone and Rockhart, 1991). However, such a situation is also likely to lead to a polarization of office work, with relatively unskilled, low-educated data-entry clerks at one end (being replaced by automation), and the remaining workforce diversifying in skills and responsibilities (i.e., a football-shaped workforce). For example, bank clerks are largely being replaced by ATMs and telebanking and those remaining are being retrained to sell services, thus upgrading the skills of a smaller number of employees (Castells, 1988). This employment restructuring has also led to massive infrastructure changes. In particular, with the shift to automation and telebanking, financial institutions have drastically reduced the number of high-street banks, which has led to massive job losses. For example, First Direct (the telebanking subsidiary of the UK's Midlands Bank) has directly led to 750 high-street bank closures and job losses totalling 15 000 (Graham and Marvin, 1996).

5 Urban-regional restructuring

There is little doubt among analysts that processes of globalization, and employment and organizational restructuring, in part caused by information and communication technologies, are instrumental in the current restructuring of urban-regional fabric. Cities were designed as places to overcome time with space, making communications easier. However, the growth of telecommunications to certain extent nullifies this function by making communications easier through the overcoming of space with time (Graham and Marvin, 1996). As such, there is a juxtaposition between urban places and their electronic counterparts which has led several commentators to speculate that these new electronic spaces and flows will displace or substitute physical travel and physical urban functions, and lead to the dematerialization of the city.

The lure of the benefits from dematerialization is strong with commentators suggesting that the shift to an information economy could lead to immense savings in terms of time, infrastructure costs and energy consumption and ultimately to the dissolution of the city. For example, a recent report found that if 10–20% of transportation in the USA could be transferred to telecommuting, teleworking, teleshopping, teleconferencing and electronic document exchange, the daily drive for 6 million commuters, 3 billion shopping trips, 13 million business trips and 600 million truck and airline delivery miles per year could be eliminated (Boghani *et al.*, 1991). The devastating effects this will have upon local retail trade, transport industries and the people who rely on and work for them is little considered.

At present, however, there is little evidence of a process of dematerialization and dissolution of city life. To the contrary, information and communication technologies are actually reinforcing city life and urban hierarchies through processes of restructuring. As such, it is increasingly apparent that rather than the processes which underlie city development being destroyed, electronic spaces are just altering patterns of urban development, and changing a city's relationship with its surrounding region and other cities (Graham and Marvin, 1996). This restructuring is taking place at different levels as we witness the trade-offs between urban fixity and electronic mobility. At one level, far from the Utopian visions of completely footloose industries, electronic cottages and the death of the city, communication technologies are actually reinforcing, and in some cases increasing, the role of major business centres (Castells, 1988). In fact, the world is only a 'smaller' place for those places that have attracted a disproportionate share of information and communication services (Daniels, 1995). For example, Alles *et al.* (1994) report that urban systems are increasingly being dominated by cities that have greater telecommunication infrastructure. Rather than there being a lessening of the pronounced differences between higher-order and lower-order cities, with a filtering down of economic and social benefits, the differences between 'core' and 'peripheral' cities are becoming more pronounced (Daniels, 1995). This centralization occurs because, if corporations are to take advantage of the global reach of communication technologies, they must locate their command and control centres in areas with a suitable infrastructure, at affordable costs. As such, a recursive relationship has developed between the communications industry and the information industries: the communications industry is attracted to the information industries as a source of business, leading to greater density and range of services; as a result, the information industries are, in turn, attracted by the availability of cheap, efficient communication technologies. Moreover, centralization is reinforced because many companies are reluctant to give up the close

proximity that fosters social and business connections, supplying tacit information considered vital in some industries, notably the finance sector.

