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From cyber to hybrid: Mobile technologies as interfaces of hybrid spaces

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Abstract:

Hybrid spaces arise when virtual communities (chats, MUDs and MMORPGs) previously enacted in what was conceptualized as cyberspace, migrate to physical spaces due to the use of mobile technologies as interfaces. Mobile interfaces, such as cell phones, allow users to be constantly connected to the Internet while walking through urban spaces. This paper defines hybrid spaces in the light of three major shifts in the interaction between mobile technology and spaces. First, it investigates how the use of mobile technologies as connection interfaces blurs the traditional borders between physical and digital spaces. Second, it argues that the shift from static to mobile interfaces brings social networks into physical spaces, and finally it explores how urban spaces are re-configured when they become hybrid spaces. For this purpose, hybrid spaces are conceptualized according to three distinct but overlapping trends: hybrid spaces as connected spaces, hybrid spaces as mobile spaces, and hybrid spaces as social spaces.

Keywords:

Hybrid spaces, mobile technologies, cell phones, interfaces, mobility, connection, sociability

1. Introduction

Interfaces define our perception of the space we inhabit, as well as the type of interaction with other people with whom we might connect. Interfaces are defined as communication mediators, representing information between two parts, making them meaningful to one another (Johnson, 1997; Lévy, 1993). The concept of human-computer interface traditionally defines a communication relationship between a human and a machine. In this case, the role of the interface is to translate digital information from the computer to the human in order to make it understandable to us. I propose a further conceptualization of “social interface”, which defines a digital device that inter-mediate relationships between two or more users. Within this context, social interfaces not only re-shape communication relationships, but also re-shape the space in which this interaction takes place. It is important to highlight that interfaces are also culturally defined, which means that generally the social meaning of an interface is not always developed when the technology is first created, but usually comes later when it is finally embedded in social practices. Take the case of the film camera and narrative films (Murray, 1997, p. 66), which were originally regarded as a mix of photography and theater (photo + play). Similarly, TV was formerly conceptualized as a live radio with images, showing that many interfaces initially acquire their meanings from previous similar technologies.

The case of mobile phones follows this development. Formerly regarded as mobile telephones, these devices can now be increasingly compared to micro-computers,¹ remote controls, as well as to collective social devices. Moreover, every shift in the meaning of an interface requires the re-conceptualization of the type of social relationships and spaces it mediates. Because mobile devices create a more dynamic relationship to the Internet, embedding it in outdoors everyday activities, we can no longer address the disconnection between physical and digital spaces. I name this new type of space, hybrid spaces.

Hybrid spaces are mobile spaces, created by the constant movement of users who carry portable devices continuously connected to the Internet, and to other users. A hybrid space is conceptually different from what has been termed mixed reality, augmented reality, augmented virtuality, or virtual reality, as it will be discussed later on this paper. The possibility of “always on” connection when one moves through the city transforms our experience of space by enfolding remote contexts inside the present context. This connection is related both to social interactions, as well as to connections to the information space, that is, the Internet.

Mobile devices are all types of mobile technologies that promote remote and local multi-personal communication and connection to the Internet, allowing users to exchange information while moving through urban spaces. Today’s 3G² cell phones include broadband Internet connection, multimedia messaging, text messaging, mobile pictures, and more importantly, location awareness.³ Location-based applications also create a new way of moving through the city and interacting with other users. In this new spatial perception, cell phones should be regarded as not only mobile telephones – devices enabled to transmit voice in two-way communication situations – but also as portable micro-computers embedded in public spaces. In the United States, as well as in other countries in Latin America, cell phones continue to be used primarily for voice communication, as portable telephones. Likewise, affirming that mobile devices are new interfaces through which communities are formed seems odd. However, Asian and Scandinavian countries show us that voice communication is one of the least used functions of the mobile device (Rheingold, 2002, pp. 1-28).

Although cell phones have largely surpassed the number of PCs worldwide,⁴ and appear to be surpassing the popularity of TV sets (Rice & Katz, 2003, p. 598), it is not possible to define a worldwide cell phone culture, since cell phone usage differs substantially from place to place depending on cultural and socio-economic factors. Site-specific usages entail new social

meaning for the cell phone as an interface. For the conceptualization of hybrid spaces, I shall explore mostly cell phone usage in Asian countries, such as Japan, and in Scandinavian countries, such as Sweden and Finland, since cell phones in these countries have been studied as collective communication media (Katz & Aahkus, 2002; Brown *et. al.*, 2002; Rheingold, 2002; Koskinen *et. al.*, 2002). Moreover, as Rheingold (2002) noticed, their devices possess both communication and computing capabilities” (p. xii), being therefore more than mobile telephones.

This paper conceptualizes and defines hybrid spaces via three interconnected spatial analyses: connected spaces, mobile spaces and social spaces. It addresses four central questions: How do mobile technologies reconfigure our perception of space via users who are always potentially connected to the Internet and to other users? How can cell phones be regarded as interfaces of hybrid spaces, promoting new types of social environments? What happens when virtual communities migrate from the fixed Internet to physical spaces interfaced by mobile technologies?, and finally, how do mobile technologies allow users to connect in new ways to people who share the same contiguous space via location awareness? To answer these questions, and to conceptualize this new spatial perception, three perspectives are addressed: First, I define hybrid reality as blurring the borders between digital and physical spaces, and also in opposition to augmented and mixed realities, concepts that also claim the blurring of borders between the physical and the digital. Second, I analyze hybrid spaces as mobile spaces defined by mobile social networks and by the shift from static to mobile interfaces. Finally, I look at hybrid spaces as social spaces, analyzing the shift of communication spaces from cyberspace to hybrid spaces.

This essay contributes to the ongoing explorations of the relationship between mobile technologies and (physical/digital) spaces through examining three significant arenas: (1) the re-shaping via interfaces of communication relationships and the spaces in which interactions take

place; (2) the development of the concept of hybrid spaces in order to re-conceptualize physical spaces by the connectivity of digital mobile media; and, (3) the way cell phones strengthen users connections to physical space, a finding in opposition to current studies suggesting that cell phones withdraw users from the physical space in which they are (Plant, 2001; Gergen, 2002; Puro, 2002).

