

# Re-Space-ing Place: “Place” and “Space” Ten Years On

Paul Dourish

Department of Informatics  
Donald Bren School of Information and Computer Sciences  
University of California Irvine  
Irvine, CA 92697-3440, USA

jpd@ics.uci.edu

## ABSTRACT

In the ten years since the distinction between “place” and “space” emerged as a consideration for CSCW researchers and designers, the concepts have proven useful across a range of domains. In that same period of time, wireless and mobile technologies have given us new sites at which to examine the issues of space, practice, and mobility. These changes suggest that it might be fruitful to re-examine the issues of place and space in light of recent developments. In particular, the nature of space and spatiality deserve further consideration.

## Categories and Subject Descriptors

H.1.2 [Models and Principles]: User/Machine Systems – *human factors, human information processing.*

## General Terms

Human Factors, Theory.

## Keywords

Space, place, spatiality, mobility, geography, power geometry, ubiquitous computing.

## 1. INTRODUCTION

At this conference ten years ago, Steve Harrison and I published a paper entitled “Re-Place-ing Space,” in which we proposed that an analytic distinction between “place” and “space” could be usefully applied to understanding settings of collaborative work [25]. We wrote that paper in the context of burgeoning research interest at that time around the opportunities for creating new virtual spaces for collaboration and interaction, and particularly the prospects for Collaborative Virtual Environments (CVEs) and the spatial models of interaction that they supported. CVE technologies exploited the growth in both Internet connectivity and graphics processor power to create virtual immersive environments in which avatar embodiments of human users might interact in a shared graphical world. Most importantly, by attempting to recapture aspects of the spatial organization of everyday space in the spatial models embodied by these systems,

researchers in CVE hoped to be able to reproduce or support spatially-organized aspects of everyday sociality.

CVE technologies have not, as it has turned out, become dominant means of interacting and collaborating at a distance (at least, not yet), although they have become immensely popular and significant as the foundation for massively multiplayer games and “metaverses” (which emphasize social interaction rather than game play). In these environments, the spatial metaphor provides a means to understand and structure action. However, the argument that we presented concerning place and space was a conceptual one rather than one grounded in the design of specific technologies. In particular, we argued that we might fruitfully distinguish between two aspects of spatially organized environments, those that arise out of their material and geometric properties and those that arise out of the ways in which human activity takes place within them. Drawing on the work of a range of architectural and urban theorists, we glossed these two aspects as “space” and “place.” Where “space” describes geometrical arrangements that might structure, constrain, and enable certain forms of movement and interaction, “place” denotes the ways in which settings acquire recognizable and persistent social meaning in the course of interaction. The catch-phrase was: “space is the opportunity; place is the (understood) reality.”

This broad distinction was not, by any means, our unique insight; not only were we drawing on a body of existing work, but others were, at the same time, coming to similar conclusions [e.g. 20]. We were perhaps fortunate that, in putting the distinction front-and-center in our paper, it came to be particularly associated with that idea. Judging from citation evidence alone, the distinction between these two accounts of spatiality – one geometric, mathematical or physical, the other social and cultural – has, in the intervening time, proven to be a useful one in CSCW research and related areas. The ACM Digital Library lists 74 citations; scholar.google.com lists 306.

However, ten years have elapsed since that paper was published, and they have seen significant developments in spatial and technological milieux. In particular, the widespread adoption and use of networked technologies, and most especially wireless and mobile systems deployed via wireless Ethernet and cellular telephony systems has (or should have) radically altered the ways in which we think about the relationships between people, actions, and the spaces in which they occur. Despite then current research into ubiquitous computing, and the already rapid adoption of mobile telephony, in 1996 computing was still something primarily linked to particular places; the dominant paradigm for information services was the desktop computer connected to a fixed infrastructure. Mobility was certainly on the radar for

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

CSCW’06, November 4-8, 2006, Banff, Alberta, Canada.  
Copyright 2006 ACM 1-59593-249-6/06/0011...\$5.00.

researchers in CSCW [e.g. 3], but not nearly to the extent we find today when, for example, many researchers in ubiquitous computing and related fields feel that the cell phone should be the primary platform for deploying new information services. These are not simply technological transformations, but also transformations in social and cultural practice; our expectations about what computers are, what they might do for us, and the role of digital objects in everyday life have evolved considerably in the past decade.

So too have the sites of research inquiry within CSCW. In 1996, CSCW researchers focused primarily (although not exclusively) on traditional workplaces – offices, laboratories, factories, hospitals, etc. However, as digital technologies have colonized others locations and other aspects of life, those have also become part of the purview of CSCW researchers, and we have seen a growing interest in studies of information technology in the home [e.g. 12, 23], in museums and cultural spaces [e.g. 29], and in leisure settings [e.g. 1, 9, 18]. These studies have broadened both the physical settings and the sets of practices to which CSCW has addressed itself.

Considerable debate, of course, has attended these developments and the question of whether the move beyond traditional workplaces is a legitimate, appropriate, or productive concern for CSCW research [e.g. 21]. For the purposes of this paper, though, I want to argue that the apparent transformations in disciplinary interest over the past ten years are not transformations at all. CSCW has not changed its scope of inquiry, because its “site” was not simply those settings in which studies were conducted. CSCW’s “site” is the relationship between information technology and collective practice, and as both information technology and practice have developed, so too has CSCW’s research attention.

Further, since it is precisely this relationship between technology and practice that underwrites the conceptual distinction between place and space, and since questions of mobility are inextricably bound up with questions of spatiality, it seems entirely appropriate to revisit the question of place and space once again and consider how we might approach it in light of recent developments.

My goal here is to understand two related developments over the last decade. One is the way in which the conceptual distinction between place and space has been taken up by CSCW researchers, and to see what kinds of light we might be able to cast on this by returning to the roots of this distinction in fields such as geography and urban studies that have something to say about the social organization of spaces. The other is the ways in which our heightened understanding of the issues of mobility and information as an aspect of everyday life, emerging out of studies and experiences with mobile technologies, might reinvigorate a conceptual exploration of questions of practice and spatiality, and help us deepen our understandings of the implications of arguments about place and space.