Many cities have now taken a proactive role to 'wire' themselves to try to gain a competitive advantage in the global marketplace. This is leading to the formation of 'information' or 'soft' cities based around a high-tech infrastructure of computer-based networks (Hepworth, 1990). For example, Tokyo has become a telecommunications nodal centre for the Pacific rim, with government initiatives deliberately encouraging the development and integration of information technologies and telecommunications into the urban fabric to gain telematic supremacy (Alles *et al.*, 1994). In the USA, New York, Boston, Atlanta and Los Angeles have taken the lead. In Europe, the UK with its early deregulation of the marketplace has led the way. London quickly became the European capital for financial, broadcasting, publishing, advertising and other information-rich service industries. As a result, London has developed into a major telematic centre, representing some 80% of the UK data communications market (Graham, 1993). To try to keep its dominant edge, the redevelopment of the London Docklands saw the formation of a teleport linking a range of telecommunication technologies. Similar telematic developments are occurring in Manchester, Hamburg, Cologne, Barcelona, Amsterdam and Rotterdam. Elsewhere, Singapore in particular has taken a proactive approach, led by the government's National Computer Board and Telecommunications Authority, in an effort to create an 'intelligent island'. As a result, Singapore has an incredibly sophisticated and dense telecommunication infrastructure incorporating leased circuits, fibre-optic networks, household teleboxes and ubiquitous remote computer access, as it tries to move from unskilled, low-wage manufacturing to value-added business services and financial markets (Warf, 1995).

In contrast to this process of centralization, many office activities, business services and production centres are decentralizing. This is because locating in the centre of a major city carries considerable penalties in terms of high rent costs, high labour costs, recruitment problems, congestion, poor environmental quality and overcrowding (Daniels, 1995). Decentralization takes one of two forms. First, many companies are decentralizing within and across regions to smaller cities and nonmetropolitan areas to capitalize on lower workforce and operating costs. Secondly, decentralization is occurring across the city to the suburbs to take advantage of lower worker turnover, worker accessibility and a skilled, cheaper, suburban labour pool, without overly compromising customer accessibility (Castells, 1988). Ironically, the decentralization of some corporate sectors is actually reinforcing the need for the centralization of control and co-ordination in the form of global command centres (Moss, 1987). That is, the greater the decentralization of some sectors, the greater the centralization of others.

IV Social, cultural and political geographies of cyberspace

Geographers, while clearly contributing to the study of the economic and urban implications of cyberspatial technologies, are only just turning their attention to the social, cultural and political implications of cyberspace. The work of sociologists, cultural theorists, anthropologists and political scientists has highlighted that cyberspace holds many geographical questions relating to identity, community, democracy, ownership, privacy and confidentiality, and access and exclusion. To these scholars, cyberspatial

technologies represent a catalyst for a broad and extensive change in culture (Squire, 1996). As discussed, one of the main reasons that cyberspace is capturing the attention of these researchers is because it provides a new social space of interaction, but a space that is different in nature from conventional, Cartesian notions of space (Kitchin, 1997). Space in cyberspace is wholly socially produced with no physical, objective counterpart.

1 Identity

There are two emerging theories concerning the relationship between cyberspace and identity. Both theories centre around changing conceptualizations of the body. In the first, cyberspace is seen as a disembodied experience with transcendental and liberating effects. The second position conceptualizes interactions with cyberspace as aiding the merging of nature with technology, as humans and computers coalesce through a process of cyborging. Both theories draw on notions of Foucault's theory of 'technologies of the self' (see Martin *et al.*, 1988). Within this theory, Foucault suggests that certain technological devices change the social construction of personal identity. Poster (1995) argues that cyberspace is such a technology. It promotes the individual as an unstable identity, an individual bound within a continuous process of multiple identity formation. Theories of disembodiment are of particular interest to geographers as identity moves from the spatial to the spaceless.

Many of the contentions concerning disembodiment are extremely Utopian, centring on post-human life and the migration into the machine. In this scenario, embodiment is often represented as an unfortunate barrier to interactions; for serious cyberspace enthusiasts 'an organic body just gets in the way' (Morse, 1994: 157). Here, the body is often referred to as 'meat' (Lupton, 1995) or 'data trash' (Kroker and Weinstein, 1994) and the 'dream ... is to leave the "meat" behind and to become distilled in a clean, pure, uncontaminated relationship with computer technology' (Lupton, 1995: 100). At a less Utopian level, although still centring on the ideas of disembodiment, cyberspaces are seen to form protective spaces free of the constraints of the body. Unlike real-world meetings, individual representation in cyberspace is not based upon biology, birth, social circumstance or geography, but is a 'highly manipulable, completely disembodied intellectual fabrication' (Mitchell, 1995: 12). Cyberspatial interaction, it seems, provides an unrestricted freedom of expression that is far less hierarchical and formal than real-world interaction. In cyberspace, personality becomes fluid, ephemeral and empowering because people can choose how they are represented, with anonymity creating opportunities to invent alternative identities and to engage with untried forms of interaction (Baym, 1995). Users literally become the authors of their lives. Further, identity becomes multiple and decentred as different aspects of life on-line are disengaged and happen in different worlds, sometimes at the same time. Further, cyberspace gives the user more time to construct carefully his or her persona, delicately crafting emotions and appearances and giving a control not experienced in face-to-face conversations (Correll, 1995). Here, rather than the self being some permanent structure of the mind or fixed within some genetic code, self is thought of as a discourse where identity is constructed through multiple experiences. With the growth in information industries, and the opportunity to interact in a number of different environments (including cyberspatial ones), commentators now suggest that we cycle rapidly through different identities so that this process of fragmenting and multiplicity multiplies. The self thus becomes a series of roles that can be mixed and matched.