2. Hybrid spaces as connected spaces: Hybrid reality vs. virtual, augmented, and mixed realities

Hybrid spaces merge the physical and the digital in a social environment created by the mobility of users connected via mobile technology devices. The emergence of portable communication technologies has contributed to the possibility of being always connected to digital spaces, literally “carrying” the Internet wherever we go.

Because many mobile devices are constantly connected to the Internet, as is the case of the i-mode standard in Japan,⁵ users do not perceive physical and digital spaces as separate entities, and do not have the feeling of “entering” the Internet, or being immersed in digital spaces, as was generally the case when one needed to sit down in front of a computer screen and dial a connection. According to Ragano (2002 (¶ 8), i-mode developers have avoided promoting the new service as ‘the Internet’ but instead offered it as a feature that was part of any keitai (the Japanese name for cell phone).⁶ Rheingold (2002) also noticed that most teenagers in Japan did not access the Internet through desktop PCs, at the time they got their first keitai; therefore, none of them “thought of what they were doing as ‘using the Internet’” (p. 6). With no previous connections to the concepts of immersion and virtual reality, mobile digital spaces acquire a completely different meaning to this community of users: instead of focusing on issues such as immersion and identity creation in virtual worlds, users are more likely to be concerned about

how their keitai can help them in physical spaces, to find places and friends through location awareness, to buy train tickets, and pay for groceries at the supermarket. Ling and Yttri (2002, p. 147) observe that the most distinct profile of cell phone usage can actually be found in the youngest users, since they appropriate technology as an expressive medium for social purposes. Similarly, Ragano (2002, ¶ 22) affirms that many mobile Internet companies have studied children to understand the potential for new applications, since they are generally not influenced by previous meanings of existing similar interfaces and are therefore able to find unexpected meanings for new devices. Without the traditional distinction between physical and digital spaces, a hybrid space occurs when one no longer needs to go out of physical space to get in touch with digital environments. Therefore, the borders between digital and physical spaces, which were apparently clear with the fixed Internet, become blurred and no longer clearly distinguishable.

Existing concepts of augmented and mixed realities also address the interconnection between physical and digital spaces. However, a closer look at some definitions helps to stress the distinctions. Paul Milgram and Herman Colquhoun Jr. (1999, pp. 5-28) point out that current literature on augmented reality (AR) defines it in three distinct ways, depending on the technology used. First, the traditional augmented reality is achieved by means of some kind of Head Mounted Display (HMD) or Head Up Display (HUD) with see-through capabilities, in a way that the user can see the “real” world with overlaid graphical data. Broadening this concept, the second use of augmented reality refers to “any case in which an otherwise real environment is ‘augmented’ by means of virtual (computer graphic) objects” (Milgram & Colquhoun, 1999, p. 6). The authors give the example of a photograph (a real image) upon which computer generated (virtual) images have been superimposed. Finally, the authors suggest a third class of AR which encompasses the cases involving any mixture of real and virtual environments. While the first

and the second trends can definitely be called augmented reality, a broader term must be defined for the third trend. Consequently, they create the term *mixed reality* to define situations in which it is not clear whether the primary environment is “real” or “virtual,” or when there is no predominance of “real” or “virtual” elements in the environment (Fig. 1).

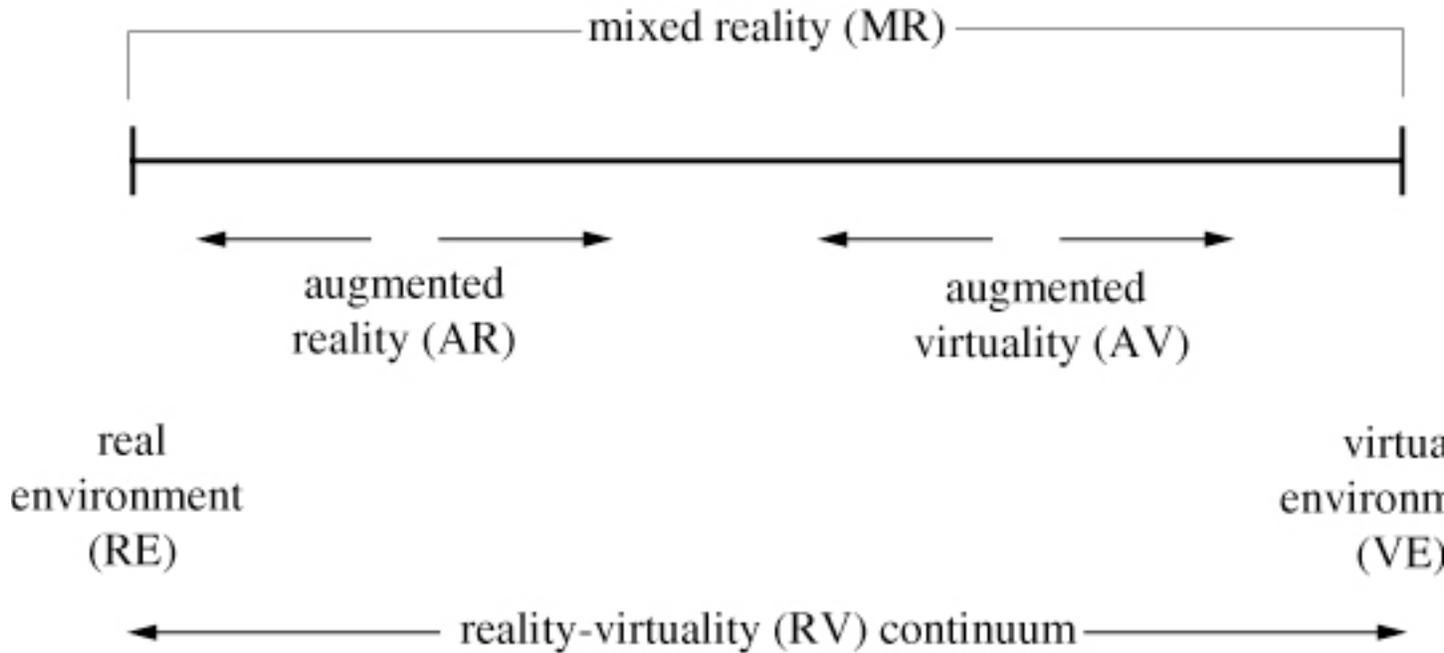


Figure 1: Definition of *mixed reality* within the context of the RV Continuum, according to Paul Milgram and Herman Colquhoun (Illustration © Milgram & Colquhoun Jr., 1999, p. 7).