There are five related themes that I want to explore here:

The first concerns the relationship between place and space. In particular, while maintaining the broad distinction that Harrison and Dourish put forward, I want to argue for a view of space that differs radically from that which emerges from the traditional place/space discourse within CSCW, seeing space as a social product every bit as much as place.

The second concerns the production of space in everyday settings, and the accomplishment of spatial practice. In this, I want to turn to a range of alternative accounts of space and spatial practice to understand how the two are related to each other. Information technologies are deployed as aspects of spatial practice, and so this relationship is particularly pertinent.

The third concerns what Massey has called the “power geometry” of space, which in turn plays a significant although often under-examined role in how we think about mobility and collaboration. I will look at this particularly in light of growing interest in technology in urban settings, although applications to cultural spaces, domestic spaces, commercial spaces, and working spaces are plentiful.

The fourth concerns the nature of information technology in space, and in particular how technology forces us to re-encounter space. Technological practices are spatial practices, and but I want to argue against an account of technologies simply creating new “virtual” spaces.

Finally, the fifth concerns the legibility of space, especially in light of the increasingly deployment of wireless networks and similar technologies, which render space and spatial practice legible in new ways.

I will begin by discussing some of the ways in which the place and space argument has developed in CSCW, and how we might relate it to perspectives from other disciplines.

## 2. RELATING PLACE AND SPACE

One reason for recounting, above, the intellectual history of the original “place” paper is to account for some of its omissions. What it primarily attempted to do – and, along with other pieces published by other researcher, seems to have done successfully – is to introduce the question of “place” into the discussion of the relationship between people, activities, and the settings in which they arise. Where technology was posited as creating new and virtual spaces, we wanted to suggest that there might be more going on – and to account, for example, for why it was that the “space” of the Media Space was not the same as the “space” of Collaborative Virtual Environments. So, although often cited as an exploration of “space and place,” that paper focused largely on place. It talked little of space, and little too of the relationship between the two concepts. While this was an appropriate rhetorical strategy given the project that the paper undertook, ten years later it seems important to revisit the question of space alongside that of place, and in particular to think about the relationship between the two.

One common reading of the relationship between space and place as articulated by Harrison and Dourish has been to see space as a natural fact – a collection of properties that define the essential reality of settings of action – and place as a social product, a set of understanding that come about only after spaces have been encountered by individuals and groups. The relationship, then, is one in which place comes *after* and is *layered on top* of space.

Kling et al. [36] refer to this as the “layer-cake model” of socio-technical systems, and it is a common way to think about the interaction between the technological world and the physical world. In setting out the layer-cake model, Kling and colleagues want to suggest that the ways in which social and technical are related to each other are much more complicated. For instance, the technological structures around which social practices emerge

are themselves the outcomes of other forms of social practice – political, organizational, economic, historical, and more. The sets of technological artifacts that we have at our disposal are ones that we created for ourselves in response to perceived needs and opportunities – thoroughly social in nature. Access to technology (not just artifacts, but training, and the ability and opportunity to create and manipulate them) are enmeshed in complex social processes, and so the relationship between social practice and technology is much more complex than the layer-cake model suggests.

A similar argument complicates the relationship between place and space. Space is a social product just as much as place. Certainly, our experience of space refers to an external world. However, the mathematical and conceptual resources that we have at hand when we talk about space are the products of particular kinds of social practice (e.g. practices of land management, commercial exchange, cartography and navigation, geometric proof, etc.)

The critical turn here is to recognize mathematical practice as, itself, socially constituted, in at least two ways. The first is that explored by Lakoff and Nunez [37], who draw on studies of embodied cognition to demonstrate that, in their terms, “mathematics has a human face” – that is, that the forms of mathematical abstraction and reasoning with which we are familiar are inherently human products, the products of our embodied encounters with and experience with the world. The second is that explored by Livingston, whose ethnomethodological study of mathematics draws particular attention to the work of, for example, producing mathematical proofs in ways that can be seen, indexically, to be outcomes of competent professional practice [40]. While mathematics lays down an open-ended series of valid manipulations of formal structures, only a subset of these manipulations are seen as being valid as part of proof; the forms of intent, progress, and rationality that they must demonstrate in order to be taken as proof lie outside of the “rules of the game” and yet are fundamental to the practice of mathematics.

Conventional spatiality, then, is a mathematical notion, a formal representation embedded in and arising from particular kinds of scientific practice. The important question to ask here, then, is what kinds of practices give rise to modern accounts of space?

One, of course, is the practice of geography. Curry [15] explores the origins of geography as a scientific discipline. Historically, he identifies three forms of related inquiry – the topographic, the chorographic, and the geographic. To some extent, these practices are related by differences in scale. Topography was, broadly, the study of places, chorography, the study of regions, and geography, the study of the earth as a whole. However, this simple scalar relation obscures broader differences in the ways in which they formulated and approached their topics. In different ways, topography and chorography addressed themselves to places understood as units, rather than to interconnections. They were both, to some extent, studies of particularity and uniqueness. Geography, by contrast, is concerned with abstraction, generality, and comparison. Where topography is concerned with the unique aspects of particular and individual places, geography is concerned with the ways in which they are connected and can be fitted into a uniform whole.

The geographic tradition is the most recent to arise, and indeed, Curry argues, its conceptual tools – not least mathematical account of space and grid systems as means to organize it – have driven out *topos* and *choros* as not just topics but as forms of inquiry, enshrining mathematical models of space as the primary way in which we think about, and talk about, the arrangement of the everyday world.

Mathematical models of space, and the grid systems that can be imposed over it, are similarly enmeshed in other forms of social practice. Space and its representations are crafted in support of particular needs. Hutchins, in writing about navigational charts for seafaring, emphasizes that “not until the Mercator projection did a straight line have a computationally useful meaning” [30:113]. While a boon for navigation, the Mercator projection has led to controversy as well. In order for straight lines to have meaning the map which results is a distortion of the Earth’s surface, one which happens to exaggerate the size of countries which lie closer to the poles, typically economically developed nations countries, and under-represent the landmass of those closer to the equator, primarily Third World countries. In this case, our experience of the vastness of the African continent is of secondary importance to the opportunity to use geometric tools for navigation. The social runs right through any “foundational” account of space.

