

# Imagining the City: The Cultural Dimensions of Urban Computing

*Amanda Williams and Paul Dourish*

University of California, Irvine

**Much urban computing research focuses on cities as generic settings and containers of action. However, they can also be viewed as products of historically and culturally situated practices and flows. When seeing urban areas in this context, rather than as collections of people and buildings, infrastructure and practice are closely entwined.**

**B**y freeing computation from the confines of the desktop, pervasive computing encourages us to think more deeply about the spaces in which it might be deployed. Urban computing research, in particular, exhibits a strong focus on the spaces for computation. Most research in this field views “the city” as a generic setting, studying phenomena that exist in any city and producing findings that might apply to any city. However, we view cities as culturally and historically specific, rather than homogenous, and are attempting to open up new perspectives on urban computing by exploring their cultural dimensions.

Cities as cultural objects can be interpreted in two different ways. The *taxonomic* view recognizes that cities in Britain are different from those in the US, Australia, or Asia. Though it allows for categorization and classification, the taxonomic view of culture obscures a deeper meaning. We are more concerned with the *generative* or *interpretive* notion of culture, which recognizes that cities reflect and reproduce cultural values, and that encounters with cities represent opportunities for cultural work. For example:

- Anthropologist William Kelleher describes a Northern Ireland city’s spatial and economic organization as a site where inhabitants produce ethnic and religious identity.<sup>1</sup> Residents interpret the site according to a “cultural script” that explains things in historical and ethnic terms.

- Geographer Keith Lilley details how Norman conquerors took advantage of English city dwellers’ belief that urban spatial organization represented a moral mapping reflected in the body and cosmos.<sup>2</sup> By transforming the city, conquerors literally achieved and symbolically represented the social marginalization of Anglo Saxon populations.
- Anthropologists Mizuko Ito and Daisuke Okabe note that conventional spatial references and pervasive information infrastructures affect cultural interpretations of presence, interaction, and intimacy in modern Japanese cities.<sup>3</sup>

As culturally and historically specific forms, cities reflect how we see our world. While the generative perspective of culture points to particular cities’ uniqueness, they are also connected by larger flows of people, goods, information, and capital. Figure 1 shows an example of these global flows. Local activities in particular cities are embedded within processes of cultural production that occur on broader spatial scales. Writing of her local shopping street in London, Doreen Massey notes that, “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.”<sup>4</sup>

Cities’ networked infrastructures enable, hinder, and direct these flows, resulting in a heterogeneous and dynamic experience of the city. Massey is concerned not only with the daily rhythms of everyday life

(transportation and movements of people and goods) and cities' longer-scale evolution (outward expansion and people's flow between urban centers and suburban and exurban communities), but also the broader historical patterns that link distant places.

Massey coins the term *power geometries* to provide a lens for understanding cities as culturally and historically specific. "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."

Thinking about urban computing from this perspective prompts several questions. What cultural dimensions frame research in technologies for city life? What lenses do researchers use to analyze and understand this research? And how might a change of frames inform our technological practice?

### URBAN THEMES

Certain themes recur in both urban computing research and anthropological and geographical accounts of cities. One of the oldest and most pervasive concerns the density and numbers of city inhabitants, their indifference, and their connectedness. Mobility is also a crucial aspect of the modern city, from Baron Haussmann's redesign of Paris's thoroughfares in the 1860s, to the more recent availability of location-based mobile services, to the flows of information and capital that connect physically and culturally distinct metropolitan areas. Finally, urban spaces are informative to their inhabitants, giving information technologies enormous capacity to affect representations of the inhabited spaces.

### Friends and strangers

Many analysts have approached urban space in terms of familiarity and access. As Figure 2 illustrates, cities are frequently portrayed as dangerous, alienating, and full of strangers. Others see them as embodiments of *communitas*, social togetherness, belonging, and mutual support. Both views are valid, of course, but provide only one facet of the complex relationship between information technology and urban space.



Figure 1. Global flows. Cities are connected by larger flows of people, goods, information, and capital, as this Chinese restaurant in the Czech Republic's Prague illustrates.

