

Hybrid Spaces in Art and Science Fiction from cyberspace to mobile interfaces

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ABSTRACT

The concept of real changes due to the emergence of ubiquitous computing and nomadic technology devices, which are responsible for creating a hybrid reality that merges physical and digital spaces, and creating a new articulation between real and imaginary. This paper addresses the evolution of virtual space from the perspective of arts and science fiction. The first section shows how the concept of virtual space as a mindspace has been developed. Also it presents how computers as simulation machines have played an important role in the construction of digital space. Second, the paper argues that the concept of virtual space is changing, since it can no longer be considered disjoint from physical space. Finally, the movies *The Thirteenth Floor* (Rusnak, 1999) and *The Matrix* (Wachowski, 1999) are case studies that illustrate how the idea of inhabiting a virtual space changes to a hybrid space that is part of our lives. As a result, it amplifies the notion of what the real can be.

Keywords: mobile technologies, hybrid space, imaginary

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RESUMO

O conceito de real muda devido ao aparecimento de sistemas computação ubíqua e de aparelhos nômades de comunicação, os quais são responsáveis pela criação de uma realidade híbrida que mistura espaços físicos e digitais, criando uma nova articulação entre o real e o imaginário. Este artigo trata da evolução do espaço virtual sob o ponto de vista da arte e da ficção científica. A primeira parte desenvolve o conceito de espaço virtual como um espaço mental. Além disso, computadores como máquinas de simulação tiveram importante papel na construção do conceito de espaço digital. Em segundo lugar, é argumentado que o conceito de espaço virtual transforma-se, pois este não pode mais ser considerado como uma instância desconectada do espaço físico, mas pertencente a ele. Finalmente, os filmes 13º Andar (*The Thirteenth Floor*) e Matrix (*the Matrix*) ilustram como a idéia de habitar um espaço virtual agora inclui um espaço híbrido que faz parte de nossas vidas. Espaços híbridos ampliam a noção do que o real pode ser.

Palavras-chave: tecnologias móveis, espaço híbrido, imaginário

RÉSUMÉ

Cette dissertation tente de révéler comment l'idée du réel est modifiée par l'apparition de l'informatique ubiquiste – ubiquitous computing – et des interfaces transparentes. Ces technologies sont à l'origine de la création d'une réalité hybride qui rassemble les espaces physiques et digitaux. C'est pourquoi elles créent un nouveau engrenage entre le réel et l'imaginaire. Pour ce faire, l'évolution de l'espace virtuel sera analysée à travers la vision des arts et de la science fiction. La première partie présente comment l'idée de l'espace virtuel en tant que perspective mentale - « mindscape » - s'est développée jusqu'à aujourd'hui. Dans la seconde partie, cette dissertation montre que le concept du virtuel est en évolution constante, puisqu'il ne peut être considéré sans être joint à l'espace physique – en d'autres termes, le virtuel ne peut exister que dans le réel. Pour finir, les films *The Thirteenth Floor* (Rusnak, 1999) et *The Matrix* (Wachowski, 1999) seront sujets d'analyse afin de démontrer comment l'idée d'exister au sein de l'espace virtuel a effectué sa mutation à celle d'un espace hybride qui s'intègre activement dans notre vie quotidienne. Il en résulte une conception amplifiée de ce que peut être le réel.

Mots Clefs : espace hybride, virtuel, simulations informatiques

RESUMEN

El concepto de la realidad cambia debido a la emergencia de computación ubicuo y divisas tecnologías nômades que son responsables por crear una realidad híbrida que

combina los espacios físicos y digitales. Por lo tanto, crean una nueva articulación entre la realidad y lo imaginario. Este reporte se dirige a la evolución del espacio virtual desde la perspectiva de artes y ciencias ficciones. La primera sección demuestra como el concepto de espacio virtual como un espacio mental se ha desenvuelto. También, presenta como computadoras, que son maquinas de simulación, han jugado un papel importante en la construcción de espacio digital. Segundo, el reporte discute que el concepto de espacio virtual esta cambiando, como ya no puede ser considerado trinchado del espacio físico al cual pertenece. Finalmente, las películas *El piso trece (The Thirteenth Floor)* y *El matriz (The Matrix)* son casos estudiados que ilustran como el perspectiva imaginario inhabitado en un espacio virtual ha estado cambiando a un espacio híbrido que es parte de nuestras vidas. Como resultado, amplifica la noción de lo que lo real puede ser.

Palabras-claves: tecnologías móviles, espacio híbrido, imaginario

Introduction

In the last few years we observe a change in what was formerly called *cyberspace* (Gibson, 2000). At first considered an immaterial space, built for the human mind and detached from physical reality, now it merges with the physical environment. Mainly due to the emergence of mobile technology devices, such as cell phones, palmtops, laptops and wireless technologies, we are live in a hybrid reality, which includes both virtual and physical. The goal of this paper is to argue that the ubiquitousness caused by new digital technologies changes and enlarges the concept of what the real can be. Consequently, it generates a new relationship between the real and the imaginary.

