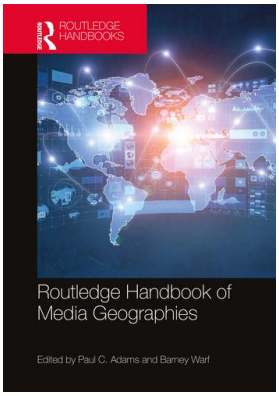

Routledge Handbook of Media Geographies

Paul C. Adams, Barney Warf

Evolving geographies of mobile communication

Publication details
https://test.routledgehandbooks.com/doi/10.4324/9781003039068-12
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Published online on: 28 Oct 2021

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EVOLVING GEOGRAPHIES OF MOBILE COMMUNICATION

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Mobile communication has long played a part within popular culture with people fascinated by the ability to communicate anytime, anywhere. As early as 1946, the comic character Dick Tracy used a "watch phone" to call others. And, in 1966, the television show Star Trek featured the "Star Trek" communicator, a handheld phone-like device said to have inspired the design of the first mobile (cellular) phone. Yet, the first mobile phone was not introduced until 1973, and mobile phones did not become a part of many people's everyday communications until the turn of the 21st century. During the past 70 years, what it means to engage in mobile communication has changed significantly, shaping how we relate to one another and the spaces around us.

When mobile phones became common at the turn of the century, people felt the need to talk about their (mobile) locations. A frequent question whenever someone received a call was: "Where are you?" This happened because telephones were now detached from physical locations and, as a result, users could make and receive calls while on the go. During these "old" days, we also would frequently hear about mobile phones disconnecting people from their surrounding spaces by connecting them to remote others. As such, early mobile communication was embedded into a rhetoric of disconnection between people and spaces, overlooking its value for producing "co-presence," coordinating face-to-face encounters, and connecting users to places and locations (Hjorth 2007; 2008; de Souza e Silva 2013). Although some of this rhetoric of disconnection still persists, the emergence of smartphones in the late 2000s normalized the constant tracking of location and the mapping of spaces with an array of location-based apps. As a result, carrying a mobile technology not only allowed communicating with remote others, but also embedding digital information into physical spaces through which people moved. During this time, navigation apps, location-based games and mobile social networks gained popularity.

Today, smartphones are just one of the nodes—albeit a very important one—of the immense network of interconnected devices (aka "the internet of things") that populate our spaces. A constellation of mobile infrastructures, such as sensors, watches, beacons, cars and radio frequency identification (RFID) tags, constantly track our location as well as personal and physiological data. They also allow for mobile networks to extend into new spaces where network connectivity might be infeasible or inconsistent, such as rural areas. In doing so, mobile infrastructures allow new networked spaces to emerge; they also change our

DOI: 10.4324/9781003039068-15

mobilities within, and relationship to, these spaces by reshaping interactions and ways of knowing about these spaces. This progression of mobile communication over the past 20 years begs the question: What are the evolving geographies of mobile communication? In this chapter, we look at the evolving ways in which mobile phones in particular, and mobile infrastructures in general, are intrinsically connected to the production and experience of spaces (Lefebvre 1991). We analyze the progression of relationships between people and spaces mediated by mobile infrastructures, focusing on three key moments: (1) the late 1990s and early 2000s, when mobile phones were widely diffused and adopted into new spaces, (2) the emergence of smartphones in the late 2000s, along with the normalization of locations embedded with digital information, and (3) the spread of mobile infrastructures in the second decade of the 21st century, focusing on how they relate to communication and mobility.