Milgram and Colquhoun (1999, p. 8) however, restrict their definition to graphic information; thus elements from the real world inside modeled environments correspond to photographs, while elements from virtual realities inside unmodeled environments correspond to computer-generated images overlaid on photographs, for example. Their concepts of mixed and augmented realities take into consideration only the technology used to construct digital spaces,

but does not consider social and communication issues. Although it does consider connections between physical and digital elements (which they name real and virtual) it is restricted to the overlay of graphic digital information on physical reality.

A different approach toward the definition of mixed reality is endorsed by Hiroshi Ishii (1999, p. 232), from the Tangible Media Group at the MIT Media Lab. Ishii foresees desktop computation changing into two major directions: onto our skin / bodies, and onto the physical environments we inhabit. Whereas the first trend is connected to the definition of wearable computing, the second is related to ubiquitous computing. Ishii's group attempts to "bridge the gap between cyberspace and physical environment by making digital information (bits) tangible" (Ishii, 1999, p. 233). In this sense, he dedicates considerable importance to material interfaces, focusing on how to bring the "immaterial" bits of digital spaces into the physical world.

Ishii's (1999) approach takes Milgram and Colquhoun Jr.'s (1999) definition one step further by emphasizing the physicality of digital interfaces. Ishii (1999) attempts to demonstrate that the interfaces through which we connect to digital spaces do change our perception of digital information and re-configure our perception of both physical and digital spaces. Moreover, by connecting mixed reality with wearable computers, Ishii (1999) emphasizes the relevance of mobility in the blurring of borders between physical and digital spaces. However, just like Milgram and Colquhoun Jr. (1999), Ishii's (1999) definition also does not include sociability and communication.

Following Ishii's tendency to interconnect digital and physical worlds, Lev Manovich (2002, p. 1) recently stated that the 1990s were about the virtual, and that it is quite possible that this decade of the 2000s will turn out to be about the physical. Manovich (2002, p. 6) defines three types of applications that create an *augmented space*, a term he derived from augmented reality. The first one is video surveillance, which captures data from the physical environment

and adds it to the digital network. The second, cellspace, inverts this situation by sending data to mobile users in physical space carrying GPS devices and cell phones. Similarly, but in a non-personalized approach, computer monitors and video displays in public places can present visible digital information to passersby. Manovich (2002, p. 4) defines augmented space as a physical space transformed into a dataspace: “extracting data from it (surveillance) or augmenting it with data (cellspace, computer displays).” Therefore, the flows of information that previously occurred mainly in cyberspace can now be perceived as flowing into and out of physical space, blurring the borders between both.

Lev Manovich (2002) develops an interesting approach towards augmented spaces because his definition is not only restricted to technology, but also intrinsically connected to art works that take place in public spaces, including urban spaces in the definition of augmented reality. For example, Manovich (2002) describes how Janet Cardiff’s audio walks overlay pre-recorded sounds onto the city landscape while the user walks in public spaces. However, communication and social interaction are still not required components for the construction of an augmented space.

From the merging of mixed reality / augmented spaces, mobility, and sociability arises a *hybrid reality*. It is exactly the mix of social practices that occur simultaneously in digital and in physical spaces, together with mobility that creates the concept of hybrid reality (Fig. 2).

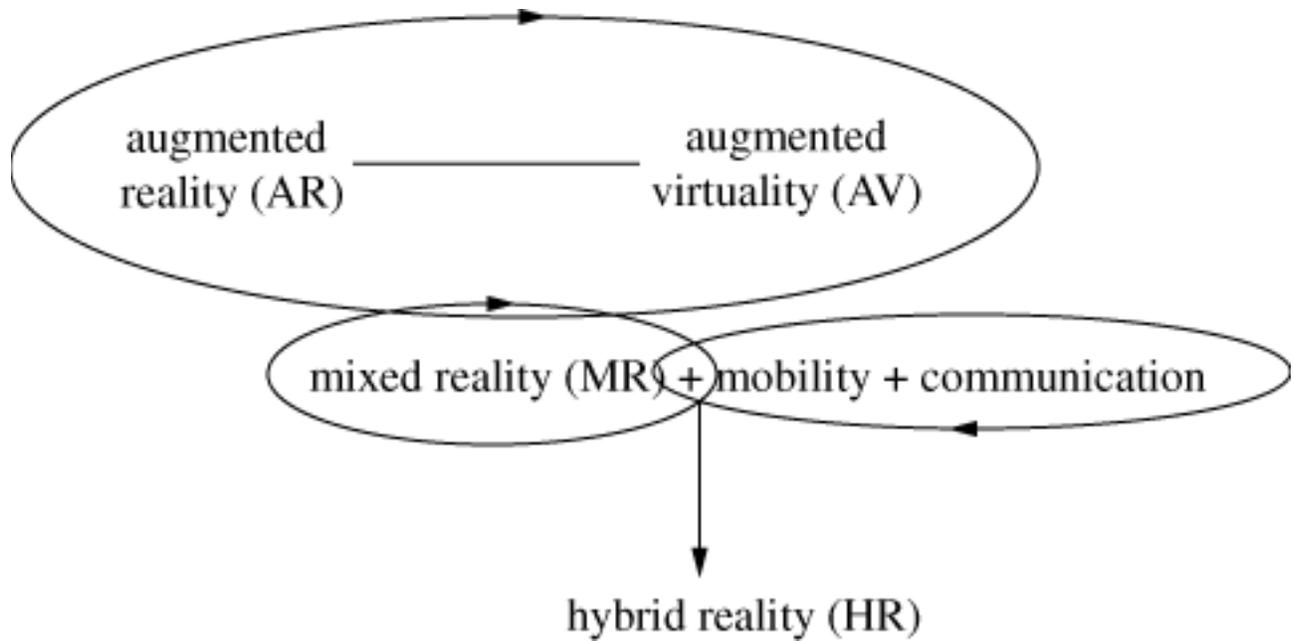


Figure 2: Definition of hybrid reality (Illustration © de Souza e Silva, 2004b)

A hybrid space, thus, is a conceptual space created by the merging of borders between physical and digital spaces, due to the use of mobile technologies as social devices. Nevertheless, a hybrid space is NOT constructed by technology. It is built by the connection of mobility and communication, and materialized by social networks developed simultaneously in physical and digital spaces.