So, the layer-cake model does not hold. While the 1996 paper pointed to the importance of understanding place socially, similar arguments can be applied to space. Indeed, where the conventional reading of place and space in CSCW has suggested that “place” arises only out of (and therefore both consequentially and subsequently to “space”), I would suggest instead that place comes first. Our experience of the world is not an experience of mathematically derived uniformity and connectedness; what we experience are places, heterogeneous locales with local meaning, different extents, and individual properties. Space is something we can encounter only afterwards. We can look elsewhere to find the emergence of this notion of space as an outcome of practice.

What does this mean for us as designers and analysts of collaborative technologies? A range of technological considerations will emerge as we explore different aspects of the relationship, but the skeptical reader might appreciate some reassurance at this stage. So let us think about space and place and technology for a moment.

I have argued that the predominant interpretation of the relationship between place and space has looked at space as pre-given and place as a social product. From that point of view, the overriding technical question is to understand those features of spaces that are conducive to the creation or emergence of place. However, I have argued for a different perspective, one that recognizes the ways that both space and place are products of embodied social practice.

What this suggests, then, is that we need to understand, first, something of the relationship between spatiality and practice, and, second, how multiple spatialities might intersect. This is particularly the case when we think not about “virtual” settings but rather about the ways in which wireless and other technologies might cause people to re-encounter everyday space. Introducing technology into these settings does not simply create new opportunities for sociality (the creation of places); rather, it transforms the opportunities for understanding the structure of

those settings (developing spatialities). Indeed, technologies are always already spatializing, whether those are technologies of movement (transportation systems), of navigation (telescopes, sextants, and GPS devices), of representation (maps), or of disputation (legalisms). What we need to understand, then, is how spatiality arises, and the role that technology plays in these practices.

### 3. SPATIAL PRACTICE

French cultural theorist Michael de Certeau has drawn attention to the relationship between practice and spatiality [16]. De Certeau's concern is the ways in which, in everyday, unconscious practice, people alter, adapt, and appropriate cultural products and make them their own. This is, of course, a concern familiar to CSCW researchers who have often focused on the relationship between design intent and the actual use of technologies, but de Certeau goes further. He is especially concerned with the power relationships within which these uses of technology are embedded.

In the case of everyday space, he argues that we should distinguish between "strategic" and "tactical" spatial practices. Broadly, strategic spatial practices are those associated with centers of power and control. "It would be legitimate," he writes, "to define the power of knowledge by this ability to transform the uncertainties of history into readable spaces" (p36). So, strategic spatial practices are those by which the large-scale narratives of space are constructed and achieved. One famous example might be Haussman's design of Paris, but, writing in a Foucaultian mode, de Certeau attributes to the strategic other ways in which spatial design and organizational disciplines movement and presence, and brings it into alignment with other structures of power; examples might include the disciplines of moment imposed by factory floors, theme parks, or (perhaps) smart homes. Tactics, on the other hand, are "acts of the weak" (p 37). In speaking of tactical spatial strategies, de Certeau draws attention to the ways in which people create their own meaning for spaces, individually and collectively, through the specific ways in which they move through those spaces and put them to use. Speaking of walking in the city, he notes:

"The act of walking is to the urban system what the speech act is to language or to the statement uttered. At the most elementary level, it has a triple 'enunciative' function: it is a process of *appropriation* of the topographic system on the part of the pedestrian (just as the speaker appropriates and takes on the language); it is a spatial acting-out of the place (just as the speech act is an acoustic acting-out of the language); and it implies *relations* amongst differentiated positions" (p.97, emphasis original)

What is especially relevant here for CSCW, of course, is that strategic practices are the practices of design, whereas tactical practices are the practices of use. To the extent that design is an exercise of power over the forms and functions of technology, de Certeau points out that these take their shape only through the ways in which they are subsequently appropriated. Critically, this must be understood as practice rather than representation:

"It is true that the operations of walking on can be traced on city maps in such a way as to transcribe their paths (here well-trodden, there very faint) and their trajectories (going this way and not that.) But these thick or thin curves only

refer, like words, to the absence of what has passed by. Surveys of routes miss what was: the act itself of passing by. The operation of walking, wandering, or 'window shopping,' that is, the activity of passers-by, is transformed into points that draw a totalizing and reversible line on the map. They allow us to grasp only a relic set in the nowhen of a surface of projection. Itself visible, it has the effect of making invisible the operation that made it possible. These fixations constitute procedures for forgetting. The trace left behind is substituted for the practice." (p. 97).

There are two points that it is important to take from this.

The first is that the relationship between spatiality and practice leads de Certeau to a distinction between space and place which seems, at first glance, to be quite different from that proposed by Harrison and Dourish, but which is, in fact, compatible with it in the ways in which I have argued here. De Certeau described space as "a practiced place", but the practices to which he refers are the spatial tactics described above:

"A space exists when one takes into consideration vectors of direction, velocities, and time variables. Thus space is composed of intersections of mobile elements." (p.117).

So, for de Certeau, space is a social product. Certainly, this view is incompatible with one that postulates that the difference between space and place is the difference between physical and social. However, I have been arguing here for an alternative approach that understands *both* space and place as the products of different sorts of social practice, and this seems strongly resonant with de Certeau's argument.

The second is that the production of space takes place within specific power relationships. In distinguishing between spatial strategies and spatial tactics, he draws attention to the different positions from which spatial practices emerge. The next section will explore this point in more detail. Before moving on, though, I want to note a series of examples that may help to make the relationship between practice and spatiality clearer.

For example, consider Hutchins' studies of Micronesian navigation [30]. Hutchins starts off with an apparent conundrum – the accuracy of Micronesian navigators undertaking long sea journeys, but without the maps and other navigational devices that support Western navigation.<sup>1</sup> What he finds is an alternative set of ways of representing space and ones movement through it which do not depend on the "view from nowhere" that is the basis of Western navigation – the projection of oneself onto maps and charts, real or imaginary. Micronesian navigation depends instead on an alternative imagining of space and ways therefore of reasoning about movement through it. Hutchins' concern is with the technologies of representation that support particular kinds of cognitive effort, and I will return to this topic later; for now, though, I want primarily to draw attention to the alternative spatialities at work.