With the emergence of the Internet, especially the World Wide Web in the 1990s, we observed the growth of a new type of space, a virtual digital realm that shared with physical space the status of reality. Hence, it expanded our ways of inhabiting the world, because virtual spaces could also be built according to our imagination. Inhabiting imaginary spaces are not a novelty in human history. Arts and literature have for a long time

filled human mind with new and “unreal” places. Nevertheless, there has never been a virtual space with which people could interact via diverse interfaces. In addition, it has become possible to communicate with people from different places in the same virtual environment, thus creating a new sense of community.

Cyberspace, however, has been traditionally considered an immaterial space, a place for the mind, contrasting to physical reality, inhabited by the physical body. The perception of cyberspace as a mindspace and the strict separation between physical and virtual have contributed to create a whole imaginary realm in science fiction. Movies like *The Matrix* (Wackowisky 1999, USA) and *The Thirteenth Floor* (Rusnak, 1999, USA/Germany), which are going to be analyzed later, are some examples of how cyberspace has been envisioned as a simulation space which one could inhabit. Often immaterial spaces have been compared to the non-real, while physical spaces have been considered real. Consequently, the emergence of this new virtual space, which was viewed as non-physical, although real, addressed again the traditional Cartesian doubt, that is, *does the mental image correspond to reality?*

Descartes challenged the veracity of the connection between physical objects and their representation in our minds, stating that the only indubitable truth is that we know that we think regardless of the connection between mental images and their “real” corresponding objects. The only reality we could be sure of is that which is inside our minds. In the last 50 years the development of computer simulations and virtual reality allowed to create other types of realities that could also be imaginary, that is, that might not exist in the physical world. The opportunity of inhabiting and interacting with these alternative realities has changed the traditional distinction between real and imaginary. Henceforth, imaginary was not only considered what was inside our minds but also virtual spaces that could be constructed by means of technology and that could be shared with other people.

Recently, the emergence of mobile technology devices and ubiquitous computing have contributed to the possibility of being always connected to virtual spaces. It has become possible literally to carry the Internet wherever we go, allowing us to be everywhere at the same time. Mobility is a critical

characteristic of hybrid spaces, which differ from augmented or mixed realities by the fact of not restricting themselves to overlaying digital data on physical reality. Mobile technologies contribute to the appearance of a new concept of reality, which emerges both physical and digital, since digital is no longer considered an alternative space. Hybrid spaces are part of our everyday life and hence necessary to human communication and interaction. Virtual thus becomes part of physical, enlarging our notion of what the real can be. What now defines digital space is not the concept of space itself; rather, it is the awareness that it is a network made of connections. Thus the hybrid notion of space simultaneously enlarges the world (creating a new type of reality that is constructed by both physical *and* digital) and also narrows the world (eliminating physical distances and allowing people from different places — or realities — to connect to each other). Nowadays, when virtual no longer represents a place for the mind, what space is left for the imaginary? If computer technologies are generating a new relationship between the real and the imaginary, how was this distinction formerly addressed?

What is real? The construction of virtual/mind space

Descartes and the distinction between the real and the imaginary

The distinction between mind and body (or soul and body) is much older than Descartes. The Greek philosopher Plato had already defined the concept of “idea” and positioned it above any materialistic form, perception, sensation or even manifestation of reality. However, the idea of knowledge as an inner representation was conceptualized some time later. According to Pierre Vernant (1989), before Saint-Augustine, writing autobiographies was not a common practice, because there was no notion of an interior life or self-consciousness. From the 3rd or 4th centuries on a profound change in social, religious, and spiritual life starts to take place, configuring a human being with interior and exterior lives. Although the Ancient Greeks had been able to write some forms of biography, it is only with Saint-

Augustine's autobiography, his *Confessions*, that the literature of the inner-self emerges.

When Descartes challenged the connection between mental image and external reality, he created the psychological concept of idea. The philosopher was interested in exploring whether the mental image corresponded to the physical world and even if there was a physical world at all (or if everything was just a product of our minds). Therefore, the dualistic notion mind-body that emerged with Descartes is quite different from the separation between body and soul for the ancient Greeks. Descartes helped to create the concept of mind as consciousness, as an inner existence, in contrast to the concept of mind as reason for the Greeks. More important, there had been no term, even of philosophical art, in the Greek and in medieval traditions coextensive with the Descartes use of "idea." Nor had there been the conception of the human mind as an inner space in which both pain and clear and distinct ideas passed in review before a single Inner Eye. Doubting of everything but the thought, Descartes questioned whether our perception of the real matches reality. Are we aware of the totality of the real surrounding us? Or is what we call "real" no more than a simulation of real? In this case, what is the real? How can we know that anything that is mental represents anything that is not mental? Or better: does the mind represent the world?

The possibility of creating a representation of the external world inside our minds, one that could have no connection at all with reality, has greatly contributed to the development of the concept of cyberspace as a mindspace, and as a place that could be disconnected from the physical world.

Cyberspace as a mindspace: immateriality and simulation

Placing cyberspace inside the mind emphasizes its disconnection from the physical space and addresses it as another type of reality: an alternative place for our minds to inhabit and a space in which one could play with different selves.