As Pile and Thrift (1995) note in relation to 'real' space, mapping identity, given its fluid, multiple and fragmented nature, is fraught with difficulties. This is multiplied when time-space itself becomes fluid as traditional relationships between power, knowledge and people become unstable and reconfigured and the body in which identity is grounded takes on less (no) importance. As such, untangling cyberspatial identity is complex. Recent studies have highlighted the ways in which people are constructing their cyberspatial identities. For example, there are a number of well documented cases of people constructing multiple, fluid online lives based around experiments with gender. In one example, a middle-aged male psychiatrist pretended to be a compassionate, disabled older woman who tapped out her messages using a headstick (Stone, 1991). Using this persona, the psychiatrist developed several deeply personal relationships, mainly with women. Some of these women shared their deepest troubles and he (Julia) gave advice.

Not all commentators are enamoured with an idea of life in a virtual world and question some of the claims made regarding identity. For example, Robins (1995: 139) argues while we might experiment with 'new identities, mobile identities, exploratory identities', they are invariably banal identities, and identities removed from the realities of everyday life. For Robins, cyberspace is a space where the imagination is dead, where old dreams are foisted upon new technology. In this context, cyberspace provides nothing beyond a new space, a new medium. There is no denying that cyberspace makes an interesting arena to study identity, but the medium does not fundamentally challenge how self-identity is constructed – we still use the same rules of engagement, the same consensual protocols we use in everyday life. While identities are fluid, contested and multiple, online identities are shallow and distract from life in the real world. Admittedly given the nature of cyberspace it is easier to go through a journey of self-discovery, but it is a journey removed or distant from where the self predominantly presides. Cyberspace does provide a more protective space to 'play' with our fantasies, our othernesses (e.g., gender), but it is only a protective space; we can 'play' these fantasies by crossdressing, by inhabiting the different social spaces that make up the social fabric of communities we *have* to live in.

Further, while it is clear that we do construct online social spaces whose rules are built not received it is also evident that the vast majority of social spaces on the Internet bear a remarkable resemblance to real-world locales. As such, many online interactions are in fact situated in real-world protocols undermining the potential liberating effects of being on-line. In other words, online spaces are situated – not only are they like real-world spaces but they are also often in the image of real-world spaces. Foucault (1978; 1979) constantly reminds us that it is practice and not belief which shapes our lives. The real question therefore does not relate to disembodiment but rather to 'what extent the embodied spaces in real life become replicated on-line?' – to what extent do the practices and structures (organization and regulation of space, time, movement) which shape our lives off-line, shape our lives on-line? Women, for example, are not finding cyberspace to be free of sexual harassment, unwanted approaches and blatant sexism, and their lives on-line are being shaped through the same practices that regulate their lives in real space. In Foucaultian terms, online women (in general) still remain 'docile bodies' – bodies which are regulated by, and subjected to, men. Clearly, the role of the body in interaction on-line and off is different, but to what extent are our real bodies being metaphorically re-created as virtual bodies in cyberspace? While Haraway (1991) has argued that 'bodies are maps of meaning and power' in real space, does the text simulate bodies in

cyberspace so that the spaces become embodied? Is it a fallacy to suggest that we can become disembodied when on-line? Evidence for the embodied nature of cyberspace comes from studies which show that many people do not take the opportunity to play with their identity on-line. The number of MUD users remains small and the majority of news-list members remain 'lurkers' (readers but not posters).