As a second example, take Nancy Munn's account of Australian Aboriginal conceptions of space and movement [43]. This is prompted, in part, by the observation of elaborate detours and

---

<sup>1</sup> Obviously, this is no conundrum to the Micronesians, but only to those for whom Western navigational practices are thoroughly naturalized.

round-about paths followed by Aboriginal people moving through an environment which does not present significant physical obstacles to movement. What it does provide, though, is a range of “ritual exclusions” – cultural and historical obstacles and constraints upon ones movement through the space. The ritual association with spaces and particular kin groups, the presence and movement of others and their ritual or kinship status, the association of particular locations with events and people with whom one might stand in an excluded status (e.g. recently dead kin) creates a complex pattern of spatial arrangements towards which one must be continually oriented. Spatiality, here, cannot be separated from the cultural and spiritual aspects of the landscape.

Closer to home – for me, at least – is the example provided by Kelleher’s study of memory, identity, and space in a Northern Irish city [34]. Kelleher is concerned not least with the ways in which particular forms of sectarian identity are enacted in everyday life, and the encounter with the space of the city is a central consideration here. It is not simply that certain areas of the city are regarded as belonging to “us” and others to “them,” although that is certainly the case. Rather, the very topography of the city is associated with a series of historical moments and movements that account for the ways that things are now, so that movement through the space of the city reproduces and reinforces these identities. (See also [13, 35, 38].)

Again, my goal is not to suggest that these are cultural experiences that are “layered on top of” an absolute, external, and objective account of space. Rather, I want to suggest that cultural and social accounts of space are fundamental to our everyday experience, and that the mathematical accounts of space are another amongst a range of cultural lenses through which we may see and act in the world.

#### 4. POWER GEOMETRY

What we see at work here is the production of particular spatialities as the outcomes of different forms of concurrent practice. In the distinction between strategic and tactical spatial practice, we find a means to understand something of the context in which individual spatial experience takes place.

De Certeau embeds the production of space within frames of power. While in his arguments about spatial tactics he draws particular attention to the ways in which individuals move through space, we might generalize this and think more broadly about the flows of people, goods, capital, and information that help to create spatiality – or the multiple spatialities of complex environments like cities [52].

Cities are not only internally complex spaces, but also linked together through these flows. Writing of her local shopping street in London, Doreen Massey notes: “it is (or ought to be) impossible even to begin thinking about Kilburn High Road without bringing into play half the world and a considerable amount of British imperialist history” [42:65]. Duruz provides related examples in the “culinary journeys” available in London and Australia, and the ways in which they act as sites for considerations of identity, locality, and globalization [19].

Cities are enmeshed in these flows and reflect them in their own structures. The infrastructure of the city enables, hinders, and directs these flows, resulting in an experience of the city that is both heterogeneous and dynamic. The flows that concern Massey

are not simply the daily rhythms of everyday life – transportation and movements of people and goods – nor even the longer-scale evolution of cities (outward expansion and the flow of people between urban centers and suburban and exurban communities), but also the broader historical patterns that link places together.

With the seeming ubiquity of information and communication technologies has come a focus on what may seem to be a collapse of time and space. Castells discusses globally distributed processes of production, in which capital, labor, management, and markets may be half a world away from one another and yet linked and coordinated [10]. Harvey refers to the “time-space compression” that is part and parcel of modern capitalism [27]. However, Massey’s concept of “power geometries” is more nuanced, and provides a useful lens for understanding cities as culturally and historically specific in these terms:

“For different social groups and different individuals are placed in very distinct ways in relation to these flows and interconnections. The point concerns not merely the issue of who moves and who doesn’t, although that is an important element of it; it is also about power in relation to the flows and the movement. Different social groups have distinct relationships to these anyway-differentiated mobility: some are more in charge of it than others; some initiate flows and movement, others don’t; some are more on the receiving end of it than others; some are effectively imprisoned by it.” [42:61]

We find these considerations especially important when we start to think about mobility and technology, most especially in the context of growing research interest in what has been called “urban computing” – the role of technology in urban experiences [e.g. 41, 45]. While, again, these considerations arose first in ubiquitous computing, they have also been a focus of attention at CSCW research venues [e.g. 9, 33]. We want to draw attention to two particular concerns here.

The first, which will occupy us further in a moment, is the role that technology plays in staging encounters between people and urban space. Transportation systems are the most visible of these, as illustrated by Vertesi’s exploration of the London Underground map as a mental model for the organization of London [49]. However, with the increasing interest in municipal networks, we start to encounter the spatiality of city through the range of services that might be available, particularly when such services are deployed selectively. An investigation of the spatial correlation between wifi access points and median household income might be instructive.

The second consideration here is the very way in which we think about personal mobility and urban movement in the context of technology design. It has been noted elsewhere the cities that are the sites of urban computing research typically quite similar (first-world “world cities” with significant infrastructures and capital investments – San Francisco, New York, London and Tokyo, but not Kuala Lumpur, Sao Paolo, Detroit, or Calcutta) [17]. However, we would note further that the contexts of mobility have been similarly constrained. The urban resident is frequently pictured as young, well-heeled, techno-savvy, and, above all, engaged in discretionary (often somewhat predatory) movement through and consumption of urban space. The overwhelming sense that urban computing technologies convey is one of options and opportunities. Urban computing technologies help people

answer questions like: Where shall I go today? What's the latest "happening" restaurant? Where might I find people whom I might like? They encourage an appropriation of space [11] in ways that certainly reflect De Certeau's concern with spatial tactics but often fail to acknowledge his considerations of the systems of power and control within which those tactics emerge (and against which they should be read). By way of contrast, let us think of other residents of urban space whose orientation towards mobility might be quite different, such as the homeless, for whom movement is a way of avoiding problematic encounters with authority [6, 48], taxi-drivers for whom mobility is a form of labor, or those who spend upwards of four hours a day on public transit to reach employment to support themselves and their families [8].