The Lovegeety, one of the earliest and most well known commercial gadgets for urban use, helped strangers in Japanese cities find potential love matches. Popular in the late 1990s, the portable matchmaking device easily



Figure 2. Urban alienation. Cities are frequently portrayed as lonely and alienating, a portrayal that makers of matchmaking devices and services are attempting to reverse.

attaches to a cell phone. As described in *Wired* magazine, the three-button oval device provided talk, karaoke, and “get2” functions.<sup>5</sup> Once the user selected the mode, the Lovegety searched for device holders of the opposite sex within 5 meters, beeping when it found one. Implicit in the name is the idea that love can be “gotten” on the streets of Tokyo and that the city is full of strangers who might be like you, if only you had an introduction.

More recently, services such as *dodgeball.com* exploit local social networks to provide that introduction. At the *dodgeball.com* Web site, a user can identify or add friends to his online profile. When out on the town and looking for company, a *dodgeball.com* user can send a text message to the service specifying his location. The site will notify the user’s friends of his whereabouts and vice versa, also alerting him if friends of friends are located within 10 blocks.

The heavily promoted “crush list” feature lets the user choose people he likes from afar. When he checks in, *dodgeball.com* alerts the crush object to his location. It also tells the user if a crush is nearby, although it doesn’t reveal her exact location. The gendering of this scenario on *dodgeball.com*’s Web site is particularly noticeable: “You” are a young male, all of “your friends” are male, and “your crush” is a pretty girl suggestively named “Randi,” who is wearing a tight, red tank top. Rather than being full of ominous strangers, *dodgeball.com* presents the city as full of available crush objects for these young males. Although not usually so extreme or blatant, pervasive computing technologies are commonly depicted as being capable of transforming strangers into friends who are available for social (frequently heteronormative) interaction.

Urban scholar Georg Simmel discussed the city as a place so full of strangers that urban dwellers must affect indifference to avoid the exhaustion of reacting emotionally to so many people.<sup>6</sup> Contemporary readers are so familiar with the “cold and uncongenial” perception of city dwellers that it seems quite unremarkable to see it mentioned in Simmel’s 1903 work. Arguably, the aforementioned mobile friend-finder technologies can be thought of as a reaction to the indifference of urban strangers. However, Simmel pointed out another, less culturally ingrained, side of the phenomenon: Strangers’ indifference gives city dwellers unprecedented freedom and autonomy to move about and develop as individuals.

Researchers Eric Paulos and Elizabeth Goodman explore the figure of the urban stranger;<sup>7</sup> drawing on the “familiar stranger” concept that psychologist Stanley Milgram developed in the 1970s. Neither unfamiliar nor friendly, familiar strangers contribute to urban dwellers’ sense of place without penetrating their anonymity. Though strangers, they may also contribute to urbanites’ sense of safety.

Paulos and Goodman’s device, *Jabberwocky*, detects the people its user encounters in travels throughout the city, lighting up when it detects someone the user has encountered before. While not designed as a friend finder, it nonetheless renders spaces intelligible in terms of occupancy and patterns of hidden and potential familiarity. Rather than simplistically evaluating the city in terms of friends, strangers, and potential acquaintances, *Jabberwocky* highlights the connections between mobility, legibility, and one’s relationship to a city’s inhabitants.

### Mobility

In their discussion of familiar strangers, Paulos and Goodman note that, “mobility is a key factor in the existence of strangers,” who are, by necessity, from “elsewhere.” *Dodgeball.com* assumes discretionary mobility and leisure time. The service expects users to be able to switch locations effortlessly to socialize with friends, who are, naturally, available to socialize at about the same time.

In their study of urban mobility, Scott Mainwaring, Ken Anderson and Michele Chang focus on how young urban professionals manage their mobility and the interfaces they use as they move about the city over the course of the day.<sup>8</sup> Besides day-to-day commuting, the three people featured in the study visit friends in outlying cities, travel coast-to-coast for business, or work for someone based on another continent. The study explicitly focuses on “global” cities and the similarities of young mobile professionals across several cities. As evidenced by the nearly indistinguishable content of these professionals’ pockets, mobility applies to goods, capital, and information, as well as people. Their local mobility is embedded within a system of global mobilities.