2 Community

For Utopianists, such as Rheingold (1994), computer-mediated communication represents the opportunity to recover the meanings and experiences of community that are rapidly dissolving from our everyday lives. Rheingold argues that much of our public space, and hence social fabric, is disappearing. The places we used to meet, talk and swap information are being reclaimed for other purposes; the café is replaced by the impersonal mall. Through the Internet, we will be able to form new forms of communities based upon our interests and affinity, rather than coincidence of location (Robins, 1995). Here, individuals will be able to shape their own community through real choices in whom they interact with; 'we will be able to forge our own places from among the many that exist, not by creating new places but by simply choosing from the menu of those available' (Jones, 1995: 11). Turkle (1995) suggests that online communities form an attempt to retribalize in a new space. In this context, community is seen as a network of social relations and not necessarily as a concept that is tied to place. In traditional conceptions of community, place is considered of importance along with common ties and social interaction (Correll, 1995). *The community*, however, is characterized by factors such as personal intimacy, moral commitment and social cohesion. For commentators such as Rheingold, cyberspace does allow the development of *the community* without the locale; people can form into strong, cohesive and supportive groupings. Indeed, Rheingold's grand vision is a 'global civil society' with a shared consciousness: community will no longer be local but global.

Rheingold's arguments seem in line with theorists such as Sennett (1978) and Habermas (1989), who suggest that the notion of community is in transition as the public arena merges with the private and personality over-rides opinion. Sennett, for example, suggests that our notion of community has evolved from *Gemeinschaft*, where community relationships are tied to social status, public arenas and bounded, local territory, towards *Gesellschaft* where community relationships are individualistic, impersonal, private and based on 'like-minded' individuals (Fernback and Thompson, 1995). Rheingold, however, suggests that *Gemeinschaft* and *Gesellschaft* aspects of community can be brought together so that we have individualistic, like-minded people forming public-based communities. Whereas Sennett feels that the material (the locale) and symbolical dimensions of community are increasingly being conflated in geographic space, Rheingold feels that can be rejoined in cyberspace. If this is the case, then Rheingold little speculates upon whether cyberspace will rapidly progress the degeneration of communities in geographic space as people search out public online forums based upon individual personalities.

There is a growing body of empirical work that has started to examine ideas pertaining to online community formation and regulation. For McLaughlin *et al.* (1995) the fact that there are commonly agreed protocols and the advent of distinctive referent language (abbreviations, jargon, symbols) and the formation of strong social networks, suggest that online communities, in one form or another, do exist. Rafaeli and Sudweeks (1996)

suggest that people would not invest so much time and effort into computer-mediated communication without gaining some sense of social cohesion or sense of community from their virtual actions. They suggest that the form and depth of interaction mean that these communities are neither pseudo nor imagined.

In contrast, Fernback and Thompson (1995) pose the question as to whether online communities are little more than a postmodern simulacrum. While it is clear that many commentators suggest that interactions via computer-mediated communication do form online communities, others are beginning to question the nature of this community and if it can be called a community at all. For example, Robins (1995) suggests the use of the Internet does not mean we will be able to recover the meaning and the experience of community which Rheingold feels are dissolving in real space. It is a misnomer to equate communication directly into communion and community (Robins, 1995). For example, while some people would claim to be part of a virtual community the vast majority of cyberspace users are transient, moving between different spaces. While some virtual communities seem to have rules and protocols very similar to real communities, they do not possess the same kinds of responsibility. How deep and bonding are virtual relationships in comparison to real-world relationships? What is the nature of the commitment and how strong is the sense of responsibility (Jones, 1995)? Rheingold (1994: 61) himself questions whether 'relationships and commitments as we know them [are] even possible in a place where identities are fluid?' In communities in 'real space', community members must and do live together. It is not simply a case of logging on and, when we feel like it, logging off. The Internet, however, allows interaction where we can disengage with little or no consequence – if you do not like what the neighbours have got to say you can just turn the machine off, or uproot and connect to somewhere else, or enter a flaming match where the fear of physical reprisal is minimal. Whereas personal conflict is often dealt with by diplomacy in real places, flame wars are not uncommon in cyberspace – the screen depersonalizes contact. For Robins (1995: 150), then, 'there is an invocation of community, but not the production of society'.