These different circuits of mobility intersect and overlap in urban spaces, and provide alternative opportunities for thinking about the spatialities of technology. Paulos and Jenkins' engaging "urban probe" encourages people to reflect on the patterns of occupation and action of urban space seen through the lens of the trash can; yet it fails to incorporate the idea that, for a small but significant number of urban dwellers, the public trash-can is a source of food [45].

In other words, the production of space is conditioned by one's access to and legitimacy within that space. Encounters with space occur within specific contexts, and the spatialities that result reflect those contexts.

## 5. TECHNOLOGIES OF SPATIALITY

While the discussion so far has been concerned primarily with the social and cultural production of space, it is important to note that the emergence of these spatial logics is conditioned by the technologies through which the world may be encountered and navigated, including technologies of mobility and technologies of representation. Similarly, information technologies are deeply implicated in the operation and emergence of these logics, and the forms of collective encounters with space [7].

One interpretation of this remark is that our interest must be directed towards the ways in which information technologies create new "virtual spaces" that transcend and overlay the "real" spaces of the everyday world. In fact, a number of attempts to create electronic spaces for collaboration and communication, such as technologies for "virtual copresence" or telepresence, have often been founded on just this sort of principle. I would argue for a quite different interpretation of the relationship between place and space in technologically mediated practice. The technologically mediated world does not stand apart from the physical world within which it is embedded; rather, it provides a new set of ways for that physical world to be understood and appropriated. Technological mediation supports and conditions the emergence of new cultural practices, not by creating a distinct sphere of practice but by opening up new forms of practice within the everyday world, reflecting and conditioning the emergence of new forms of environmental knowing.

Ito and Okade's discussion of aspects of Japanese use of mobile telephony and mobile messaging provides a series of vivid examples [31, 32]. Two are particularly relevant here. First, they note the critical role of mobile messaging technologies in face to face encounters in the city. Like Ling and Yttri [39], they point to the ways in which mobile messaging technologies support

"hypercoordination," providing a "last 100 yards" solution for rendezvous, as well as allowing very fine-grained coordination of actions in space when people are together. However, they also show that mobile messaging, beyond hypercoordination, also provides for different forms of presence as a part of a rendezvous. In a large and complex city like Tokyo, travel can be challenging especially at busy times, but, amongst the teens whom they studied, one is not "late" to a meeting if one participates virtually. Mobile messaging is a proxy form of participation when one is not yet physically at a meeting spot: "presence in the virtual communication space is considered an acceptable form of initial 'showing up' for an appointed gathering time".

In a second example, they discuss the use of phones to allow private and intimate communication amongst those who are otherwise unable to find the privacy or autonomy to maintain such relationships [31]. Examples include young people whose mobility in urban spaces might be limited and whose autonomy may be strictly curtailed by parents, teachers, and others, college-age adults who live at home with their parents before or even after beginning to work due to the high cost of housing, or young couples who find that that same housing market forces them to live apart until they have accumulated money for a larger place together. For people in these situations, mobile messaging provides an opportunity for private communication and intimate extended co-presence through the day.

It is tempting, perhaps, to see this as suggesting that new electronic "spaces" are being created which transcend the spatial arrangements and constraints of mundane reality; but I think that this would be a mistake. The "technosocial situations" that Ito and Okabe detail are certainly forms of social and cultural practice that rely on information technology for the forms that they currently manifest. However, they are firmly situated within, motivated by, and shaped in response to everyday life. Mobile messaging technologies in the examples cited by Ito and Okade do not create new spaces, but rather allow people to encounter and appropriate existing spaces in different ways. These new practices, then, transform existing spaces as sites of everyday action. Far from creating a space apart, technology is fundamentally a part of how one encounters urban space.

## 6. SPATIALITY AND CSCW

As was suggested by some of the examples to date, the production of space is a process in which both technology and collaboration are critical elements. On the one hand, space is a collective product; it is an outcome of shared forms of practice and meaning-making. On the other, technologies of all sorts – information technologies not least – are means through which we encounter space. What is particularly interesting at this point – and, I think, significantly different from ten years ago – is the ways in which recent technological developments provide opportunities to re-encounter and re-imagine everyday space. As in the case of the studies by Ito and Okade, what we are interested in here is not the creation of new "spaces apart," but rather the production of new spatialities. In this section, I want to illustrate some of the concerns at work here with reference to recent and ongoing research in CSCW.

Recent work in the UK Equator consortium provides two telling examples. The first, Can You See Me Now, is an urban street game that overlays two spaces, one online and one real (the streets of Sheffield) [22]. Online players, connected to the system

through a website, would move their virtual representations through a map of Sheffield, while human players, armed with GPS location devices and wireless Internet connections, would hunt them on the streets of the real city. When the human player and the virtual player reached the “same” spot, the virtual player was caught. While this layering of spaces itself is intriguing, what is particularly of interest for my purposes is the forms of tactical play that emerge in the ways in which virtual players might exploit their knowledge of the city’s topography (busy streets to be crossed, or steep hills to be climbed) while the human players would similarly begin to exploit GPS blackspots and areas of high and low network connectivity, and incorporate these into their gameplay (hiding in GPS blackspots in order to ambush unsuspecting virtual players, for example.) In other words, the presence or absence of network services became a new way to re-encounter the city streets. This is not simply thought of as an overlay of virtual and physical; GPS satellite line-of-sight and WiFi network signal strength are thoroughly physical phenomena. What they do provide, though, is a new way to think about the space and what one can do there – a new spatiality of access, presence, and interaction.

A second example is the Treasure game created at the University of Glasgow, which takes this one step further by explicitly building a sensitivity to the network infrastructure into the experience of the game [2]. Treasure sets teams of players in a shared physical space to the task of collecting virtual objects. In order to do this, though, and particularly in order to engage in some more advanced tactical play, players must develop an understanding of those regions of the game space that are “within” the wireless network, and not only be able to tell when they are in or out of the range of the game, but also when others might be. Even more clearly here, we see an orientation not only towards the availability of services for oneself, but a spatial rendering of that.

Indeed, we do not need to invoke such specialized examples to see the effects at work. Anyone who has wandered around a conference center looking for the best wireless network signal, or moved themselves from one spot to another in order to get better mobile telephone reception, has encountered just these sorts of issues. Indeed, wireless networking seems to provide a particularly rich ground for the imaginative reinterpretation of space – both for good and ill [23].