Despite significant differences, these explorations all notably focus on discretionary mobility. Their central figures enjoy the opportunity and freedom to move about and between cities as they desire. While the bulk of urban computing work shares this image of urbanity, unrestricted discretionary mobility is far from a universal experience for a city’s occupants. Although researchers and knowledge workers might occupy this privileged position, we share urban spaces with people who, due to disability, economic status, immigration status, employment, race, caste, and other reasons, find themselves unable to move about easily or, conversely, have mobility forced upon them. Figure 3 shows an example of a service that caters to a segment of the population whose lack of mobility limits their access to urban spaces.

The mobilities of a migrant worker, refugee, homeless person, or daily commuter bear different qualities from the mobility of the jetsetter. In her discussion of Sydney backpackers, Fiona Allon draws attention to Australia’s

Mobility applies to goods, capital, and information, as well as people.

(and indeed, the world's) "contingent and uneven mobilities."<sup>9</sup> Even as the Australian government grants more working holiday maker visas to travelers (typically Europeans), it is bolstering coastal surveillance to deter asylum seekers and boat people. The latter are often described as "queue jumpers, invaders, illegals, and potential criminals" while WHM visas are granted to people considered to be "resourceful, self-reliant, adaptable, young, single, without dependent children or spouse, fit, and healthy." Yet, one wonders how someone might arrive on the coast of Australia in a flimsy vessel without being resourceful, self-reliant, and adaptable.

In a particularly poignant example, Frédéric Le Marcis contrasts mainstream theories of urban mobility and identity to the movement patterns of HIV/AIDS sufferers in Johannesburg, South Africa.<sup>10</sup> His research highlights the extent to which urban theory assumes a healthy, unproblematic body. The "suffering body" of AIDS patients, on the other hand, must move—despite difficulties presented by ill health—in an ever-expanding network of clinics, hospitals, support groups, and hospices, coming to rest finally in the graveyard.

Local political factors mediate both the need and ability to travel. Hospitals' locations and quality reflect the remnants of apartheid, and many AIDS sufferers' monthly disability checks equal the cost of a month's worth of the drug AZT. Due to the stigma still attached to the disease, people travel several hours to meet with HIV support groups to avoid being recognized while attending a meeting in their neighborhood. Mobility, then, is neither uniformly discretionary nor universally welcome.

While the experience of Johannesburg AIDS sufferers is locally embedded, they also participate in global mobilities of goods, ideas, and capital. Local economic considerations and the relative expense of conventional medications, in part, lead many AIDS sufferers to use alternatives such as ayurvedic medicine, immune-boosting vitamin supplements, and aloe vera gels from an Arizona-based company—natural pharmaceutical products that claim to live up to "international standards." Sufferers seek treatment as part of drug trials, which are regulated to varying degrees. Both international drug companies and local groups searching for an "African" treatment for the disease operate the trials.

International funds may support activist networks, but at the same time local activists arrange AIDS sufferers' funerals to incorporate foot-stamping and slogan-chanting reminiscent of apartheid protests. The



*Figure 3. Mobile services. Although a portion of the population is increasingly mobile, we share urban spaces with people who, due to disability, economic status, immigration status, employment, race, caste, and other reasons, find themselves unable to move about easily. Services, such as this mobile ministry, cater to such segments.*

mobility of the funeral march is enmeshed within the mobilities of pharmaceuticals and international funds, articulating global influences in a uniquely local way.

### Legibility

Thus far, we have discussed the inhabitants of urban spaces and their relationships to each other, as well as patterns of urban and inter-urban mobility. Our final urban theme underwrites the first two, and centers on cities as informative environments that inhabitants can understand and interpret.

Lilly suggests that residents viewed medieval cities through the concepts of centrality and peripherality, high and low, a hierarchical Christian cosmology, and a Neoplatonic interpretation of the body.<sup>2</sup> "Through medieval Christian interpretations of classical cosmology and biblical cosmogony, the city was understood as a scaled-down version of the wider world, a microcosm, as well as a macrocosm, a 'body' writ large, both sharing in a divine order." Both the body and the cosmos were based on threes: God ruling over the angels ruling over man, and reason ruling over passions ruling over appetites. In the city, the elevated and centrally placed castle ruled over soldiers and below them tradesmen and ordinary citizens. To be spatially peripheral was to be socially peripheral.