3. Hybrid spaces as mobile spaces

Mobile spaces are networked social spaces defined by the use of portable interfaces as the nodes of the network. The idea of mobile social networks and the use of cell phones as collective communication devices have been observed in countries such as Japan, Philippines, Finland and China (Rheingold, 2002; Kasesniemi & Rautiainen, 2002; Koskinen, 2002; Castells, 2004) One

of the most popular cases of macro-coordination via mobile technologies occurred around the downfall of Philippine President Estrada in 2001. After some senators associated with the president succeeded in stopping the President's impeachment process, opposition leaders started to broadcast text messages in order to call citizens to gather. In 75 minutes after the failed impeachment, more than 20,000 people converged on EDSA, Manila's central thoroughfare. "The rapid assembly of the anti-Estrada crowd was a hallmark of early smart mob technology, and the millions of text messages exchanged by the demonstrators in 2001 was, by all accounts, a key to the crowd's esprit de corps" (Rheingold, 2002, p. 160). Similarly, a phenomenon named Flash Mobs has been observed in San Francisco, London, and Berlin. It consists of "dozens or even hundreds of people with cell phones who gather suddenly, perform some specific but innocuous act, and then promptly scatter" (Walker, 2003, ¶ 2). The "mobs" organize themselves via mobile phones and pagers, and, according to Walker (2003), the social phenomenon has the ability to "make networks tangible" (¶ 4).

Perhaps the strongest evidence of bringing networked communities into hybrid spaces is the emergence of hybrid reality (location-based mobile) games. Hybrid reality games (HRG) are multiuser games played with cell phones equipped with location awareness and Internet connection. HRG allow players to use the city space as the game board. *Botfighters*, produced in Sweden in 2001 by *It's Alive* was the first commercially released location-based mobile game (LBMG). It was designed as the traditional first-person shooter video game. However, in order to be played, users must be moving through urban spaces. Depending on the relative position of each player in the city, users can shoot other players with text messages, be targeted to receive a shot, and get into battles. The accuracy and success of each shot depends on the virtual weapons a player carries and her or his real distance to the target. In this sense, hybrid reality games are configured as MMORPG⁷ played in physical (hybrid) spaces.⁸

A common characteristic of political demonstrations like the one in Philippines, social events like Flash Mobs, and hybrid reality games like Botfighters is their ability to invert the traditional logic of the network, making it mobile and emphasizing its paths and connections to physical spaces instead of its nodes. A network, as defined by Pierre Rosenstiehl (1998), only considers specific connections, and never looks at the paths. The network-man can play with alternate paths and “completely ignore the fact that a flight from Paris to Algeria flies over the Mediterranean” (Rosenstiehl, 1998, p. 229). Forgetting the space “in-between” is a characteristic of networked systems. The Internet, as computer network, and consequently cyberspace, as the information space that emerged from the connections of computers around the globe, have been frequently studied as the ultimate representation of the network concept, where physical geography would not matter and anywhere in the globe would be “one click away” (Kelly, 1999). In this context, Michel Serres (1994) applied the metaphor of a rich place (*riche lieu*) to the Web, as a single place that encompasses all others. This single place is oversized, equal to the planet, because it contains (virtually) everything. In this place, information, values, and data accumulate and circulate in the same single movement (Serres, 1994, p. 142). Although each Web site represents a node (a server) in the network, the Internet user has generally no clue about the path information travels between the time when a request is made and when the information is eventually shown on the client screen. Information travels by servers and routers, choosing the best path to follow, generally unknown to the common Internet user.

However, the popularity of mobile technologies and their uses as collective communication media reminds us that networks are indeed spatial phenomena and that the space “in-between” represented by the paths in fact matters. In contrast to the fixed Internet, where servers and routers represent the fixed nodes of the digital network, in a mobile network cell phones become these nodes, which are carried by users who wander through physical spaces. In

this movement, not only the nodes of the network become mobile, but also the paths through which they move are critical to the configuration of the network.

Deleuze and Guattari (2002) offer a theoretical framework to understand the idea of mobile networks through the association of the nomad existence and the spatiogeographic aspect⁹ of the war machine. The authors point out three characteristics of the spatiogeographic nomadic movement. The first one is related to points and paths of the nomadic network. Although the nomad is not ignorant of points, he focuses on paths, on the movement that happens in-between these points. In the nomadic network, the points are subordinated to the paths. Nomads also go from point to point, but as a mere consequence of their trajectory. “The life of the nomad is the intermezzo” (Deleuze & Guattari, 2002, p. 380). Nomadic spaces are, following Deleuze and Guattari (2002) smooth spaces, which means that the paths that determine the nomadic movement, are also mobile and easily “effaced and displaced with the trajectory” (p. 381). The nomad does not occupy pre-defined routes and paths: he constructs his own while moving through space. Mobile technology users take the nomadic concept one step further, since not only their paths are mobile, but also the nodes. With the fixed Internet, and fixed landlines, computers and telephones were primarily connected to a place. Conversely, cell phones represent movable connection points, accompanying the user’s movement in physical spaces.

A brief analysis of the cellular network model reinforces this connection between mobile networks and physical spaces. Figure A shows the classic representation of a cellular network. Cells are designed as hexagons adjacent to each other. Transmission towers occupy the corners of each hexagon and users are represented by the dots. Note that the cell is defined by the gray dashed line. The full line defines the transmission range of each antenna, which transmits inwards the cells.¹⁰ This representation, however, works for didactic purposes but does not correspond to reality. Ideally, the transmission range of each antenna defines a circle (Figure B).