The vision of cyberspace as a place for the mind has been widely explored in literature, especially in science fiction since William Gibson's *Neuromancer* (2000) in 1985. Gibson creates the concept of cyberspace

as a place which can be inhabited by downloading one's mind into an information space. For him it is a dataspace, a non-physical place, which one can inhabit through neural implants. Also, this place represented a space of liberty, since users perceived themselves as no longer attached to the "weight" of their physical bodies. During the 1990s, especially after the emergence of the World Wide Web, cyberspace has been viewed as another (and generally better) place, disconnected from the physical world.

The idea of cyberspace as a place of liberty is explored by Margarette Wertheim in *The Pearly Gates of Cyberspace* (1999). Wertheim describes digital space as the outcome from a series of visions of space that were responsible for the idea of liberty throughout western history: Dante's Purgatory and Heaven in the Middle Ages, the perspective in the Renaissance, and the idea of the Fourth Dimension of space in the Modern Ages. She thus describes how the concept of space has been developed since the Middle Ages, influencing our perception of the Internet as a place. The sensation of freedom in cyberspace is analyzed from the standpoint of Multi User Domains (MUDs), which in theory are places in which the user can embody any character and which are not constrained by the laws of the physical world. MUDs have been considered places for the freedom of the psychological ego, for a disembodied mind that would no longer need the physical body.

Decisive for the construction of this concept of virtual space are specific interfaces used to connect to it: a computer screen and cables connected to the telephonic network. This situation has two main consequences. First, in order to connect to the Internet it is necessary to disconnect from the physical world. It is necessary to *stop* moving in order to enter the Internet. Second, the screen as an interface represents a "barrier" in the relationship between virtual and physical spaces. The need of avatars is a consequence of this fact. Since one cannot be physically in cyberspace, there is the need of representing the subject (through avatars) in the digital space. That is why body issues have always been critical for the development of Multi-User Environments. Once in cyberspace, the user is disconnected from her physical body and therefore able to create as many bodies as she desires. Consequently, issues about multiple identities have become a central point of study during the last decade (Turkle, 1995). In addition, science

fiction stories like *Neuromancer*, which have contributed to the conceptualization of digital space, generally show the connection to cyberspace through neural implants which require the user's immobility.

Since the connection with cyberspace is disconnected from physical (material) space, virtual space began to be considered immaterial. In addition, since physical is considered real, cyberspace became a place for the imaginary. The possibility of creating virtual reality environments in which the user could feel immersed but could not actually touch also contributed to the immateriality of cyberspace. But, how can a space created by means of physical interfaces be considered immaterial? The connection to the Internet has always been made through the use of a keyboard, a mouse and a screen: material interfaces. The Internet itself is a network of physical computers, working as servers and routers, connected by wires and waves. Also, most of VR immersive environments use the Head Mounted Display (HMD) as an interface.

William Gibson's description of cyberspace as a "consensual hallucination" emphasized virtual space as a place that existed inside the mind, as well as an information space. Information has historically been regarded as an immaterial entity, disconnected from any materiality. However, according to Katherine Hayles, "for information to exist, it must always be instantiated in a medium." (Hayles, 1999: 13) Therefore, it is impossible to disconnect information from the physical artifacts that embody it and make it real. For example, a book would never be a book without its physical interface. The information that it contains must be physically somewhere. Human beings would never be humans *if* it were possible to detach our minds from our "support" bodies. Also, cyberspace would never be possible without physical computers and networks. According to Hayles, "the point is not only that abstracting information from a material base is an imaginary act but also, and more fundamentally, that conceiving of information as a thing separate from the medium instantiating it is a prior imaginary act that constructs a holistic phenomenon as an information/matter duality." (Hayles, 1999:13)

Consequently, for users who may not know the material processes involved, the impression is that information is predominant over materiality, since it is frequently thought that information can manifest itself on several

different material supports and still be the same. This point of view goes directly against McLuhan's theory, in which "the medium is the message." That is, more important than the actual information is the medium that carries it, since the physical support has the ability to change the meaning of the message. This means that information can never be detached from the material supports (or interfaces) that carry it. Hence, it is not possible to disconnect matter and information. There could never be an information space without the physical interfaces that actualize it.

Since Descartes, we have become accustomed to the dualism that separates mind and body, immaterial and material. From this dualistic point of view, mind and immateriality are generally considered better and purer than matter. Descartes, in turn, was deeply influenced by Catholic's dogmas. Why was it such a positive value to have one's mind downloaded to the information space and set free from the body's weight? According to Descartes, if the only indubitable truth is that we think, thus the only reality that we can be sure of is that which is inside our minds. Everything else could be faked. How strongly this Cartesian bias influenced the development of the concept of cyberspace in western society?

In addition to the philosophical tradition, an important fact that contributed to the concept of cyberspace as a mindspace was the development of computers as simulation machines. >From its inception, the function of a computer has been to simulate real life processes. According to William Flake (Flake, 2000: 5), "one of the first uses of computers was to simulate the evolution of complicated equations." Later, computers were used to represent weather simulations, economic models, and cognitive models of the brain. Hence, we can conclude that computers were born as simulation machines, even before the invention of the graphic user interface (GUI), which intended to simulate on the screen the physical space of the desk. According to Sherry Turkle (Turkle, 1995), the graphic interface's opacity that emerged with the desktop metaphor marks a division line between a culture of calculations and a culture of simulations. The GUI is intended to simulate our physical desk and, thus, create a closer relationship between computers and humans. Henceforth, we started to consider computers as spatial entities, as long as we could interact with them.