Extending phones into new spaces

Closer to the turn of the 21st century, "mobile phone adoption exploded, with subscriptions reaching a half billion worldwide and well into the billions in the following decade" (Campbell 2007, 34). The release of second generation (2G) networks in the early 1990s provided digitally encrypted and consequently more reliable phone calls. It also brought with it the ability to send SMS (short messaging service)—known colloquially as text messaging. At the same time, mobile phones became much smaller, allowing users to carry these devices with ease into a variety of spaces; 2G phones also included new features, such as display screens, access to the mobile web (with the development of the Wireless Application Protocol—WAP—in 1996), and the integration of ringtones and address books. These new features, along with dropping prices, helped to integrate mobile phones into quotidian life. Mobile phones quickly went from a luxury item to a social device used by teenagers and younger adults to coordinate daily life (Kasesniemi & Rautiainen 2002; Ling & Yttri 2002; Matsuda 2005). As Ito (2005) described, time became more flexible because mobile users could negotiate meeting arrangements in real-time, and forgetting the grocery list at home could be solved with a quick call. Micro-coordination shaped everyday life spaces as flexible spaces. In addition, younger people started to use mobile phones as expressions of their self and identity by customizing their phones and interacting with friends (Weilenmann & Larsson 2001; Fortunati & Cianchi 2006).

Public spaces also became places for communication with remote others. The introduction of the mobile phone into new social contexts required renegotiating social norms within public spaces, as the mobile phone allowed for bringing formerly private conversations into public spaces. A particularly heated debate around this time revolved around using mobile phones on public transportation and in restaurants, as these spaces were traditionally only composed of interactions among co-present people. Bringing outside contexts into a local physical space created all sorts of uncomfortable situations for people who did not participate in those phone conversations (de Souza e Silva & Frith 2012). Likewise, many expressed concerns about how mobile phones impacted a person's relationships with others occupying the same space. Some scholars began to study how mobile phones could help create intimacy between people by connecting distant spaces. Licoppe (2004), for instance, discussed the idea of "connected presence" to refer to the mediated presence of a person who is geographically distant; Habuchi (2005) offered the term "telecocoon" to discuss the maintenance of private relationships while using the mobile phone in public spaces; and Fujimoto (2005) described the mobile phone as a "territory machine," capable of inscribing a personal boundary for communication in a public space. Collectively, these scholars describe a qualitative change to

the experience of space, brought forth by the mobile phone's capacity to merge otherwise distinct contexts. As a result, people had to learn to negotiate a new reality that included the merging of formerly defined private and public spaces.

Mobile phones were also often blamed for disconnecting users from their physical surroundings in favor of connecting with distant social networks (Gergen 2002; Puro 2002). Gergen (2002), for instance, argued that mobile phone users physically inhabited a space but dedicated their attention elsewhere, thereby creating an "absent presence." This argument has gained some traction over the years (Turkle 2011); however, many scholars have rejected it, arguing instead for a more nuanced understanding of how the mobile phone is embedded into society and social spaces. Yes, mobile phones can indeed distract us from the surrounding spaces, but they also become a part of those spaces. They help to facilitate encounters, find venues and inscribe locations. They increase our connections to nearby spaces. This became increasingly evident with the popularity of GPS-enabled phones in the mid-2000s.

Smartphones and digitally inscribing place / space

The mid-2000s reflected a major shift in mobile communication practices with the introduction of smartphones. Smartphones converged multiple, distinct media into a single portable device—a process referred to as "technological convergence" (Humphreys et al. 2013). They also normalized the use of mobile internet and location-based services on the phone, which have been key to the ongoing process of digitally inscribing information onto space and place. According to Hjorth (2008), with these developments, "one could almost forget that mobile media arose from an extension of the landline telephony" (p. 143). Such a statement reflects a change in tenor from the discourse of the late-1990s and early-2000s, which primarily emphasized the mobile phone as an extension of the landline. Mobile phones were still called "phones" but, in fact, they became mini-computers—able to run applications, access the internet and, most importantly, display their locations (de Souza e Silva 2006).