In the physical world, however, each cell is influenced by weather conditions, by the number of users in each cell, and by the users' movement within each cell, which turns them into ill-defined shaped areas, in constant movement (Figure C). It is as if the cellular network stands as a layer over the physical space, attached to and being influenced by it. (Fig. 3)

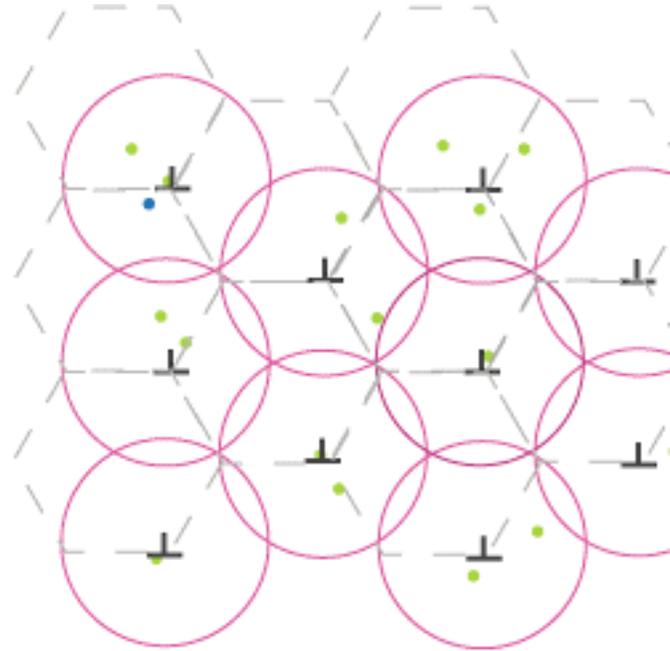
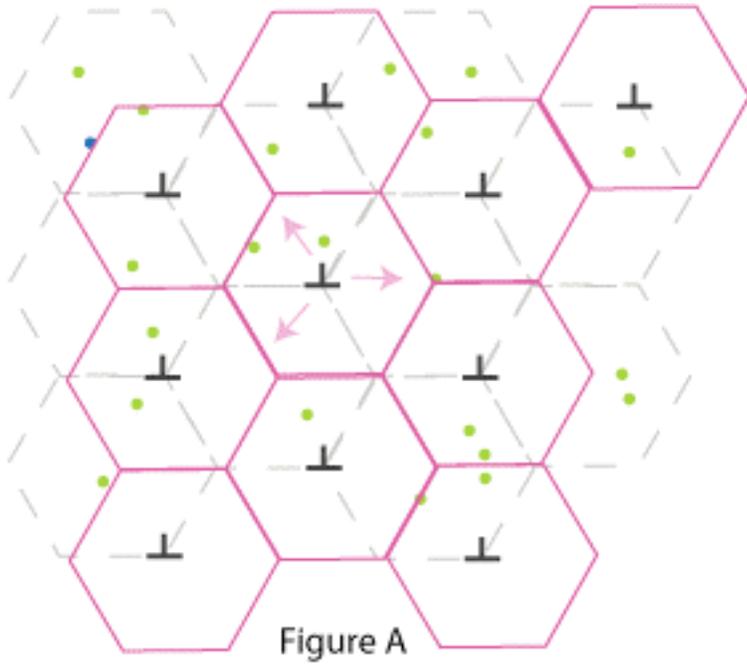


Figure B

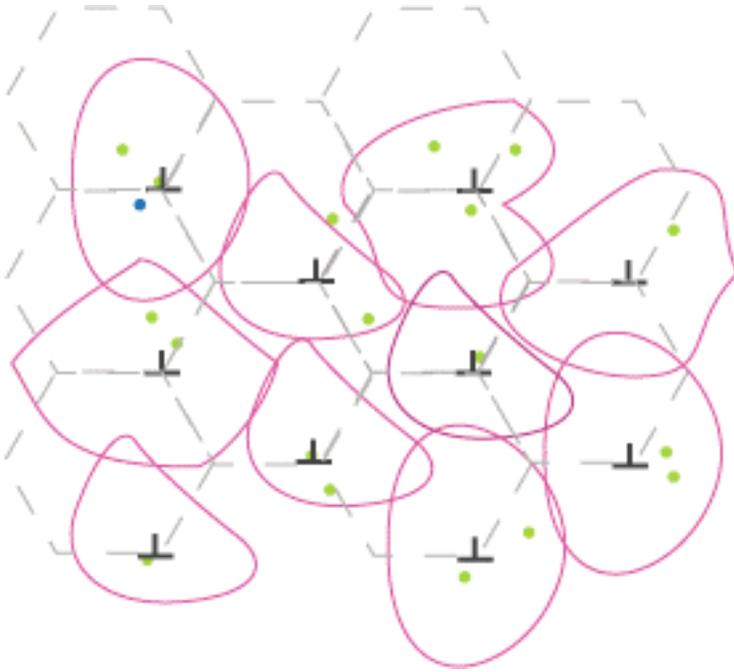


Figure C

Figure 3: Real representation of a cellular network, according to Raby, Suzuki and Catterall (2000). (Illustrations © de Souza e Silva).

Finally, a relevant perspective to define mobile spaces is the shift from static to mobile interfaces. This shift redefines the way we connect to the Internet, and consequently our perception of digital spaces, as exemplified with the case of Japanese teenagers who do not see a disconnection among physical and digital spaces because their first experience online was via the cell phone. Static interfaces are defined as large-sized monitors, desktop computers, Head Mounted Displays (HMD), that is, every type of interface that allows the connection to digital spaces, but does not allow a high degree of movement in physical space while connected. Conversely, mobile interfaces are defined as cell phones, PDAs, and Palmtops, that is, interfaces that allow our connection to the Internet while moving through physical space.¹¹ These

interfaces literally allow us to “carry the digital space” with us. As a consequence, mobility becomes part of the process of connecting to the digital and exploring hybrid spaces. The connection via mobile devices is fundamentally different from the connection through a desktop computer. First, desktop PCs are considered static interfaces, and therefore the user needs to be stationary in order to “enter” the Internet. Second, because of the static interface, the experience of being online is generally a solitary one (Donath, 1997, p. 27). With portable technologies, users are connected while surrounded by other city dwellers. Mobile interfaces are used primarily inside social public spaces. Take the case of Japan. Kusahara (personal communication, January 16, 2003) suggests that the *keitai* is so popular in Japan because of the Japanese lifestyle: They live in a limited space, spending a long time using and waiting for public transportation. Therefore, a small device, which can fulfill the “in-between” space, becomes the ideal communication tool.¹²

As a consequence, the main question from the last decade regarding cyberspace, “how does one construct digital spaces?” can now be rephrased to “how is physical space re-conceptualized by the connectivity of digital mobile media?” According to Anthony Townsend (2000), the mobile phone might “lead to a dramatic increase in the size of the city, not necessarily in a physical sense, but in terms of activity and productivity” (p. 14). Townsend (2000, p. 10) notes that the technology for a high degree of mobility across the city has been around since the invention of the automobile. However, the ability to coordinate social actions in real-time has only occurred with the advent of mobile communication technologies.