Similarly, Janet Murray [1999] affirms that computers started to be seen as space when it was first possible to interact with them. From this perspective, the graphic interface is not responsible for the digital environment's spatiality; it only emphasizes it. For instance Zork, a computer game created in the 1970s at the Massachusetts Institute of Technology (MIT), was the first digital Role Playing Game with a textual interface. The possibility of giving commands to the computer and receiving a feedback from the machine created a whole new space on the other side of the screen. Due to the interactivity, the user could feel that she "belonged" to that other realm. Hence, spatial sensation depends on interactivity, not on graphics. With a mere textual interface, Zork simulated a fantasy world, following the models of traditional RPG games. However, while Zork simulates an imaginary world, the GUI represents the physical space.

Besides simulating space, computers are also able to simulate life. Therefore, it is possible to argue that computers were created to simulate both the world as well as the world's inhabitants. Also in the 1970s, John Conway invented the *Game of Life*, based on John von Neumann's study of cellular automata (CAs). In the 1940s, von Neumann envisaged a systematic theory which would be mathematical and logical in form, and which would contribute in an essential way to our understanding of natural systems (natural automata) as well as to our understanding of both analogue and digital computers (artificial automata). Neumann wanted to study reproduction abstractly, but the word "cellular" is not meant biologically when used in this context. It refers, rather, to adjacent spaces that form a pattern. Interestingly, he concentrated on the simplest mathematical framework that would allow information to reproduce. CAs were not invented, therefore, to be realistic models of nature, but to represent information reproduction.

Cellular automata use simple sets of instructions, which are distributed uniformly over all processors and are invariant over time. Thus, each processor is able to work independently without any central control of organization. In order to simulate a cellular automata behavior one needs to establish an initial set of rules and place a determined number of cells in a n-dimensional grid. Once the initial state of the system is determined, its

evolution is unpredictable, because each cell acts just depending on the state of the closest neighbor, which changes over time. The neighborhood of a given cell is the set of cells whose distance, based on a given metric is within a fixed radius of that cell. A two-dimensional cellular automaton, for example, can form numerous different patterns that cannot be formerly envisaged by the programmer (Wójtowicz, 2001). The simulation can, therefore, end up either in a state of stasis or continue forming different patterns, depending on the position of the initial cells and the set of rules formerly determined. Neumann's cellular automaton had a total of 29 states and over 200,000 cells. While his work has never been simulated (due to its enormous complexity), it proved the viability of artificial reproduction and launched the study of cellular automata.

Three decades later, Conway simplified von Neumann's ideas creating a pattern where cells could be either alive or dead (on or off), and that had a very simple set of rules for determining what the next state of the system would be. The game is played on a two-dimensional grid. Each cell has eight neighbors, adjacent across the sides and corners of the square. Moreover, whereas Von Neumann's cellular automaton was developed on paper, Conway developed a model that could support universal computation. In the *Game of Life*, if a cell has less than two neighbors, it dies (loneliness); if it has more than three neighbors, it also dies (overcrowding); if an empty cell has three live neighbors, then it comes to life (reproduction); otherwise (exactly two live neighbors), it stays as it is (stasis). According to William Flake (Flake, 2000: 246), "this set of rules contain the most basic properties of how real-world creatures interact with the basic constraints on population density and the conditions for 'reproduction'."

Computers have been used to simulate life, and they may also create whole new forms of life. A frequent question among artists and professionals who build virtual worlds and environments has been whether virtual spaces and creatures should simulate their physical correspondents or be developed with no reference at all in reality. Why should we simply reproduce physical creatures and spaces in the digital space of computers, if there is the possibility to experiment with whole new types of spaces and life forms? Due to the fact that cyberspace is a dataspace and information is considered immaterial, digital life and spaces could in theory assume any form.

For example, Karl Sims' *Evolved Virtual Creatures* (MIT, 1994) is a computer simulation that deals with the Darwinian evolution of virtual block creatures. Virtual agents living in a 3D virtual environment are programmed to evolve on their own through competition with other beings. Each one has different skills, such as swimming, flying, or crawling. Sims has also created simulations with evolving virtual plants. In *Panspermia* (1990), artificial evolution techniques were used to interactively select from random mutations of plant shapes until a variety of interesting structures emerged.

Both in the *Game of Life* and in Sims' simulations, creatures evolve based on their relationship to the simulated environment in which they live. Simulations generally simplify complex behaviors and try to model real world features in digital space. Simulations like *The Game of Life*, *Panspermia* and *Evolved Virtual Creatures* are one part of cyberspace, according to Gibson's definition. By creating the word "cyberspace", Gibson put together different instances like computer simulations, networks and hypertext windows, which were described as separate phenomena before. We can cite other types of simulated spaces, which have been also considered immaterial: the Internet itself and VR interactive immersive environments. These last ones are generally not networked or allow few people to connect at once.