3 Democracy

Commentators are nearly all agreed that cyberspace technologies have wide-scale implications for politics and polity. In one form or another they are set to transform political structures and organizations, political campaigning, lobbying strategies and voting patterns (Neustadt, 1985). Here cyberspace is viewed as opening 'qualitatively new political opportunities because it opens new loci of speech' (Poster, 1995). This has led analysts to two separate but equally radical conclusions. First, representative government could potentially be replaced by direct government. Here, we would all be able to propose, debate and vote upon local, national and international issues rather than elected officials doing this on our behalf. Secondly, the role of place-based political mobilization will rapidly diminish (Thu Nguyen and Alexander, 1996). Instead, political opinion concerning specific topics will be mobilized globally by interested parties as politics fragments and people's perspectives narrow. For example, groups such as Tibet Information Network, Greenpeace and Amnesty International all use web pages to disseminate information and raise political awareness at an international, rather than just local scale. Readers are given specific information on how to effect effective political action. Indeed, for Poster (1995) global communication networks challenge the notion of nation-states. Technologies such as cyberspace defy the character of power employed by modern

governments by undermining the concept of territoriality. Cyberspace knows no borders. This has wide-ranging implications given that boundaries are seen as central to current political theories. As such, Luke (1994) suggests that the geopolitical conditions of the 1990s are best described as spatial confusion, and such is the concern for national security that agencies such as the FBI are insisting on building surveillance systems into the Internet to monitor traffic.

Thu Nguyen and Alexander (1996) argue that, although nations still exist, they are progressively losing control over their people because cyberspace is undermining polities through the availability of outside information. They describe how nations and organizations keep political control through gatekeepers (people who control and regulate information). Within computer networks they argue that people can bypass the gatekeepers and get to information directly. This bypass represents a 'major shift in the nature of embodied power' away from central individuals who 'hold' power (Thu Nguyen and Alexander, 1996). For them, the Internet is a 'conversational, demassified, non-representational democracy that transcends nation-state' (p. 111). It represents the communication system needed to underlie the continued differentiation and complexity of society. As society fractures, the more information social systems need. Cyberspace is providing for that need and, as such, is an active agent of change – an agent that is challenging the traditional notions concerning power, knowledge and information through the altering of conventional power relations. This challenge, they contend, through demassification and atrophy of the polity, will eventually lead to chaos through weakened polities unable to contain disruptions. In short, there will be a basic conflict between the coming Internet society and modernist democratic institutions. They explain that modern politics is grounded in geographical units and communities, and in the assumption that individuals have concrete identities and interests. However, cyberspace renders place meaningless, identities fluid and reality multiple. They suggest that democracy based upon geographical units is withering and is destined to suffer the same misfortunes as the monarchy.

In contrast to Thu Nguyen and Alexander's position, the Internet in many instances, such as free-nets and many commercial web sites, rather than challenging convention, actually works to reproduce and reinforce existing hegemonic structures (Interrogate the Internet, 1996). For example, local governments in the USA are increasingly experimenting with community-orientated, participatory democracy within their city through the use of free-net systems. Using public electronic networks (PENs) registered users can access city information, complete some transactions, send email to departments, elected officials or other PEN users and participate in public conferences (Schuler, 1995). PENs such as Santa Monica PEN and Cleveland Free-Net have grown in use and popularity and hundreds of community organizations maintain and disseminate information. Users can use their own PC or those strategically placed in public areas such as libraries around the city to gain access. In this context, the Internet strengthens the civic, public dimensions of cities/nations by providing a free-access public space for debate and interaction (Graham and Marvin, 1996). Indeed, the homeless, a normally poorly organized group, have successfully used Santa Monica's PEN to lobby for shower facilities. Cyberspace is thus going to bring us a democratic renaissance based on the notion that an abundance of available data and information is liberating, that cyberspace allows greater access to officials, and that cyberspace undermines the traditional media bases of democratic institutions such as broadcasters by allowing individuals to be both sender and receiver, thus permitting a more eclectic range of views to be disseminated (Brants *et al.*, 1996).

Rather than radically overhauling existing structures, the Internet is seen at best as just another tool to help conduct the everyday, democratic functioning of a government, allowing people to express their opinions. People can, and will continue to, lobby in conventional ways.