Historian David Garrioch reports on urban ambient sounds as a semiotic system in early modern European cities.<sup>11</sup> Merchants, for example, plied their wares vocally, using distinguishable rhythms and cadences. Bells were particularly significant, as they were versa-

tile and one of the loudest noises that could be heard in the city. Bells from different churches might be tuned differently, and besides the time, they marked the liturgical season or day of the week. Their ringing pattern might also signify a birth, death, wedding, mass, or closing of the city gates.

With a complex grammar relying on local knowledge, time of day, and other senses, inhabitants could read the noises of the early modern city. Additionally, sounds might be understood differently, depending on people's affiliation, neighborhood, or social position. Protestants might respond differently to church bells than Catholics, while servants could distinguish merchants' cries that their masters could not understand. In addition, people could be distinguished not just by the sounds they made but by their reactions to sounds around them.

The residents of Kelleher's Northern Irish town of "Ballybogoin" demarcate the city by "whether a space is populated by people wearing uniforms or not, whether a house is two stories or one story, whether or not you and your neighbor know each others' first names, whether one's movements through space are 'Protestant' or 'Catholic,' whether you park your car east or west of the town square, whether you talk or do not."<sup>1</sup> Inhabitants further distinguish space by painted curbs; the colors of political posters; people's clothes, haircut, and accent; and whether soldiers defaced or ignored graffiti. Though they could see and read the same signs, Protestants and Catholics had profoundly different interpretations of which spaces were safe and welcoming.

### INTEGRATING PERSPECTIVES: TECHNOLOGY AND REPRESENTATION

The examples presented here illustrate the intertwining of inhabitants, mobility, and legibility. Paulos and Goodman's users read spaces according to their inhabitants, for example. Whether it's the bodily motion that distinguishes Protestants and Catholics in Ballybogoin or structures one of Garrioch's early modern towns, the caution taken with attending HIV support groups among strangers and in distant parts of Johannesburg, or how the Australian government differentiates between international travelers and international refugees, people's movements generate meaning. Conversely, who *you* are and how you move will affect how the city might be legible to you, as in the case of masters' and servants' different understandings of merchants' cries or the divergent interpretations of safe places in Ballybogoin.

Urban information technologies and their infrastructures continue the legacy of environmental features like church bells in creating an informative, interpretable environment. Those interpretations, however, aren't

always universally available. Enhanced 911 (or E911) allows emergency-response services to determine the address of the calling telephone. In 1996, the US Federal Communications Commission required wireless service providers to determine the location of cell phones placing calls so they could be incorporated into the E911 system. Michael Curry argues that the E911 system renders the landscape—and the people within it—"legible" in new ways.<sup>12</sup> This process is not new, but continues the rationalization of space practiced by mapmaking, postal address standards, ZIP codes, and Jefferson's systematic survey system (still visible in rural American road and farm outline patterns).

The legibility of location-correlated personal (albeit anonymized) data wouldn't necessarily stop with emergency responders. Direct marketers might have altogether different interpretations and uses for such data, potentially reconfiguring public spaces. According to Curry, "When the telephone beeps and the ad for

Starbucks appears ... what we are doing has been disrupted, and the place where we are doing it has been transformed. It is no longer a place where I can walk freely, a place in a certain way in my control; rather, it is a place where routine activities are disrupted, and by activities that are 'out of place.'"

As the E911 example illustrates, the legibility of spaces is a rich area of inquiry for urban and ubiquitous computing researchers. Available technologies enable our constructions and representations of space. This raises a set of questions concerning technology and the legibility of spaces. Who finds the space legible and in how many different ways? Who controls the representations? Who controls the technological infrastructure? Who stands to gain from a particular representation of space?

### FRAMING PLACE AS A PROCESS

What should we make of these questions? Like Massey, we argue for place as process rather than object or container. In light of this broad framing, we offer three considerations to influence the direction of urban pervasive computing efforts.

First, it's important to see the city as more than an accumulation of people, buildings, and services. A city's static and dynamic structures reflect and shape a range of significant cultural understandings for its occupants. We need to see spatial distance, regional familiarity, and personal contact not simply as instrumental aspects of cityscapes to be "overcome" by new technologies, but also as contexts within which new technologies must operate.

Second, we should adopt a broader view of the city's occupants, their activities, and the conditions in which they conduct those activities. While it's easy to understand why commercial enterprises focus on young profession-

The legibility of spaces is a rich area of inquiry for urban and ubiquitous computing researchers.

als with discretionary income and disposable time, a comprehensive approach to urban computing as a domain of intellectual, moral, and political inquiry requires a more inclusive view of the city and its occupants.