Questions of spatiality are also illuminated by a number of recent studies on museums and gallery spaces. The most extensive set of these studies come from the Work, Interaction and Technology group at King’s College London. Vom Lehm et al [50] provide detailed accounts of the ways in which, through orientation, movement, and gesture, people mutually present in galleries configure the exhibit space for each other, creating the spatial settings within which art work is encountered. Subsequent work such as that reported by Heath, Hindmarsh, and colleagues explicitly draw upon these understandings in creating artistic experiences that are compelling precisely because of the kinds of spaces that they create [28, 29].

There are two points that I would like to draw particular attention to in this work. First, in looking at the ways in which people create space in their movement through the gallery space, their work illustrates the ways in which places and spaces are not coextensive. These are not simply two views of the same

locations or volumes; like place, space is being produced here and it may be that the meaningful locales are bounded by people and actions rather than by walls and ceilings. Harrison and Tatar similarly point to the importance of people and events alongside place [26]. The second is that, again, spatiality is a collective product. This is perhaps seen even more strongly in Grinter et al’s study [24], also conducted in museum space. Here, people using a prototype technology supporting communication and collective browsing of cultural space explicitly talk of the ways in which their spatial relations are organized through the technology, talking of such spatial relations (and social interpretations) as “connected,” “nipping at my heels,” or linked by “an invisible rope.”

On a broader scale, a number of researchers have investigated the role of maps and spatial practice in tourism [e.g. 9, 44]. Tourism brings these issues to the fore particularly because of the limited spatial resources available to tourists and their inherent unfamiliarity with the spaces through which they move. What is perhaps especially interesting here is the kinds of tourist spaces and spatial orientations that emerge towards cities and their cultural resources, particularly as a consequence of collective practice. The very existence of tourists and tourism as a category – and a target demographic for technology developers as well as for “urban entrepreneurs” – is dependent on particular conceptions of space, culture, and nature and hence of the flows of people through and between “cultural” and “natural” spaces [14, 47]. Tourism defines a relationship between an individual and other tourists in whose footsteps one moves and with whom one travels, either formally or informally. When we speak of “tourist trails,” we are speaking almost literally, and both paper and electronic maps for tourists do not simply document but produce spatial forms and spatial experience.

To round things out with an example hopefully quite far from leisure domains, studies of waste water treatment plant engineers conducted at Aarhus University display a similar concern for the production of spatialities in the course of work, and the ways in which these are manifest in relation to particular forms of technology [4, 5]. In this case, what we find a form of mobility quite different from that of the tourist or the urban resident, but rather one that is organized around specific forms of work and the technology to which that work is directed. Here, the flows – quite literally – that the technological system defines, and the working activities that maintain them provide an organization spatial frame by which movement, both of self and others, is understood.

## 7. DISCUSSION

What we see at work in this wide range of examples is the production of alternative spatialities – encounters with everyday space and the opportunities for action that it affords which, in turn, become ways in which spaces, their extents, their boundaries, and their capacities become legible, understandable, practical, and navigable. It is tempting perhaps to think of these as radical new possibilities opened up by the latest technology; however, these sorts of space-making are fundamental aspects of embodied experience and should be seen as variants on the ways in which spatial experience is seen through a cultural and social lens [7]. Three points are especially worth drawing out here.

First, it is important to recognize that the kinds of legibility at work here are collective. In just the same way as we argued in 1996 for a collective experience of the meaningfulness of place,

spaces become legible here collectively, through the forms of collective practice that they enable. Practice, in Wenger's formulation, is a process by which we find the world and our encounters with it meaningful [51]; and meaning is a collective phenomenon. It is not simply that, as in Treasure, I must learn to understand others' action in space with reference to my own, although that is certainly the case. But going further, the ways we have of encountering space through practice are just that – ways we have. For Ito and Okade's teens in Tokyo, the meaningfulness of mediated presence is a collective matter, not an individual one.

Second, the forms of legibility at work here are heterogeneous. They exist at the intersection – or, more appropriately, as the superposition – of many different spatial systems. I mean this in two ways. The first is that there are many spatial systems and infrastructures at work simultaneously, so that Internet accessibility, mobile telephony, transportation systems, visual and physical access, and more, all result in different forms of spatial experience and that, when we talk about spatiality, we must think of the ways in which they occur together. The second (reflecting the discussion of power geometries) is that spatialities are relative to the different constituencies, populations, and agencies at work.

Third, and drawing on both of these, the spatialities with which we are concerned here are experienced and produced from within rather than defined and imposed from without. They are the products of lived experience and embodied action, rather than external codifications. The attempt to impose spatial forms inevitably falls foul of the collective, heterogeneous, and adaptive nature of everyday spatiality [46].

One question that might be left after this discussion of the social origin of spatiality is, what role is left for 'place'? In fact, I would argue, the notion of 'place' as explored ten years ago remains reasonably intact. By place, we attempted to express the ways in which our encounters with specific locales, our interpretations of their borders, and our behavioral responses draw on social and cultural foundations. Here, though, my concern is with spatiality – with the ways in which we understand the structures that relate those places that we encounter. That said, this is certainly not, as one reviewer suggested, a paper about navigation; in fact, the limited focus of many technology and design efforts on navigational tools reflects precisely the configuration of space and practice that I am critiquing here. Navigation is primarily concern with how we might find our way; my concern here is with how, in our encounters with space, we might find *more than* our way.

## 8. CONCLUSION

In the decade since Re-Place-ing Space was published, the questions of space and place have only become more relevant to CSCW research and practice. Mobility, the encounter with technology in different social settings, the need to understand contexts, the ability to transform spaces through the introduction of technology, the emergence of "locative media" – these and any number of other changes have both made space more relevant to CSCW, and CSCW more relevant to space.

However, we have, by and large, made little appeal to the disciplinary areas in which these ideas take center stage. In this paper, I have attempted to draw out the relevance for CSCW of various positions within the broad area of cultural geography, and explore some alternative accounts of place and space from that point of view. The perspectives that I have presented amplify

rather than contradict the distinction raised in Re-Place-ing Space and related research of the time; however, at the same time, they also provide new perspectives.