The construction of virtual worlds that mimicked physical spaces has always been a way of stressing the distance between both. There was the "real" world, physical, and the simulated world, digital. The digital world should simulate the physical environment. The belief on this fact explains why most Multiuser environments on the Internet have been spatially built following the models of the physical world. MUDs are "virtual," and therefore they could be considered "immaterial" worlds. Consequently, users can act as *if* they are in physical world but not exactly. They can play with identities and change the space in a way that would be impossible in the "material" world. Therefore, MUDs (as well as cyberspace as a whole) become places for the imaginary, rather than "real" places. Sherry Turkle, in *Life on the Screen*, writes about people who would live more time in these virtual environments than in the "real" world itself, using the virtual as an escape to the real.

In a summary, the development of computers as simulation machines as well as the concept of cyberspace as an immaterial space contributed to reinforce the separation between mind and body inherent to western society. Because arts and literature always reflect society (and vice-versa) it is common to address the question *what is real?* in several works. To question *what is real?* in the age of cyberspace, means: is what we call real physical reality or is it just a simulation running inside our minds?

What would happen if the relationship between inside and outside was altered? This began to happen a few years ago, when we started to see both in arts and in science fiction works that connects physical and virtual instead of treating them as separate entities.

Towards a hybrid reality: Merging physical and digital spaces

Since the end of the last decade, it is progressively clearer that physical and virtual spaces become firmly interconnected. Cyberspace is no longer regarded as an isolated space for the mind, but as a place mixed with the physical environment. Actually, the concept of cyberspace itself is now outdated, since it originally means a world of information that exists apart from material space. This hybrid reality has become true partly because the way we connect ourselves to virtual spaces is changing from the imaginary neural implants and computer screens to mobile technology devices and ubiquitous computing. The possibility of being “always connected,” and to move while connected, contrasts with the act of staring at a computer screen, and emphasizing our life in a hybrid reality. When we start to consider cyberspace as contiguous to physical space, the question **should it simulate the real?** is no longer important, because both spaces are merged in the same environment.

Therefore, the question **what is real?** should be also re-addressed. In fact, where is the place for the imaginary now that digital space is no longer apart from physical space? This question is clarified once we describe how this connection is being made through technology, arts, and literature.

Since the last ten years, experiments that create virtual spaces and creatures isolated from the “real space” are being replaced by works that

merge physical and digital spaces. This tendency is true especially in arts in works from, for instance, Christa Sommerer and Laurent Mignonneau, The Tangible Media Group, and the Aesthetics and Computational Group at the MIT Media Lab. Their works reflect and are influenced by new developments in computer technologies, which contribute to the progressive interconnection between physical and digital spaces. Although still no representing a hybrid reality, these works contributed to define mixed and augmented realities, connecting physical and virtual spaces.

Christa Sommerer and Laurent Mignonneau created *Interactive Plant Growing* in 1993. The artwork uses actual live plants and deals with the growth of virtual plant organisms and their evolution in real time in the three-dimensional virtual space. By touching real plants, which are on the top of black pedestals in a dark room, users can influence and control the virtual growth of around 25 program-based plants, which are simultaneously displayed on a projection screen in front of the pedestals. Following the idea of *Interactive Plant Growing*, Sommerer and Mignonneau built *A-Volve* (1994/95), which also deals with the concept of artificial life, but instead of using plants, it works with fish and other aquatic creatures. *A-Volve* creates a full artificial life environment in which creatures can interact with each other, as well as with human beings. The creatures are designed by the user's finger; hence, they are not perfect fish-like beings. Each aquatic creature is able to grow by itself, to eat, to reproduce and to die. Users are also able to "hold" the virtual beings avoiding that, for instance, a predator eats a prey, thus influencing the global environment development. In contrast to Conway's *Game of Life* and to Sims' *Evolved Virtual Creatures*, where the simulated system evolves by itself without the need of any external input, *Interactive Plant Growing* and *A-Volve* need real people for their evolution. Therefore, *A-Volve*, similar to *Interactive Plant Growing*, looks for natural interfaces that allow the interaction with virtual environments and deal with the connection between physical and virtual spaces.

Christa and Laurent were actually envisioning what would be the development of the concept of digital space. This transformation started to be considered at about ten years ago, but it has been just a few years since we began to feel its effects. Hence, the main issue about virtual is no

longer how we can inhabit cyberspace; rather, how do digital spaces change our way of inhabiting the physical world?

According to Mark Weiser (Weiser, 1996), from the Computer Science Lab at Xerox PARC, we are moving towards a third era in the history of computers. The first one he calls mainframes, and it is characterized by one computer being shared by lots of people. Also, computers were run mostly by experts. The second phase, in which we are now, is the personal computing era, where person and machine stare uneasily at each other across the desktop. Each personal computer is meant to belong to one person. Next comes ubiquitous computing, or the age of calm technology, when technology recedes into the background of our lives. The relationship then is going to be many computers to one single person. Thus, ubiquitous computing happens when computers are embedded in our daily lives and no longer part of a distant reality. In this sense, “ubiquitous computing is roughly the opposite of virtual reality. While virtual reality puts people inside a computer-generated world, ubiquitous computing forces computers to live out here in the world with people.” (*Id.*) Also, he believes that the future of interface design is going to lead us to an era of invisible interfaces. “A less-traveled path I call the ‘invisible;’ its highest ideal is to make a computer so imbedded, so fitting, so natural, that we use it without even thinking about it.” (*Ibid.*)

At this point we can suggest another layer of space that comes after virtual reality and ubiquitous computing. It is the concept of hybrid space. Although all these spatial perceptions can co-exist, there is an intrinsic difference between hybrid reality, mixed reality, augmented reality or virtuality, and virtual reality. Mixed and augmented reality or virtuality are generally connected to the layering of physical / digital data in virtual physical spaces (Milgran, 1999). Augmented or mixed reality (AR) research aims to develop technologies that allow mixing or overlapping of computer generated 2D or 3D virtual objects on the physical world. Unlike virtual reality that functions apart from the physical world, AR enhances physical reality by integrating virtual objects into the physical world, which become in a sense an equal part of our natural environment.