In the early 2000s, United States President Bill Clinton removed the degradation of civilian-use GPS signals, allowing the public to use GPS-enabled devices to pinpoint a geographic location to within a couple of feet. However, it was not until 2004 that Qualcomm developed a software—called gpsOne assisted GPS—that enabled mobile phones to display their precise geographic location. This development was key to the later creation of location-based services for smartphones, allowing users (and their mobile apps) to identify their location in space through an interface. Also, in the early 2000s, cellular networks were upgraded to 3G connections (3rd generation cellular networks), allowing for mobile broadband internet. This infrastructural change enabled high-speed internet connections for smartphones—critical to many of the data-consumptive and location-specific uses of the smartphone today.

Among the early popular location-based services were navigation systems, such as Google Maps and Waze, and location-based social networks, such as Loopt, Brightkite and, eventually, Foursquare (de Souza e Silva & Frith 2010). These apps allowed users to "check-in" to locations, inscribing digital information onto spaces and broadcasting their locations to a social network of friends. For example, in a fashion that later led to apps such as Yelp, people could use Foursquare to write a review about a restaurant or bar. That review was tagged with latitude/longitude coordinates, and anyone within a radius of that location was able to read the review when using the app. Although restaurant reviews might seem like an irrelevant example, the ability to inscribe locations with digital information represents a significant shift in the meaning of locations. For the first time, locations could be embedded with digital

information, which then became a part of that location in what Zook and Graham (2007) refer to as a "DigiPlace." While DigiPlace accounts for the "range of political, economic, and cultural considerations" of how digital code represents and interacts with physical spaces (p. 466), we also offer de Souza e Silva's (2006b) concept of hybrid spaces to account for the social changes to spaces as a result of this process. This embedding of digital information meant that our social places were no longer purely physical spaces, with physically co-present people and things. Any serious attempt to understand communication and social interaction from then on, needed to take into consideration the confluence of physical and digital spaces—along with both physically co-present and distantly connected people. Hybrid spaces are essentially mobile communication spaces, because they arise from the social use of mobile technologies. Understanding that we live in hybrid spaces means that we cannot address social interactions by looking exclusively to their happening in physical or digital spaces, because they occur in the merging of both.

Hybrid spaces not only denote a different way of inscribing spaces with information; they represent a new logic of social conduct in these spaces. For example, "checking-in" came to characterize part of early 2010s culture, with mobile users sharing their location when they thought it might reflect something positive about their identity—that is, a user would check-in if they were at a "cool" concert, but not at the cheap neighborhood market. Sharing locations also served as ways of inscribing places with identities. Places' identities are shaped not only by descriptive information about those places (such as the reviews), but also by the people in them. Judging from the profile of people who are in certain locations (even those not in one's social network), one could potentially be more inclined to visit that place (de Souza e Silva & Frith 2012; 2013). Alternatively, sorting through this information could lead to racist, classist or even gendered connotations of spaces based on those who occupy them (Leszczynski 2016, 1697). From this, we note that inscribing spaces with digital information at once offers opportunities to better connect with surroundings, but at the same time exacerbates existing inequalities and prejudices that shape how many people experience particular spaces.

Of course, location-based services such as these raised many issues about our social constructions of space and the creation of differential spaces—that is, spaces which people experience differently depending on their access to a mobile interface and their ability to actually interact with the information that is embedded into those spaces. Differential experiences of space and ways of moving through spaces, however, are not only created by mobile technologies; they have always existed (Graham 2005). According to Wood and Graham, "from the moment some people rode or were carried while others walked, there have existed differences in mobility which reflect and reinforce existing social structures" (Wood & Graham 2005, 177). Nevertheless, we must still look at how mobile technologies contribute to current experiences of inequality and prejudice. Sheller's (2018) call for mobilities justice has offered an important intervention for interrogating how differences in identity "interact with mobility regimes and control systems that reproduce uneven mobilities" (p. 18). We therefore situate access to and experiences of hybrid spaces as an important site for understanding these contemporary social structures, particularly as the ways that people interact with hybrid spaces increase.