Coordination implies not only micro-coordination among individuals, but especially macro-coordination as is the case of Flash Mobs, political manifestations, and location-based games.

The relationship between mobile interfaces and hybrid spaces is two-fold. On the one hand, the concept of digital space is no longer the same, since it is now merged with physical

space. Embedding the Internet in everyday activities means that issues like the creation of body and identity will be potentially replaced by issues such as location-based services and macro-coordination. On the other hand, mobile technology devices also influence the perception of urban spaces. According to N. Katherine Hayles (personal communication, November 19, 2002) space is becoming enfolded, “so that there is no longer a homogeneous context for a given spatial area, but rather pockets of different contexts in it”. For example, someone talking on a cell phone is part of the context of people who share the same spatial area, but she is also part of a distant context, because she is talking to someone who is spatially remote from her area. Hence, there is a context that is created by the spatial proximity of people and inside it another context that is created by the cell phone. The notion of enfolded spaces is well exemplified by what Rheingold (2002) named “Tokyo Thumb Tribes”, which describes Japanese teenagers who exchange huge numbers of text messages a day (about 80) and who barely use mobile phones as voice communication devices. Mizuko Ito observed that the use of text messages has also changed their notion of presence: “As long as people participate in the shared communications of the group, they seem to be considered by others to be present” (Rheingold, 2002, p. 6). The enfolding of contexts (or “doubling of space” as defined by Scannell (1996)), which allows users to feel like they are in two places at once, might have been studied as a feature of other media as well, such as the radio, TV or wired telephones (Scannell, 1996; Trow, 1997; Meyrowitz, 1985), but the difference with mobile technologies is precisely the possibility of moving through space while simultaneously interacting with others who are both remote and in the same contiguous space via your relative location to other users. Within this context, concepts such as “enfolded” and “doubling” must be redefined, since they still allude to a division, or separation of space. Enfolded is perhaps a better idea, since it alludes to some type of overlapping. However, the term

“hybrid” defines a situation where the borders between remote and contiguous contexts no longer can be clearly defined.

4. Hybrid spaces as social spaces

The Internet has been studied as a social immersive space where users develop communities and construct worlds (Rheingold, 2002; Donath, 1997; Smith & Kollock, 1999; Kim, 2000; Dibbell, 1999). MUDs, MOOs¹³ and recently MMORPG are examples of such online social spaces. Multiuser environments, constructed metaphorically as public social places, have attracted many people willing to socialize with others outside their situated geographical boundaries. During the last decade there has been a common belief that these “virtual” communities would indefinitely grow, and that communication would increasingly migrate to cyberspace (Mitchell, 1995; Wertheim, 1999).¹⁴ However, once mobile technologies become the interface to connect to the Internet, these communities are potentially brought into public urban spaces. Unlike traditional social public places, such as bars, squares, and automobiles, these new communities are re-configured in hybrid spaces, since their users are simultaneously moving through physical space while connected in real time to other users via digital technology depending on their relative position in physical space.

Location-based games, such as the previously mentioned Botfighters, and Mogi in Japan, have shown that location-awareness is a key factor to bring virtual communities into hybrid spaces. Mogi is a hybrid reality game released in 2004, in which the main goal is looking for virtual creatures and objects spread around the city of Tokyo. Equipped with java-enabled cell phones, users are able to see in their mobile screen a map of the city and the position of nearby objects. Once within 300 meters of their target, objects can be caught and uploaded into the cell phone. However, some creatures live in parks and just go out at night, so the player must go to a

specific place at a specific time to capture the particular creatures. The multiuser function of the game comes from the need to exchange creatures and objects with other players in order to complete the collection. Once again, exchanges can only be made if the players are within a specific distance from each other in physical space. Another location-based application that brings the concept of instant messaging to urban spaces is the software ImaHima, originally released in Japan in 2001. Similar to any instant messaging software, each user must agree to have her location tracked by ImaHima. There is also the possibility of contacting a stranger whose profile matches the user's request if she allows herself to be contacted by an unknown person. However, whereas traditional instant messaging displays on the computer screen simultaneously connected users, independent of their physical location, ImaHima connects people within a close radius in physical space.¹⁵ There are currently 250,000 active ImaHima users in Japan who access the ImaHima service through i-mode and WAP phones.¹⁶

The popularity of these gadgets, devices, and applications in Japan provides evidence that cell phones are not only used to communicate with people who are distant, but also to socialize with peers who are nearby, sharing the same physical space, even if they are not at eye-contact distance. Finding people to socialize in cyberspace has always been critical in multiuser environments in the fixed Internet. Mobile Internet users also look for people with whom to socialize. *The difference, however, is that mobile networks help to find people in public places.* In the hybrid spaces logic, cell phones do not take users out of physical space, as has been suggested by many scholars who studied mobile devices as voice communication technologies (Plant, 2001; Gergen, 2002; Puro, 2002). Conversely, they strengthen the users' connection to the space they inhabit, since the connection to other users depends on their relative position in space. Therefore, games like Botfighters and Mogi change the perception of physical spaces by transforming them into potential multiuser environments.

Once there is a shift from static to mobile interfaces, users are no longer required to sit in front of their computers, but they rather move around in urban spaces – which are already social public spaces. The enfolding of digital and physical social spaces thus requires a re-definition of not only the concept of digital space, but also of our sense of distributed communities. How does the mobility of users influence the construction of social spaces?

Spaces have been defined in many different ways (Lefebvre, 1974; de Certeau, 1984; Castells, 2000; Kelly, 1999; Massey, 1995; Moores, 2003). Although it is outside the scope of this paper to make a detailed analysis of this concept, I would like to briefly point out some relevant notions for the construction of hybrid spaces as social spaces. Manuel Castells (2000, p. 453) defines the space of flows as the dominant spatial logic of the network society. The space of flows is conceptualized as “a new spatial form characteristic of social practices that dominate and shape the network society.” In this sense, “the space of flows is the material organization of time-sharing social practices that work through flows” (Castells, 2000, p. 442). Paraphrasing Castells, Stalder (2001) affirms that “the space of flows is created by the real-time interaction of distributed social actors. The space is comprised of interactions and the material infrastructure that makes these interactions possible”. What is important to understand from this definition, is that the space of flows is intrinsically a social space; according to Castells (2000), space is the expression of society (p. 440). However, in the space of flows, the material infrastructure that makes these social interactions possible is in part comprised of digital technologies, and a physical network.