While virtual reality strives for a totally immersive environment, an augmented reality system augments the physical world scene requiring

that the user maintain a sense of presence in that world. Virtual images are merged with the real landscapes in order to create the augmented display. There is a mechanism to combine the real and the virtual that is not present in other virtual reality works. Some common applications for augmented and mixed reality systems are in the medical field, entertainment industry, and military training. Also, artworks like *A-Volve*, actually deal with mixed reality, when allowing people to “touch” and interact with virtual aquatic creatures. Virtual reality is mostly connected to the idea of inhabiting a computer modeled world. On the other hand, hybrid spaces are nomadic spaces, created by the constant mobility of users who carry portable devices continuously connected to the Internet. These users are literally carrying the virtual space. Instead of having virtual reality environments through which one can move without changing their physical position, the contemporary nomads of cyberspace in fact move through physical space. Nomadicity is truly a revolutionary change in information technology. It is defined as the systems support provides a rich set of computing and communication capabilities and services to nomads as they move from place to place in a transparent, integrated and convenient form. This new paradigm is already manifesting itself as users travel to many different locations with laptops, PDAs, cellular telephones, and pagers.

One of the consequences of a hybrid reality is the appearance of people moving around carrying mobile technology devices. Hence, carrying the virtual space. Instead of having virtual reality environments through which one can move without changing their physical position, the contemporary nomads of cyberspace in fact move through physical space. Nomadicity is truly a revolutionary change in information technology. It is defined as the systems support provides a rich set of computing and communication capabilities and services to nomads as they move from place to place in a transparent, integrated and convenient form. This new paradigm is already manifesting itself as users travel to many different locations with laptops, PDAs, cellular telephones, and pagers.

Adapting networked technologies to move around with us, instead of staring in front of a screen is indeed a much more natural way of dealing with technology and it is going to change our relationship with it. According to Leonard Kleinrock (2000), one of the inventors of the Internet, “access

to wireless communications provides two capabilities to the nomad. First, it allows the nomad to communicate from various (fixed) locations without being connected directly into the wireline network. Second, it allows the nomad to communicate while traveling.” The first case exemplifies ubiquitous computing, that is, the possibility of connecting to the Internet from anywhere. The second case illustrates nomadic technology devices.

Nomadic technologies are used for communication connected to mobility. By doing that, they change our perception of space and time. Wearable computers and transparent interfaces contribute to create a more natural relationship with technology, including them in our everyday life, without the need of really *perceiving* them. Therefore, they become a part of our lives and also a part of our bodies. In addition, nomadic technologies both shrink and enlarge the world, changing the relationship between local and global – and between real and imaginary. These connections and differences between what is real and what is imaginary have always played an important role in human history. Philosophy, arts and literature have always tried to address this topic, questioning what the real could be.

Consequently, artists and writers try to address new borders between physical and virtual (real and imaginary) pushing further the limits of technology. Science fiction has always played a critical role in re-defining these borders and influencing the future (*Neuromancer* is a critical example). Recent sci-fi movies address again the question *what is real?* playing with the relationship between physical and digital spaces. *The Matrix* and *The Thirteenth Floor* are examples of movies that deal with the connection between physical and virtual by placing the virtual either inside our minds and/or together with physical reality.

SCI-FI hybrid reality: anticipating future

The movie *The Thirteenth Floor* begins with the famous quote from Descartes: ‘I think, therefore I am,’ suggesting that physical presence is not as important as mental presence, that is, our existence only depends on what we think. However, as the movie develops, we perceive that human existence also depends on technology and that Descartes’ doubt is exactly

the point which the movie tries to subvert: physical presence is indeed important.

The Thirteenth Floor is not the first movie that deals with the idea of simulated spaces by means of philosophical questions. *The Matrix* has accomplished a similar goal, yet in a different way. Early in the film, while the main character Neo (Keanu Reeves) works on his computer, we are able to see a book on his desk. It is *Simulacra and Simulations*, from Jean Baudrillard (1994), suggesting that the main idea of the film (also what is real?) is constructed through the concept of reality as a simulated space. How can we distinguish reality from simulation, physical from virtual? Similar to Descartes' doubt, the challenge in both movies is to know whether reality is indeed real or simply a simulation running inside computers (and downloaded into human minds). In *The Thirteenth Floor*, the answer for this question is apparently clear since it is almost evident that there is a simulated world that follows the model of the "real" world. On the other hand, in *The Matrix* there is no evidence of it until the middle of the film, when we discover that what is "real" is just a simulation for our minds to live in (similar to *Neuromancer's* idea). Is this simulated world a copy of our "real" world? Or is it something else, a world of data, as in *Neuromancer*?