We argue for using hybrid space to theorize the changes introduced by the convergence of digital and physical spaces. Hybrid spaces are different from other understandings of the mixing of digital and physical information, such as code/space (Kitchin & Dodge 2011), augmented space (Manovich 2007), mixed reality (Milgram & Colquhoun 1999; Benford & Giannachi 2011), DigiPlace (Zook & Graham 2007), and Hertzian spaces (i.e. a space

characterized by signals from our various electronic devices) (Varnelis & Yoshida 2008). Although all of these perspectives point to some kind of mix between digital information and physical spaces, hybrid spaces refer specifically to the *social transformations* of space that occur as a result of interacting with mobile technologies. The emphasis on the social aspect is important to understanding the dimensions of power and control that are embedded in our interactions with mobile technologies. For instance, hybrid spaces take into consideration people's ability to inscribe and "read" locations, as part of ongoing interactions with a mobile phone. de Souza e Silva and Frith (2013) show how digital information can be inscribed onto physical spaces in a practice they name "writing space." People can write space when they are able to add digital information to places, adding longitude/latitude coordinates to text, audio and video, and as a result, transforming places into locations. Inversely, smartphone users can "read" spaces for digitally inscribed information. We do that basically every day, whenever reading information from a location-based application, such as Google Maps or Yelp.

Nevertheless, much of the digital information inscribed onto places often reproduces dominant views of space and accentuates the biases of social groups. For example, Leszcyznski (2016) and Thatcher (2013) note how safety apps represent spaces as safe/unsafe based on factors like crime statistics and street lighting—factors which disproportionately represent traditionally white and affluent neighborhoods as "safe," while representing traditionally BIPOC and impoverished neighborhoods as "unsafe." Moreover, the inscription of digital information onto physical spaces reflects a preference toward urban rather than rural spaces and commercial rather than non-commercial spaces. Together, these examples demonstrate that hybrid spaces do not inherently reflect homogenizing or democratizing potential, whereby the experience of the digital would mitigate inequalities within the physical. Instead, hybrid spaces can compound those inequalities—reflecting and reinforcing them to mobile users. One way of addressing these inequalities comes from "participatory mapping," which happens when everyday users create their own maps of the world reflective of their experiences in spaces (Kabisch 2008, 225). An example of participatory mapping is the project WikiMapas, developed by the Rede Jovem program in Brazil. Though the WikiMapas platform, slum dwellers can plot points of interest on Google Maps, such as the locations of hospitals, schools, stores and streets in their low-income communities. This is particularly important, as these locations are not represented in traditional online satellite maps. As such, WikiMapas helps to integrate these communities into official city maps and geography (de Souza e Silva et al. 2017). Hybrid spaces, therefore, have the potential to engender creativity, as everyday mobile users can contribute to how spaces are experienced.

Likewise, hybrid spaces are also ludic spaces, experienced by playfully interacting with the surrounding world. Location-based mobile games, for example, turn urban spaces into games boards. Using a mobile or smartphone as an interface to play the game, people can find digital objects embedded into physical locations and interact with other people depending on their physical distance (de Souza e Silva & Hjorth 2009; de Souza e Silva & Sutko 2009). Location-based games gained popularity in 2016 with Pokémon Go, but in fact their history traces back to the beginning of the 2000s (de Souza e Silva 2013). For example, Mogi—a popular game in Tokyo, Japan—allowed players to see the location of virtual creatures and other players on their mobile phone screen. Players had to physically walk to the locations of creatures and people to interact with them; that is, they needed to be nearby in physical space to be able to play the game. Other location-based mobile games have even transformed the physical properties of spaces. Spallazzo and Mariani, for instance, explain how interacting with physical objects helps to "achieve results in the digital world" (Spallazzo & Mariani

2020, 41). In some of their location-based games, players need to literally destroy physical objects to retrieve codes, which then need to be typed into the mobile phone game interface to advance in the game world. In all these examples, the interplay between physical and digital spaces is what defines location-based games—the game would not exist had one of these spaces been removed from game play. Moreover, both spaces become transformed through their interaction with the other. Importantly, though, the mobility required by these games has exposed how inequalities and prejudices become structured into spaces and experiences via the interactions in hybrid space. Aspects of gender, race and class impact how players move through spaces to achieve game objectives; access to infrastructures controls when and where players can play the game. Thus, even in such playful moments, we must attend to those limitations that shape our encounters with spaces.