V An agenda for future research

The explicit message within this discussion is that geographers with their emphasis upon space, spatiality and place are well placed to add significantly to studies of cyberspace. As I have argued elsewhere, cyberspace cannot be fully understood without an appreciation of the role of space (Kitchin, 1997). Further, the widespread adoption of cyberspatial technologies raises fundamental questions concerning the role of space and place in contemporary society and culture. Some of these concerns have been highlighted in the discussion. For example, Castells (1988) argued that we are witnessing the transition from a 'space of places' to a 'space of flows' with the convergence of time and space through instantaneous communication. This is leading to rapid restructuring of organization and employment structures and urban-regional development. Rheingold (1994) suggested that communities are no longer reliant on proximity, with place rapidly diminishing as the basis for a viable society. Thu Nguyen and Alexander (1996) contended that cyberspace is going to transform geopolitical relations leading to the dissolution of nation-states and place-based politics. These claims either diminish the role of geography or suggest that spatial relations are being radically configured. However, at present, we are still unsure as to the new spatialities which cyberspace instigates. An agenda for future research must directly examine the various spatialities of cyberspace.

The basic urban and economic geographies of cyberspace have been mapped out. However, there are a number of questions that need to be addressed further, plus some that we have not yet begun to explore. Questions that need to be examined include: to what extent is cyberspace an 'agent of change' in the current shift to a postindustrial society? If, as Harvey (1989) argues, periods of economic growth and stability are dependent upon certain spatial configurations and relations, are we currently undergoing a period of restructuring to enter an age where stability is a virtual space overlain across real space? If this is just a transitional period, however, aiding rapid globalization, what will be the next underlying spatial nexus of the new global economy? What are the long-term local employment patterns resulting from cyberspatial businesses? Will teleworking becoming more popular with increasingly more sophisticated and cheaper hardware and software? To what extent is cyberspace leading to patterns of centralization and decentralization of certain corporate divisions? What is the spatial manifestation of this restructuring? Is cyberspace, and telematic communications in particular, leading to the dematerialization and dissolution of the city? Are electronic spaces really replacing urban spaces, or is there a symbiotic relationship between the two? How will cyberspace affect our spatial behaviour and the social aspects of the city? Will we see radical changes in shopping patterns (home buying), travel patterns (home working), entertainment (online video), education and in particular higher education (home studying)?

Outside the 'world in the wires' geographers have actively engaged with the highlighted issues of identity, community and democracy, and the associated roles of space and place. However, in general, geographers have yet to examine the social, cultural and

political implications of cyberspace and to examine the role of space and place in a distributed social space that lacks physicality. As such, future research needs to address a range of related questions concerning the mapping of identities, community development and geopolitical futures. These questions include: how are spatial relations maintained in cyberspace, a social space that has been described as 'spaceless', 'placeless' and 'profoundly anti-spatial' (Mitchell, 1995)? Does cyberspace render place meaningless? Are cyberspaces merely embodied spaces, situated in real-world images and protocols? Does cyberspace allow a recoding of the body and self? Is cyberspace providing an effective space in which to challenge patriarchal relations, as Haraway (1991) and others suggest? Does spatial and social behaviour in virtual spaces 'spill over' and affect behaviour in the real world? Are communities, as Rheingold (1994) contends, viable in cyberspace, and to what extent are social interactions different from the real world? How will cyberspace affect current place-based political systems? Are current polities, as suggested by Thu Nguyen and Alexander (1996), destabilized by access to greater information and the bypassing of gatekeepers? Is the concept of the nation-state under threat because cyberspace knows no borders?

The questions posed draw upon issues discussed within this article. However, there are a number of other social and political issues relating to the development and use of cyberspatial technologies that should be of interest to geographers. For example, to what extent is the blurring of reality with virtuality, if occurring, the result of a changing spatiality? Is cyberspace altering our geographical imagination? Is the fabric of reality becoming warped and reconfigured? Further, cyberspace accentuates the recent blurring between public and private spaces. Once a publicly owned series of interlinked networks, cyberspace has been increasingly privatized. With the changing of ownership comes questions of regulation and censorship. Cyberspace is rapidly becoming a policed space controlled by online service providers selling value-added services. This raises questions of access. Cyberspace is promoted as a space for all. Looking beyond the egalitarian hyperbole, however, it is clear that cyberspace usage is fragmented along traditional spatial and social divisions and is not universally accessible. In fact, far from creating a more egalitarian society, some commentators have suggested that cyberspace is going to reinforce and create new inequalities bringing about a world that is more unequal and socially fragmented (Thomas, 1995). Added to this, there are concerns that privacy and confidentiality are being compromised with the emergence of a sophisticated 'surveillance society' (Lyon, 1994). The great fear is that the Internet 'may well simply turn into an extension of social control through the control of information' (Interrogate the Internet, 1996: 129). Increasingly large portions of our individual details have been converted into digital form, residing in various databases (Mitterer and O'Neill, 1992). Agencies from the police, to the military, to the government and industry are all actively collecting and exchanging digitally recorded data via cyberspatial technologies. Moreover, there is a growing geodemographic industry which identifies the characteristics of suitable areas for advertising and marketing based upon census and other corporate database variables. These issues raise a number of questions. Will cyberspace be a reality for people with low incomes and what are the 'real world' effects if they are excluded? Does cyberspace form the effective basis for a superpanopticon and Orwellian 'surveillance society'? What are the ethical implications of geodemographic industries? What are the sociospatial implications of a 'surveillance society'?