The main issue in both movies, however, is how the connection between physical and digital environments is created. In *The Matrix* there is no connection at all between the two realms. Machines lived in the physical world and humans "lived" in the virtual world. Only some special mortals could have the power to move through both realms and have the awareness of the world reality. For them was given the power of nomadism, which allowed them to have the awareness of both physical and digital spaces.

Nevertheless, the majority of human beings had neither consciousness nor movement. They "lived" in a simulated space. Similar to Descartes' idea, their world's appearance had no connection with reality at all. On the other hand, in physical space they could not move, since they were connected to wires and cables. The absence of movement is also related to the way people are used to connect to cyberspace and virtual reality environments. Therefore, what they thought, what they did, was totally determined by the program. People only had the illusion that they could think, but they could not think at all. This idea is close to the concept of agents in the cellular

automata model described by Edward Fredkin in which everything is determined, programmed. "In DM (Digital Mechanics), the whole universe has spent its whole history arranging for whatever is going to happen in each end every cell. No digit can just change; everything, everywhere at every time, past, present and future, has operated, does operate and will operate in perfect lockstep to cause the state of every cell to be what it is." (Fredkin, 1990: 264)

Fredkin defines this phenomenon as digital determinism.

Programmed human minds were represented in virtual reality, but their physical bodies were imprisoned in the physical world, connected with cables and wires, being used as batteries. They were condemned to live in virtual space, because of their inability to move in physical space. Hence, the separation between real and simulation is addressed through the absence of the possibility of movement. Immobility avoids the connection between physical and virtual.

Neo, as one of the chosen people to whom were given the power of movement, breaks up the enclosure beginning his real life and thus connecting real and simulation. Neo breaks up the disconnection between physical and virtual, setting people free from the simulation.

The idea of simulation as a virtual space that mimics the physical world is not represented literally in the movie. The "matrix" of the movie's title, which is a virtual space created by machines, is not a simulation of the machines' world. It is a re-creation of the humans' world. Therefore, it is similar to a dream space, built for the human mind. This means that the matrix is a simulacrum (Baudrillard, 1994), with no reference or origin in reality. The Matrix creates another reality, which we believe is the real. Hence, it intends to be more real than the real itself because reality is in fact a dark and empty world inhabited by machines.

The idea of constructing a simulated world that is better than its model follows Umberto Eco's concept of hyperreality (Eco, 2000). Hyperreality is over or above that which is real. If it is not possible to have the real thing, one fabricates the absolute fake or makes an authentic copy. Eco demonstrates that the American culture is the greatest model of hyperreality: Disneyland, wax museums, Las Vegas... These are places that pretend to be real, but are actually copies without originals. More

specifically, they intend to be more real than real. For instance, if you cannot have the Mona Lisa, you can construct a 3D model of the painting and place it in an environment with an ancient atmosphere and sound, mimicking the way she was 500 years ago. It is thus possible to access the “real” one, not only its representation. *The Matrix* is an attempt to create a hyperreality.

In the movie, people no longer enter the virtual space. They belong to it. Something similar happens in *The Thirteenth Floor*. There are virtual personas that actually live an independent life inside the simulation. Nevertheless, while in *The Matrix* people who live in the simulation are people who were born in the physical world, *The Thirteenth Floor*'s characters are meant to be completely programmed entities. At a first glance, they seem to be like Karl Sims' creatures or cellular automata. However, the development of the movie shows that this first impression is erroneous. Virtual personas are modeled after real people and they can sometimes feel sensations that belong to their models.

The complexity in *The Thirteenth Floor* arises, then, when we perceive that physical and virtual spaces are so interconnected that one cannot realize which one is the real and which one is the simulation. Also, oppositely to *The Matrix*, where the absence of movement avoids the connections between physical and virtual, *The Thirteenth Floor* explores the complexity that happens when movement occurs.

In this movie, the question is no longer **what is the real?** because real is everything, but **what is the connection between physical and virtual spaces?** All characters can move through physical and virtual. Not only “real” people are able to download themselves into the simulation, but also virtual personas have the capability of transporting themselves into physical space. Also, avatars (virtual bodies from “real” characters) are able to feel sensations that belong to their models, illustrating that one world influences the other. If avatars are able to live in both spaces, the question what is real? arises again, but with a different connotation, since it is no longer possible to separate virtual from physical. Therefore, real must be redefined in order to encompass both physical and virtual, creating a hybrid reality.

The Thirteenth Floor deals with complex behaviors that can happen whenever virtual starts to merge with physical. At a first glance, avatars seem to have no physical distinction from their models. Nevertheless, they can have completely different personalities, which are sometimes incompatible. This fact generates some strange episodes. For example, when Hannon Fuller (the owner of the company located at the 13th floor of a building in L.A. in 1999) decides to “jack in” the 1937 simulation embodied in his virtual persona, Grierson. Whenever H. Fuller downloads himself to the virtual place, he uses Grierson’s body (which, in fact, is his own). Grierson is a serene old bookseller who decides to go to nightclubs and have sex with young girls while being “used” by Fuller. When Hannon Fuller decides to go back to the “real” world (1999), his avatar becomes Grierson again, who still keeps some vague memories of Fuller’s behavior. He remembers doing strange things while “sleeping”. And his old wife often complains about his “strange” behavior. The sensation that we have is, thus, that events are not happening properly.