The idea that our interactions with digital location-based information shape our movements in and through space is reflected in the new mobilities paradigm (Hannam et al. 2006; Sheller & Urry 2006; 2016). According to Sheller (2016), examining mobilities includes looking to how mobile technologies and infrastructures enable or constrain movement. It also addresses the politics of movement, also considering how mobile technologies and infrastructures might contribute to the production of mobilities by enacting force or friction, controlling velocity, dictating routes, and shaping the experience (Cresswell 2010). From this perspective, we can at once see how mobile technologies can limit our mobilities: shaping if and how spaces are represented to us, enabling or prohibiting our access to them. On the other hand, mobile technologies can also enhance our mobilities and increase our control over spaces. Sutko and de Souza e Silva (2011) build on this idea of coordination of time to argue that mobile phones equipped with GPS also influence how people coordinate space, such as when people move differently or for specific purposes based on their knowledge of space(s). They describe two kinds of interfaces by which users might gain knowledge about a space: eponymous and anonymous. Anonymous interfaces, such as the crowdsourcing app Waze, afford coordination with strangers and places. For instance, if a person sees there is a car crash in a specific location, they will likely avoid that route, even though they do not know who inscribed that location with the crash information. Differently, eponymous interfaces identify users, including information about them like their name, interests and location. For instance, many social platforms like Instagram and Facebook allow for adding geotags to photos and status updates. As such, if a person sees that several friends are having coffee nearby after work, they might be tempted to join them on their way home. These apps foreground connections between the social and the spatial as they facilitate spatial coordination.

Embedding mobile and networked infrastructures

Increasingly, our spaces are not only embedded with digital information, but with all sorts of mobile infrastructures connected to digital networks, such as sensor networks, CCTV cameras and smartcards for urban transit systems. McQuire (2017) suggests these urban infrastructures are constructing "increasingly rapid and precise feedback loops between mobile subjects and their particular urban routines" that actively transform spaces as well as mobilities through them (McQuire 2017, 4). For instance, Georgia Tech's Living Lab has partnered with the city of Atlanta to create "smart corridors." In its first implementation, 100 sensors were integrated into North Avenue to monitor and regulate all forms of traffic. Accordingly:

> The technology provides emergency vehicle pre-emption through traffic signalized corridors (where signals change to green for faster response times), provides drivers

> with signal phasing and timing data to their phones and cars, alerts drivers when they are speeding through a school zone or sharp curve, and alerts cyclists and pedestrians of vehicles approaching too fast or too close. All of the communication from the infrastructure and different mobility users is disseminated to a smartphone app called Travel Safely that improves safety for the overall traveling public.
>
> *(Levine 2017)*

Like in this example, increasingly our smartphones interact with more than just cell towers and GPS satellites, but also a number of mobile infrastructures spread throughout (often urban) spaces that can determine how we move through spaces and our ways of knowing about spaces. We should therefore consider our smartphones' interactions with these infrastructures as part of the changing geographies of mobile communication.