Some suggest that cyberspace is creating a new space of deviancy, a space that provides a social context where the socially alienated can occupy and play out their

fantasies. Cyberspace is space where some of the more distasteful facets of contemporary society can proliferate and flourish (Squire, 1996). Here, images and messages of sex and abuse, and racial and ethnic hatred can be found and groups, such as paedophiles and neo-Nazis, have quickly moved into digital space where they can communicate easily and reproduce endlessly their messages and images. Moreover, cyberspace has been trumpeted as a new space of white-collar crime. Here, cyberspace is creating a new space where embezzlements can be camouflaged, fraudulent payments made and reports and inventories falsified. Martin (1995) reports that cybercrime is encapsulated as the seven *Es*: error, embezzlement, ego, eavesdropping, espionage, enmity and extortion and costs the USA at least \$2 billion in direct costs every year. To what extent is cyberspace a new space of deviancy and crime? In what ways, and to what extent, do these deviant spaces intersect with geographic spaces? What are the material consequences of crimes in cyberspace? How is such crime policed and the public protected when cyberspace knows no borders and laws differ from state to state?

VI Approaching geographies of cyberspace

In order to answer these questions, and to approach and study the geographies of cyberspace effectively, it is argued that we need to adopt an approach which allows us to deconstruct the complex spatialities of cyberspace which underlie cyberspatial use, development and regulation. Such an approach can be achieved by combining aspects of postmodernism with social constructivism and political economy. Within this approach the combined power of cultural and political-economic ideologies to shape human life is recognized while the grand narrative aspects of social constructivism and political economy are rejected. Instead a position is developed which seeks to deconstruct the complex ways in which the local and global, and sociocultural and politicoeconomic intersect; a framework constructed in which the fragmentation, decentring and restructuring of society can be read and interpreted.

A similar approach has been forwarded by Graham and Marvin (1996). They sought to combine social constructivism and political economy in order to try to explain the geography of telecommunications. They argue that these approaches are suitable for combination because they both recognize that technologies are applied within, rather than from outside, society. However, both are flawed when used independently as political economy neglects social processes and thus overplays the significance of capitalist structures, and social constructivism solely concentrates on social processes neglecting wider political and economic forces that create power imbalances and help shape local conditions (Graham and Marvin, 1996). They thus persuasively argue that the relationships between technology and society can no longer be framed within strict economic and political terms or in strict social and cultural terms, but must encompass both. Essentially, cyberspatial use and development are socially constructed at the local scale and mediated by a broader, more regional/global political economy; there is a recursive relationship between local, social/cultural and regional/global, political/economic processes. Here, technological developments, uptake and usage are locally constructed through the interplay between individuals and institutions, and bound within historical systems. These local constructions are, however, further bound into larger political and economic contexts and affected by factors such as investment, policy,

marginalization, local economic conditions and status (levels of unemployment, poverty, etc.), and the opportunity to exploit and break into both local and global markets.

The approach forwarded here builds upon Graham and Marvin's ideas, but in contrast adopts a more critical stance that rejects some of the modernist underpinnings of their approach, particularly the notion of grand narratives, universal truths and causality. As such, the integration of a postmodernist perspective seeks to acknowledge a rejection of modernist values and the adoption of an approach which seeks 'readings' not 'observations', 'interpretations' not 'findings', 'intertextual relations' rather than 'causality'; the recognition of difference and a recognition that society is rapidly progressing through a series of rapid transitions as traditional modernist ideas concerning space, time, reality, nature are undermined and reconfigured. Whereas Graham and Marvin plot the changes telecommunications are making to the urban landscape, the approach forwarded here is designed to examine how cyberspace reconfigures and transforms society in a new postmodern world. Within this context, it is possible to integrate notions of power relations and dominant ideologies and to acknowledge that identity and community are fluid, multiple and contested.