As a result, when H. Fuller creates the 1937 simulation, he is murdered in the 1999 simulation by a character from the future simulation. Being a virtual persona as well, Fuller was not supposed to create a simulation inside a simulation, which would interfere in the development of the 1999 simulation, which we had believed was “the real world.”

Similarly, Jane Fuller, who downloads herself to the 1999 simulation as Hannon Fuller’s daughter, breaks up the detachment between real and simulation. Coming with the goal to shut down Hannon Fuller’s company, she falls in love with Douglas Hall, H. Fuller’s employee, who was modeled after her husband, David. However, while her husband has become an aggressive serial killer, D. Hall was sensible and intelligent. Being aware of it, her husband also downloads himself into the simulation, in order to kill her in the virtual space. But how actions taken in virtual space could affect physical world? At this point, who is in the virtual space and who is in the physical world?

The connection between physical and virtual does not happen only because real characters are able to “jack in” the simulation, but also because virtual personas have the possibility to come to the “real” world, ascending from the simulation. Every time a character is killed while its representation

is embodied in it, it is uploaded to the upper level of the simulation. For instance, when Jason Whitney (the other company's programmer) is killed while embodied in his virtual avatar, Jerry Ashton, Ashton automatically goes to the 1999 simulation. Being a 1937 mind, he is then absolutely surprised with all the technology that he sees. Meanwhile, he meets Douglas Hall, who was Whitney's partner. However, at that moment, Hall's body was being used by David, his model in the future simulation. David, then, kills Ashton, because Ashton was not supposed to be in that simulation. Characters from the future and past parallel worlds meet in the middle level and the events that arise from these meetings change the whole story. These facts mean that both (or the three) worlds could be connected, but they were not supposed to. That is why Jane Fuller comes back to 1999: she wants to no longer permit that a simulation run on top of another simulation, and that different types of realities connect to each other. When a "real" model downloads itself into the simulation, its functioning can be affected, generating possible errors. The model's action is similar to a virus in the system. It crashes the simulation.

In addition, oppositely to *The Matrix*, all the agents from *The Thirteenth Floor's* simulations have consciousness (although they were not supposed to) and they are likely to have non-programmed behaviors. This explains why H. Fuller in 1999 discovers that his world was actually a simulation from another reality and why Ashton in 1937 is so upset when he finds out the same. They are disappointed because their perception of the world has been proved false. Since characters start to question their own reality and the environment they live in, they can no longer be compared to cellular automata. Similar to Karl Sims' agents in *Evolved Virtual Creatures*, Fuller and Whitney learn from the environment and start to have unpredictable behaviors. That is why the "real" characters lose control of the simulation.

The construction of the 1937 simulation, as well as the 1999 virtual world, were attempts to create imaginary places, which were copies of past realities. However, as the movie develops, the simulations prove to be as real as the "real" world. What is then the distinction between real and imaginary?

Existing virtual worlds, similar to what happens in *The Thirteenth Floor*, require that the user choose or define an avatar. The virtual world's

interface ? textual or graphical ? connects the user in the physical world to virtual environment. Therefore, the avatar allows one to “inhabit” the virtual environment. Nevertheless, due to the integration between virtual and physical spaces, the critical issue is no longer creating avatars and playing with identities, since we can be anywhere at the same time. Mobility has replaced identity matters. Moreover, since the main concern about digital space is no longer space itself, but its connections, body issues are also replaced by speed issues. Concerns change from how people should be represented in cyberspace? to how long does it take to access other points of the network/world?

Science fiction has contributed to bring up a world where this thin layer that separates the user from the virtual environment becomes transparent. In *The Matrix*, it is possible to enter the simulation through the user’s own body. Therefore, the user becomes its own avatar, and the boundaries between physical and virtual are softened. In addition, *The Thirteenth Floor* deals with what could happen if we could go in and out virtual spaces, having them influencing our lives in physical space. Yet people no longer *enter* the virtual space. They belong to it. This does not mean, however, that William Gibson’s goal has been achieved and that now it is possible to connect to cyberspace via neural implants. Conversely, the concept of virtual space has changed, being included in physical reality.

The Thirteenth Floor, although based in the concept of virtual space as a place for the mind, addresses contemporary issues like nomadicity and transparency, when their characters move freely between physical and digital space. Also it is never clear in the movie which is the virtual space, and which is the physical space.

Nowadays the question what is real? starts to have another meaning, since the physical is being directly influenced by the digital. In the era of personal computing and virtual reality, we questioned the real due to the existence of another space, virtual, which could be modeled after the physical space, but could also be imaginary. Yet in the era of hybrid reality, the question what is real? has been used to affirm that there are no longer two different realities (virtual and physical); there is only one that contains in itself both physical and virtual. In addition, virtual also obtains another meaning, since the virtual as a discrete space is vanishing.

When we can be everywhere at the same time, space becomes time and our sense of real is augmented. Consequently, due to the hybrid space that emerged with nomadic technologies, a new dichotomy between real and imaginary arises. If before the virtual could be synonymous to the imaginary, now imaginary spaces are included in physical space.

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