Our smartphones have embedded within them a number of sensors and other hardware that allow them to interact with mobile infrastructures that populate our surroundings, including QR code and barcode readers, WiFi routers/dongles, Bluetooth beacons, and near field communication (NFC) devices. While these mobile infrastructures allow access to digital inscriptions of spaces, they also track many of our behaviors as we move through space. For instance, major retailer Walmart introduced Bluetooth beacons to their stores, allowing many customers access to relevant coupons. However, these Bluetooth beacons also track the mobilities of customers who carry Bluetooth-enabled mobile devices. These devices are small and inconspicuous, leaving most customers entirely unaware of their intervention. This relates to the premise of the ubiquitous computing paradigm, which suggests that sensors and computational devices should "weave themselves into the fabric of everyday life, freeing users to focus on other tasks (Weiser 1991, 94). While the concept of ubiquitous computing dates to the early 1990s, it was just in the past decade that ubiquitous computing—now commonly understood as the "internet of things"—has gained traction with the widespread adoption of smartphones and other "smart" devices (e.g. sensors, RFID tags, Bluetooth beacons, etc.) that are embedded into the infrastructure of everyday spaces, thereby creating "smart spaces." We can understand "smart" spaces as networked spaces that attempt to seamlessly connect our surroundings, transforming whole cities into hybrid spaces. Such devices do not permeate just urban public spaces; domestic spaces are also embedded with smart technologies creating what has been termed the "smart home" (Dourish 2016, 27; Fortunati 2018).

The integration of these devices into various arenas of life raises questions about how to interpret these changes. Some scholars understand these devices as forming a massive complex of networked infrastructures. For instance, Andrejevic (2007) offers the concept of digital enclosures—an ever-expanding (surveillant) space constituted by networked devices. Although digital enclosures do not have visible borders, we cannot escape them, because it is almost impossible to be disconnected—we carry networked devices on our person, we interact with them in the public urban spaces of everyday life, and we are connected to them in our homes. Likewise, Bratton (2016) uses the term "the stack" to refer to this proliferation of devices that span the globe. He suggests that instead of considering these devices as different and independent of each other, we should pay attention to their interconnectivity, "forming a coherent and independent whole" (Bratton 2016, 5). By contrast, Dourish and Bell argue that networked spaces are "inherently heterogeneous," messy and assembled for various purposes (Dourish & Bell 2011, 43). They point out the fact that often "smart" spaces and cities are not planned spaces; they develop organically and without a central purpose. Because of this, smart infrastructures are often distributed in an uneven manner—with

affluent regions exhibiting "smart" infrastructures, while poverty-stricken and rural regions lack these networked resources. Importantly, there is methodological gain from both perspectives, but also political stakes for how we frame individuals' relationships to these "smart" infrastructures.

For example, a consequent debate concerning these networked infrastructures relates to how it shapes urban mobility. As we have shown, early mobile phones allowed for micro-coordination and smartphones facilitated spatial coordination. Now, networked infrastructures, when embedded in urban and domestic spaces, heavily determine how people can move—or cannot move—through these spaces. Take the case of the shared bikes in São Paulo, Brazil. In 2018 the start-up company Yellow introduced dockless location-based bikes in the city. In order to use a bike, people had to install an app, unlock the bike through the app and pay for the bike at an hourly rate. At first, it seemed that these bikes helped mobility in the city, because users could pick them up and drop them off wherever they wanted. However, the bikes had geofencing technology which uses GPS tracking to disable any bike that is taken outside of a designated area. Yellow placed the bikes in the Jardins neighborhood (an affluent region of São Paulo) and programmed the bikes to disable the moment they moved outside of this geofenced area. Thus, programmed bias ensured that only some regions of the city had access to these "smart" infrastructures and reinforced power relations between affluent and poverty-stricken spaces.

On the other hand, smart infrastructures do not just shape people's movements but additionally track them in nearly all arenas of life, placing them in asymmetric power relationship to those who track and collect their data. For this reason, it is useful to understand the interconnectivity between these devices that enables data to be fed from one network to another. For instance, CCTV cameras in conjunction with face recognition software can identify where people are; proximity sensors and cell phone signals can detect movements and concentrations of people in urban spaces, and location-based smartphones are constantly transmitting individuals' locations to cell phone towers. When people have their location history turned on, companies, such as Google, can tap into those location reports and build very precise tracks for each smartphone user on Earth. In 2020, Google's COVID-19 Mobility Reports[1] have crossed personal locational histories with mapping geographic information to produce detailed reports about where people are moving or not moving. Such reports help us to produce new associations and understandings of spaces, and the people inhabiting them, as well as to facilitate action that transforms these spaces (e.g. limiting who can inhabit them, how people move through them). While this information is mostly anonymized, as Andrejevic and Burdon suggest, the "emerging practices of data collection and use… complicate and reconfigure received categories of privacy, surveillance, and sense making" (2014, 20). As such, we need a framework for rethinking these categories amid the changing geographies of mobile communication.