Third, we find it useful to make a figure-ground reversal between the city and the practices that happen within it. While urban computing has focused primarily on the city's image as a setting and container of action, we argue instead for viewing the city that we experience every day as a product of historically and culturally situated practices and flows. The city is not simply housing stock and infrastructure; it is, equally, a product of social practice. Infrastructure and practice are intimately entwined.<sup>14</sup>

**T**he emergence of urban computing as a topic within pervasive computing research is fascinating and important. Cities are complex social ecosystems, and this complexity makes them a rich site for understanding how pervasive computing technologies can be put to use and brought to life. ■

---

### Acknowledgments

We gratefully acknowledge the contributions of many colleagues who have read drafts, shared their thoughts, and helped us clarify our thinking on these topics, including Ken Anderson, Genevieve Bell, Johanna Brewer, Michael Curry, Scott Lederer, Irina Shklovski, and the anonymous reviewers. This work was funded in part by National Science Foundation grants, an Intel grant, and an NSF graduate research fellowship.

---

### References

1. W. Kelleher, *The Troubles in Ballybogoin: Memory and Identity in Northern Ireland*, Univ. of Michigan Press, 2004.
2. K. Lilley, "Mapping Cosmopolis: Moral Topographies of the Medieval City," *Environment and Planning D: Society and Space*, vol. 22, 2004, pp. 681-698.
3. M. Ito and D. Okabe, "Technosocial Situations: Emergent Structurings of Mobile E-Mail Use," *Personal, Portable, Pedestrian: Mobile Phones in Japanese Life*, MIT Press, 2005, pp. 257-273.
4. D. Massey, "Power-Geometry and a Progressive Sense of Place," *Mapping the Futures: Local Cultures, Global Change*, J. Bird et al., eds., Routledge, 1993.
5. I. Yukari, "Love: Japanese Style," *Wired*, 11 June 1998.
6. G. Simmel, "The Metropolis and Mental Life," *On Individuality and Social Forms*, Heritage of Sociology Series, D.N. Levine, ed., Univ. of Chicago Press, 1971, pp. 324-339.
7. E. Paulos and E. Goodman, "The Familiar Stranger: Anxiety, Comfort, and Play in Public Places," *Proc. ACM Conf. Human Factors in Computing Systems (CHI 2004)*, ACM Press, 2004, pp. 223-230.
8. S. Mainwaring, K. Anderson, and M. Chang, "Living for the Global City: Mobile Kits, Urban Interfaces, and Ubicomp," *Proc. Intl. Conf. Ubiquitous Computing (UbiComp)*, Springer-Verlag, 2005, pp. 269-286.
9. F. Allon, "Backpacker Heaven: The Construction and Consumption of Tourist Spaces and Landscapes in Sydney," *Space and Culture*, vol. 7, no. 1, 2004, pp. 49-63.
10. F. Le Marcis, "The Suffering Body of the City," *Public Culture*, vol. 16, no. 3, 2004, pp. 453-477.
11. D. Garrioch, "Sounds of the City: The Soundscape of Early Modern European Towns," *Urban History*, vol. 30, 2003, pp. 5-25.
12. M. Curry, D. Phillips, and P. Regan, "Emergency Response Systems and the Creeping Legibility of People and Places," *The Information Society*, vol. 20, 2004, pp. 357-369.
13. S.L. Star, "The Ethnography of Infrastructure," *American Behavioral Scientist*, vol. 43, 1999, pp. 377-391.

*Amanda Williams is a PhD student at the University of California, Irvine. Her research interests include urban computing, migrant technology use, and the fusion of computation and tangibility. Williams received a BS in symbolic systems from Stanford University. Contact her at amandamw@ics.uci.edu.*

*Paul Dourish is an associate professor in the Department of Information and Computer Science at the University of California, Irvine. His research interests include ubiquitous computing, embodied interaction, and cultural aspects of information technology use. Dourish received a PhD in computer science from University College London. He is a member of the IEEE, the ACM, the American Anthropological Association, and the Society for the Social Studies of Science. Contact him at jpd@ics.uci.edu.*