It is argued that this integrative approach allows us to deconstruct carefully the implications of cyberspatial technologies within the context of the world we do live in and to understand the symbiotic relationship between the virtual and nonvirtual worlds. Within this approach it is important that we appreciate that cyberspace, while having a different form from real space, is just an extension of the real world – we access cyberspace from the real world and many of the actions in cyberspace have real-world implications. Cyberspace exists in a symbiotic relationship with real space and it is this relationship we must seek to understand. Further, it should be noted that the implications of cyberspatial technologies are many and the social, cultural, political and economic effects are interdependent and should be studied as such. At present, many analysts study the social, cultural, political and economic effects in isolation from one another. This approach allows an integrative approach, and for the various questions raised within the discussion to be approached in a consistent and coherent manner.

For example, using this approach appreciates that the development and implications of technologies are played out in an intricate fashion, with local, social and cultural processes recursively situated within broader political and economic structures and mechanisms working at the national and global scale. As such, organization and employment restructuring and urban-regional reconfiguration are best understood by carefully analysing the cultural and social processes underlying the decisions of corporate decision-makers, urban planners and regional government, and assessing the interplay between individual and institutions, while appreciating historical context and the strong influences of broader-scale political and economic processes and mechanisms.

Similarly, this approach explicitly recognizes that identity and community are fluid and contested, but that cyberspatial interaction and appropriation are socially constructed and bound within broader politicoeconomic structures – life on-line is not divorced from nonvirtual life but is highly situated within it. As such, online spaces are not completely disembodied but rather are highly embodied, with real-world discrimination and abuse reproducing themselves in a new space. Further, this approach appreciates that within the local, political organization and mechanisms are socially constructed by the interplay between individuals, institutions and technologies, while acknowledging that these constructions are bound within a historical context and the wider political agenda of nations and businesses. As such, the political implications of

cyberspace need to be contextualized into wider economic concerns relating to ownership, control and regulation, and into social concerns relating to voter behaviour, political mobilization and cultural ideologies concerning what is determined to be deviant. Studies of online politics and polity need to deconstruct the recursive relationship between on- and off-line political spaces.

VII Conclusion

Space is central in understanding the changes cyberspace is instigating. For some analysts, cyberspace is transforming the social, cultural, political and economic landscape by radically transforming space-time relations and creating 'spaceless', 'placeless' social spaces. Contrary to this position, it has been argued that geography remains paramount – cyberspace, rather than providing an alternative world, exists in a symbiotic relationship with real space. Cyberspaces are dependent upon spatial fixity, they are embodied spaces and access is unevenly distributed. This is not to deny that cyberspatial technologies are significant 'agents of change'. However, cyberspaces do not replace geographic spaces, nor do they destroy space and time. Rather, cyberspaces coexist with geographic spaces providing a new layer of virtual sites superimposed over geographic spaces. Geographers are well placed to study the interplay between virtual worlds and geographic spaces. At the points of this interplay, spatial transformations are affecting social relations while simultaneously social transformations are affecting spatial relations. As discussed, this is leading to a rapid globalization of production and consumption and widespread restructuring of organizations, employment structures and to urban-regional restructuring. Accompanying these changes has been the creation of new metamedia social spaces which have large-scale social, cultural and political implications. At present, while some aspects of the geographies of cyberspace have been mapped out, there is a need to deconstruct and map further the complex spatialities of cyberspace. In this article I have provided several agendas for geographic studies of cyberspace, outlined some of the questions that as geographers we are well placed to study, and detailed an approach for studying the implications of cyberspatial technologies. It is time to explore the 'world in the wires'.

Notes

1. Estimates of Internet users vary from 4 to 96 million. These estimates are calculated by deciding how many people are likely to be connecting with each Internet host. There are estimated to be between 4 and 0.6 million hosts worldwide, each thought to be supporting between 1 and 10 users (see <http://nic.merit.edu/nsfnet/statistics/history.hosts>).

2. Martin Dodge, of the Centre for Advanced Spatial Analysis (CASA) at University College London, provides an excellent overview of attempts to map cyberspace. His web pages 'An atlas of cyberspace' can be reached at <http://www.geog.ucl.ac.uk/casa/martin/atlas/atlas.html>.

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