Towards mobile communication futures

As we have seen, our mobile devices have transitioned from a device that initially only supported voice communication, to a mobile technology that allows communication with voice and text, and then to a device that communicates our location. Now, our mobile devices have undergone yet another transformation as they are integrated into the fabric of urban infrastructures. Through these various functions, mobile devices shape our perceptions of spaces, coordinate our mobilities and render digital information about these spaces. Because

these mobile devices are so important to shaping our perceptions of space, it is important to consider how power and control are enacted through their use. As such, scholars might attend not only to the diffusion of mobile devices within society, but additionally to *how* they are integrated into particular spaces, *where* they are placed and *who* has access to them. Such work is important to understanding the production of differential spaces.

Additionally, scholars might account for the kinds of information gathered from these infrastructures and how it becomes represented to inform our understandings of space. We argue that, at a minimum, these activities should be transparent to the end-user. Solove (2008) and de Souza e Silva and Frith (2012) suggest that often tracking activities are either undisclosed or that everyday mobile users lack the necessary digital literacy to understand how to control their privacy settings. The fact that tracking apps normally run in the background on these devices without the user's knowledge actually follows an early premise of ubiquitous computing, called "calm computing"—the notion that our networked devices should not draw attention to themselves and fade into the background of our everyday lives (Weiser & Brown 1996). Since then, some scholars have addressed the political and social stakes of calm and transparent technology. For instance, Takayama (2017) points to the political stakes of devices fading from our awareness and thus operating and enacting consequences beyond a user's control. Likewise, Galloway (2004) and Dourish and Bell (2011) have called for seam*ful* design of networked technologies—those that readily violate the principles of calm computing and, instead, make their mediation evident to users. The purpose behind such calls is that when technologies fade into the background of spaces, we become less conscious of their operations—the means through which they enact power and control in and over our lives. Importantly, we also become less conscious of how they shape our understandings and experiences of geographies.

There is an opportunity for creative interventions that challenge the uneven distribution of networked technologies in urban spaces. For instance, in Rio de Janeiro, some residents have stolen GPS-enabled scooters, removed their trackers and moved them outside of the geofenced region for "free" daily use (Guimarães et al. 2019). There is also opportunity to push back against asymmetric data-collecting measures, such as when artist Simon Weckert brought 99 smartphones into a city street, creating a fake traffic jam on Google Maps (Shammas 2020). Although seemingly trivial, such interventions resist the top-down constructions of our spaces and expose the inequalities that shape them.

Taking these points together, we suggest that one of the new challenges for mobile communication and mobilities studies is to understand the competing geographies that arise with the widespread integration of mobile and networked infrastructures throughout many urban spaces (Freudendal-Pedersen & Kesselring 2017). This perspective recognizes that infrastructures take part in the production of space and the inscription of borders (Tahwil-Souri 2015). It considers that mobile infrastructures, like Bluetooth beacons, RFID chips and WiFi routers, actively inscribe new territories for the governance, modulation and surveillance of action, including mobilities and communication, in everyday places and often without notice. Increasingly, though, these territories are inscribed not just by hegemonic forces, but also by everyday individuals aiming to produce their own territories. We must look to how the subsequent contestations over space play out through the implementation of mobile infrastructures, paying particular attention to the impact on those interacting within those spaces. At stake is an understanding of the geographies of mobile communication which accounts for the inherent dynamism of spaces and the ongoing ways that mobile technologies shape our relations to them.

Note

1 www.google.com/covid19/mobility/

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