Moores (2003, p. 2-3) criticizes Castells definition of places arguing that places are not self contained, since in any city people maintain social relationships and connections that go beyond the physical boundaries of that specific place, transforming places in permeable localities (Moore, 2003, Meyrowitz, 1985; Massey, 1995). However, perhaps the major contribution of

Castells is exactly to understand that following the logic of the space of flows, cities have become processes and networks, rather than self contained places, since the space of flows is not an immaterial fluid information space disconnected from physical spaces, but is rather embedded in urban structures (Castells, 2000, 417). Therefore, “the interaction between new information technology and current processes of social change does have a substantial impact on cities and space” (Castells, 2000, p. 429).

Perhaps what is missing from Castells definition, as noted by Moores (2003, p. 4) is the connection of the space of flows with the space of places, recognizing that both instances are not diametrically opposed forms and might be actually complementary, since the space of flows also includes social relationships within urban spaces. For the notion of hybrid space, thus, following Castells, I regard space as a concept produced and embedded by social practices, in which the support infrastructure is composed of a network of mobile technologies. Henri Lefebvre’s (1974) concept of social spaces defines social space as a social product (1974, p. 26), rather than as pre-existent physical spaces. In this sense society constructs and defines space. Moreover, social spaces are not material things, but rather a set of social relationships both between objects and objects and people (Lefebvre, 1974, 83). The logic of hybrid spaces mediates this set of relationships of mobile technologies. The connections do not occur solely in physical space, but rather in a new type of space that merges physical and digital. More than expanding the number of possible connections, as the telephone did and the fixed Internet to a much greater extent, hybrid connections also change the perception of the physical space the users inhabit. For example, some Botfighters players report that they re-discovered the city of Stockholm while playing the game:

Eventually you start to take trips to places you wouldn't go to otherwise. I found myself sitting on the Web trying to find a nice café in an unknown part of Stockholm so that me and my girlfriend could have a picnic and also destroy a certain bot. (Herald Sun, 23 Jul. 2001)

By transforming the city space into the game board – or by taking the game out of the computer screen – the familiar space of the city is transformed into a new and unexpected environment. It is as if the game creates an imaginary playful layer that merges with the city space, connecting people who previously did not know each other via mobile technologies according to their movement in physical spaces. Lehtonen and Mäenpää (1997) refer to this unpredictability in public spaces -- also a characteristic of shopping -- as *street sociability*, which is “the particular public form of sociality, of being at once both interested and yet indifferent and anonymous” (p. 156). While in the city, one cannot foresee whom one is going to meet or what is going to happen. It is exactly this unpredictability contained in gaming that makes it so exciting as an unexpected playful experience.¹⁷

Similarly, Niklas Stahre, a 24-year old engineer who lives in Stockholm, was among the first enthusiastic Botfighters' subscribers:

“What appeals to me about mobile gaming is that you can interact with people while you are on the fly. You can play it whenever you want, wherever you want. You play against real people, and, with Botfighters, you have to move around to win an advantage (Brown, 01 Dec. 2000)

Finally, similar to Lefebvre (1974), Kelly (1999) states that the true meaning of a space is related to its ability to absorb connections and relationships. Therefore, for Kelly (1999), echoing Lefebvre (1974) and Castells (2000), space is a networked entity. Networks are spatial structures,

and what guides their existence is the large number of connections embedded in them. A hybrid space is also a networked space, constituted by a mobile network of people and nomadic technologies that operate in non-contiguous physical spaces. Therefore, in order to integrate this space, a node (e.g. a person) does not need to share the same geographical space with another node of the mobile network. The hybrid space is created exactly by the merging of different and discontinuous places within each other.

When compared to the fixed Internet, mobile devices bring actions formerly performed at specific “private” places (home or offices with desktop computers connected via cables to the network) to public urban spaces. Furthermore, these technologies create another perception of what it means to access the Internet. As discussed earlier, teenagers in Japan do not feel like they are “entering the Internet” when they use their cell phones with i-mode because the always-on connection is considered as a regular function of their cell phones (Ragano, 2002, ¶ 8). The mobile Internet is becoming useful for actions that integrate the Web in physical spaces. For example, in Finland and in Japan it is possible to buy sodas in vending machines using the mobile phone. Users are also able to purchase train and ski tickets with their mobiles. Furthermore, the new I-mode Felica¹⁸ allows users to use their cell phones as their wallets, to pay for groceries in the supermarket, and as their identification cards, to check-in in an airport. Finally, if the device has location-awareness, it can be used to find restaurants, receive driving directions, and – to return to the idea of social space – to find friends who are nearby.

Since early on cell phones have been studied as social collective technologies, in opposition to the general two-way communication of regular fixed phones. In addition to the already mentioned examples, such as the Thumb Tribes in Japan, Flash Mobs, and the case of President Estrada in Manilla, mobile phones have been studied as producers of social relationships via Short Message Service (SMS) use in Finland (Kasesniemi and Rautiainen,

2002, p.182). Location-based services, such as ImaHima and games like Botfigthers and Mogi take the construction of hybrid social spaces one step further, since they connect users depending on their relative position in urban spaces.

Conclusions

The Internet undeniably opened our consciousness to the possibility of large-scale communities known as multiuser environments, which were not confined to the same physical place. Cell phones have been frequently studied as means of two-way communication whereby private spaces are created inside public spaces (Plant, 2001; Gergen, 2002; Puro, 2002). However, this paper focused on the use of mobile phones not as portable telephones, but as micro-computers. Within this context, the comparison to the fixed Internet becomes more relevant than the comparison to traditional landlines.