My goal has not been to recant the distinction raised in the original paper, but rather to argue against the simple dualism that can result. In the years since its publication, it has proven tempting to adopt a taxonomic view of the distinction between place and space – to attempt to classify some locales and places, some as spaces, and to further elaborate a typology [e.g. 33]. I have argued here that this is a product of the separation of space and place into two different domains, the domain of the physical and the domain of the social. However, a closer examination suggests that this distinction cannot hold. Place and space are both products of social practice, albeit different systems of practice.

In Re-Place-ing Space, it was place that got all the glory. Here, I have focused more on space – or, more accurately, on spatiality (and spatialities), the ways in which we generate spatial forms and articulate spatial experiences. It is time, perhaps, to re-space place. More importantly, it is important to see both as critical aspects and products of the circumstances of interaction.

Once again, as ten years ago, there is much that points in this direction already to be found in CSCW research. I have drawn a number of examples from recent work in the area to suggest that spatiality and legibility are central considerations and deserve more attention. I would not expect these issues to go away.

## 9. ACKNOWLEDGMENTS

I am grateful to Ken Anderson, Genevieve Bell, Tom Boellstorff, Michael Curry, and Steve Harrison for valuable insight into this work. Johanna Brewer and Amanda Williams have played especially important roles, and much of this has been shaped by their critiques and inspiration. This work has been supported in part by the National Science Foundation under awards 0133749, 0205724, 0326105, 0527729, and 0524033, and by a grant from Intel Corporation.

## 10. REFERENCES

- [1] Agostini A., De Michelis G., Divitini M., Grasso M.A., Snowdon D. 2002. Design and Deployment of Community Systems: Reflections on the Campiello Experience. *Interacting with Computers*, 14(6), 691-714.
- [2] Barkhuus, L., Chalmers, M., Tennent, P., Hall, M., Bell, M., Sherwood, S., and Brown, B. 2005. Picking Pockets on the Lawn: The Development of Tactics and Strategies in a Mobile Game. *Proc. Intl. Conf. Ubiquitous Computing Ubicomp 2005* (Tokyo, Japan). Berlin: Springer.
- [3] Bellotti, V. and Bly, S. 1996. Walking Away from the Desktop Computer: Distributed Collaboration and Mobility in a Product Design Team. *Proc. ACM Conf. Computer-Supported Cooperative Work CSCW'96* (Cambridge, MA). New York: ACM.
- [4] Bertelsen, O. and Bødker, S. 2001. Cooperation in Massively Distributed Information Spaces. *Proc. European Conf. Computer-Supported Cooperative Work ECSCW 2001* (Berlin, Germany).
- [5] Bertelsen, O. and Neilsen, C. 1999. Dynamics in Wastewater Treatment: A Framework for Understanding Formal Constructs in Complex Technical Settings. *Proc. European*

- Conf. Computer-Supported Cooperative Work ECSCW'99* (Copenhagen, Denmark), 277-290. Dordrecht: Kluwer.
- [6] Bittner, E. 1967. The Police on Skid Row: A Study of Peace Keeping. *American Sociological Review*, 32(5), 699-715.
- [7] Brewer, J. and Dourish, P. 2006. *Storied Spaces: Cultural Accounts of Technology and Environmental Knowing*. Working paper (currently under review).
- [8] Brewer, J. and Nguyen, D. 2006. An Ethnography of OCTA Bus Travel. Working paper, University of California, Irvine.
- [9] Brown, B. and Chalmers, M. 2003. Tourism and Mobile Technology. *Proc. European Conf. Computer-Supported Cooperative Work ECSCW 2003* (Helsinki, Finland.) Dordrecht: Kluwer.
- [10] Castells, M. 2000. *The Rise of the Network Society*. Oxford: Blackwell.
- [11] Chang, M. and Goodman, E. 2004. Fiasco: Game Interface for Location-based Play. *Proc. ACM Conf. Designing Interactive Systems*, 329-332. New York: ACM.
- [12] Crabtree, A. and Rodden, T. 2004. Domestic Routines and Design for the Home. *Computer Supported Cooperative Work*, 13(2), 191-220.
- [13] Crang, M. and Travlou, P. 2001. The City and Topologies of Memory. *Environment and Planning D: Society and Space*, 19, 161-177.
- [14] Cronon, W (ed). 1996. *Uncommon Ground: Rethinking the Human Place in Nature*. New York: Norton.
- [15] Curry, M. 2002. Discursive Displacement and the Seminal Ambiguity of Space and Place. *Handbook of New Media* (Lievrouw and Livingston, eds), 502-17. Beverly Hills, CA: Sage.
- [16] De Certeau, M. 1984. *The Practice of Everyday Life*. Berkeley, CA: University of California Press.
- [17] Dourish, P. and Bell, G. In press. The Infrastructure of Experience and the Experience of Infrastructure: Meaning and Structure in Everyday Encounters with Space. *Environment and Planning B: Planning and Design*.
- [18] Ducheneaut, N. and Moore, R. 2004. The Social Side of Gaming: A Study of Interaction Patterns in A Massively Multiplayer Online Game. *Proc. ACM Conf. Computer-Supported Cooperative Work* (Chicago, IL). New York: ACM.
- [19] Duruz, J. 2005. Eating at the Borders: Culinary Journeys. *Environment and Planning D: Society and Space*, 23, 51-69.
- [20] Fitzpatrick, G., Kaplan, S., and Mansfield, T. 1996. Physical Spaces, Virtual Places and Social Worlds: a Study of Work in the Virtual. *Proc. ACM Conf. Computer-Supported Cooperative Work CSCW'96*, 334-343.
- [21] Fitzpatrick, G. and Dourish, P. 2003. Computer-Supported Cooperative What? Panel discussion at European Conf. *Computer Supported Cooperative Work* (Helsinki, Finland)
- [22] Flinham, M., Anastasi, R., Benford, S., Hemmings, T., Crabtree, A., Greenhalgh, C., Rodden, T., Tandavanti, N., Adams, M., and Row-Farr, J. 2003. Where On-Line Meets On-The-Streets: Experiences with Mobile Mixed Reality Games. *Proc. ACM Conf. Human Factors in Computing Systems CHI 2003* (Ft Lauderdale, FL). New York: ACM.
- [23] Grinter, R. 2005. The Work to Make the Home Network Work. *Proc. European Conf. Computer-Supported Cooperative Work ECSCW 2005* (Paris, France). Dordrecht: Kluwer.
- [24] Grinter, R., Aoki, P., Hurst, A., Szymanski, M., Thornton, J., and Woodruff, A. 2002. Revisiting the Visit: Understanding How Technology Can Shape the Museum Visit. *Proc. ACM Conf. Computer-Supported Cooperative Work* (New Orleans, LA). New York: ACM.
- [25] Harrison, S. and Dourish, P. 1996. Re-Place-ing Space: The Roles of Space and Place in Collaborative Systems. *Proc. ACM Conf. Computer-Supported Cooperative Work CSCW'96* (Boston, MA), 67-76. New York: ACM.
- [26] Harrison, S. and Tatar, D. In submission. Places: People, Events, Loci – The relation of semantic frames in mediated experience. Submitted to *Computer-Supported Cooperative Work*.
- [27] Harvey, D. 1989. *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change*. Oxford: Blackwell.
- [28] Heath, C., Luff, P., Vom Lehn, D., Hindmarsh, J., and Cleverly, J. 2002. Crafting Participation: Designing Ecologies, Configuring Experience. *Visual Communication*, 1(1), 9-33.
- [29] Hindmarsh, J., Heath, C., vom Lehn, D., and Cleverly, J. Creating Assemblies: Aboard the Ghost Ship. *Proc. ACM Conf. Computer-Supported Cooperative Work CSCW 2002* (New Orleans, LA), 156-165. New York: ACM.
- [30] Hutchins, E. 1995. *Cognition in the Wild*. Cambridge, MA: MIT Press.
- [31] Ito, M. and Okabe, D. 2005a. Intimate Connections: Contextualizing Japanese Youth and Mobile Messaging. In Harper, R., Palen, L., and Taylor, A. (eds). *The Inside Text : Social, Cultural and Design Perspectives on SMS*. Springer.
- [32] Ito, M. and Okabe, D. 2005b. Technosocial Situations: Emergent Structurings of Mobile Email Use. In Ito, M., Okabe, D., and Matsuda, M. (eds). *Personal, Portable, Pedestrian: Mobile Phones in Japanese Life*, 257-273. Cambridge, MA: MIT Press.
- [33] Jones, Q., Grandhi, S., Whittaker, S., Chivakula, K., Terveen, L. 2004. Putting Systems into Place: A Qualitative Study of Design Requirements for Location-Aware Community Systems. *Proc. ACM Conf. Computer-Supported Cooperative Work* (Chicago, IL). New York: ACM.
- [34] Kelleher, W. 2003. *The Troubles in Ballybogoin: Memory and Identity in Northern Ireland*. Ann Arbor, MI: University of Michigan Press.
- [35] Klein, N. 1997. *The History of Forgetting: Los Angeles and the Erasure of Memory*. London: Verso.
- [36] Kling, R., McKim, G., Fortuna, J., and King, A. 2000. Scientific Collaboratories as Socio-Technical Interaction Networks: A Theoretical Approach. *Americas Conference on Information Systems* (Long Beach, CA).

- [37] Lakoff, G. and Nunez, R. 2001. *Where Mathematics Comes From: How the Embodied Mind Brings Mathematics into Being*. New York: Basic Books.
- [38] Lilley, K. 2004. Mapping Cosmopolis: Moral Topographies of the Medieval City. *Environment and Planning D: Society and Space*, 22, 681-698.
- [39] Ling, R., & Yttri, B. 2002. Hyper-coordination via mobile phones in Norway. In Katz, J. E. and Aakhus, M. (eds). *Perpetual Contact: Mobile Communication, Private Talk, Public Performance*. Cambridge: Cambridge University Press.
- [40] Livingston, E. 1986. *The Ethnomethodological Foundations of Mathematics*. London: Routledge & Kegan Paul
- [41] Mainwaring, S., Anderson, K., and Chang, M. 2005. Living for the Global City: Mobile Kits, Urban Interfaces, and Ubicomp. *Proc. Intl. Conf. Ubiquitous Computing Ubicomp 2005* (Tokyo, Japan). Berlin: Springer.
- [42] Massey, D. 1993. Power-geometry and a Progressive Sense of Place. In Bird, Curtis, Putnam, Robertson and Tickner (eds), *Mapping the Futures: Local Cultures, Global Change*. London: Routledge.
- [43] Munn, N. 1996. Excluded Spaces: The Figure in the Australian Aboriginal Landscape. *Critical Inquiry*, 22(3), 446-465.
- [44] Norrie, M. and Signer, B. 2005. Overlaying Paper Maps with Digital Information Services for Tourists. *Proc ENTER 2005 Conference on Travel and Tourism Technology*, 23-33.
- [45] Paulos, E. and Jenkins, T. 2005. Urban Probes: Encountering Our Emerging Urban Atmospheres. *Proc. ACM Conf. Human Factors in Computing Systems CHI 2005* (Portland, OR). New York: ACM.
- [46] Scott, J. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press.
- [47] Smith, V. (ed). 1989. *Hosts and Guests: The Anthropology of Tourism*. Pittsburgh, PA: University of Pennsylvania Press.
- [48] Spradley, J. 1988. *You Owe Yourself a Drunk: An Ethnography of Urban Nomads*. New York: University Press of America.
- [49] Vertisi, J. 2005. Mind The Gap: The 'Tube Map' as London's User Interface. Position paper at CHI 2005 Workshop on "Engaging the City".
- [50] Vom Lehn, D., Hindmarsh, J., and Heath, C. 2001. Exhibiting Interaction: Collaboration in Museums and Galleries. *Symbolic Interaction*, 24(2), 189-216
- [51] Wenger, E. 1999. *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.
- [52] Williams, A. and Dourish, P. 2006. Imagining the City: Cultural Dimensions of Urban Computing. *IEEE Computer* (to appear in 2006).