The concept of cyberspace applied to the Internet was responsible first for our view of physical and digital as disconnected spaces, second for our emphasis on the nodes of the network instead of its spatial structure, and finally for the utopian view of a future where social spaces would emerge mostly online. Mobile phones transgress this traditional relationship to the Internet because they are able to embed the Internet in public spaces. As every shift of interface transforms not only the social relationships it mediates but also the spaces in which it is embedded, the notion hybrid spaces encourages the re-definition of physical and digital spaces. For this reason, the concept of hybrid spaces arises to supply a gap opened when the Internet became mobile and when communities previously formed in cyberspace could be found in urban (hybrid) spaces.

Perhaps the most relevant feature of the cell phone in defining how mobile interfaces can influence our interaction with other users and with the space we inhabit is its location-awareness.

When a mobile interface knows where it is in physical space it automatically acquires a different meaning from a fixed telephone and from a desktop computer, since one of its key functions becomes navigation in physical space. Internet capability added to location awareness allows users to have a unique relationship to physical space, as well as to the Internet. Changing our experience of space means not only interacting in new ways with other people, but also re-defining the space in which we live.

As a last example I would like to mention an educational location-based mobile game developed by the Amsterdam Montessori School and the WAAG Society. Frequency 1550 was tested during February 2005 and used a part of the city of Amsterdam as the game board. Students on the streets equipped with java enabled 3G location-aware cell phones needed to collaborate with remote online students to solve location specific assignments about the medieval history of the city. Remote students were in classroom and could track the position of their partners on the street via a map on their computer screens, and communicate with them via audio. Frequency 1550 demonstrates not only how mobile technologies can be used for bringing educational activities outside the classroom, but also how students can have a different relationship with the city in which they live. By overlaying a fictitious narrative about the Amsterdam of the past on the actual city space, students learned history and could connect to existing city landmarks in a unusual way. Moreover, they walked around in a space that was a mix of reality and imagination.

Foregrounding the pathway from the fixed Internet to hybrid spaces reterritorializes¹⁹ multiuser environments, defined as social spaces that allow communication among people who do not share the same contiguous physical place. This idea can be easily transferred to physical space when we take a closer look, for example, at the development of location-based mobile games. Mobile communication technologies recreate urban spaces as multiuser environments.

Because mobile devices create a more dynamic relationship to the Internet, embedding it in everyday activities that happen mostly outdoors, the idea of digital spaces as instances disconnected from physical spaces no longer applies.

Consequences of changes from the passage from cyber spaces to hybrid spaces are: (1) the blurring of borders between physical and digital spaces, (2) the redefinition of the concept of the digital, (3) the redefinition of the concept of physical space to include hybrid environments, and (4) changes in sociability and communication patterns. Finally, the shift, driven by nomadic technologies, from cyber to hybrid calls our attention to the fact that the digital has never actually been separated from the physical, and can be an essential element for promoting sociability and communication in urban spaces.

Notes:

¹ A report from NTT DoCoMo (June 2004) states that today's FOMA CPU processing speed is comparable to personal computers from eight years ago running Windows 95.

² 3G (Third Generation Cellular Telephony) also stands for UMTS (Universal Mobile Telecommunication System). "UTMS allows many more applications to be introduced to a worldwide base of users and provides a vital link between today's multiple GSM systems and IMT-2000. The new network also addresses the growing demand of mobile and Internet applications. UMTS increases transmission speed to 2 Mbps per mobile user and establishes a global roaming standard." Source: International Engineering Consortium. Retrieved November 28, 2005, from <http://www.iec.org/online/tutorials/umts/topic01.html>

³ There are two different ways by which the cell phone can be aware of its position. One is accomplished by cellular positioning, which indicates the device location through the triangulation of radio waves detected by the cell phone in relation to the transmission towers. Another much more accurate way uses GPS systems embedded in the phone.

⁴ According to the International Telecommunication Union (ITU), in 2004 there were 770,641 million personal computers vs. 1,751,940 billion cell phones. Retrieved November 25, 2005 from <http://www.itu.int/ITU-D/ict/statistics/>

⁵ See NTT DoCoMo's website for more information about the i-mode: <http://www.nttdocomo.com/corebiz/services/imode/what/index.html>

⁶ Keitai is the Japanese word for cell phone, which roughly means "a carried telephone".

⁷ MMORPG stands for Massively Multiplayer Online Role-Playing Game. MMORPG are descendants from MUDs. However, whereas the early MUDs were purely textual, MMORPG generally have graphical interfaces.

⁸ An extensive list of existing location-based mobile games can be found at http://www.in-duce.net/archives/locationbased_mobile_phone_games.php

⁹ The other two aspects are the arithmetic or algebraic aspect, and the affective aspect (AXIOM II) (Deleuze & Guattari, 2002, p. 380).

¹⁰ More on cellular networks and wireless technologies can be found on Privateline.com: <http://www.privateline.com>

¹¹ Note that all mobile interfaces are wireless, but this does not mean that all wireless interfaces are mobile. It's possible for example, to connect a desktop computer and a printer via Bluetooth or Wi-Fi, however, they do not support mobility.

¹² Conversely, as noted by Ito "Americans move between private nucleated homes, private transportation, and often private offices and cubicles as well, with quick forays in the car to shop occasionally (not daily grocery shopping as in Japan), and use of public space and restaurants has the sense of an optional excursion rather than a necessity" (Rheingold, 2002, p. 22).

¹³ MOO stands for MUD, Object Oriented. It is a type of multi-user environment in which users can use programming language to build objects in the virtual world.

¹⁴ Authors such as N. Katherine Hayles (1999) and Kevin Robins (1999) have criticized this position by emphasizing the connections between cyberspace and our physical world.

¹⁵ ImaHima won the Prix Ars Electronica in the category Net Vision / Net Excellence in 2001.

¹⁶ For more information on ImaHima, see

http://www.imahima.com/ihcorp2/container/imahima_community.php?stlang=EN

¹⁷ Authors also suggest that "even though we emphasize unpredictability as the key to playful street sociability, it is important to note that this entertainment aspect of uncertainty relies on mutual trust between the 'players.' (...) If the implicit rules of street sociability are not followed, the aleatory elements, the feeling that 'something unexpected might happen,' starts to generate fear." (Lehtonen; Mäenpää, 1997, 161)

¹⁸ More information in the i-mode Felica at the NTT DoCoMo website: <http://www.nttdocomo.com>

¹⁹ Concept defined by Deleuze and Guattari (2002, p. 380) in *A Thousand Plateaux*.

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