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SPACE TIME PLAY
COMPUTER GAMES, ARCHITECTURE
AND URBANISM: THE NEXT LEVEL

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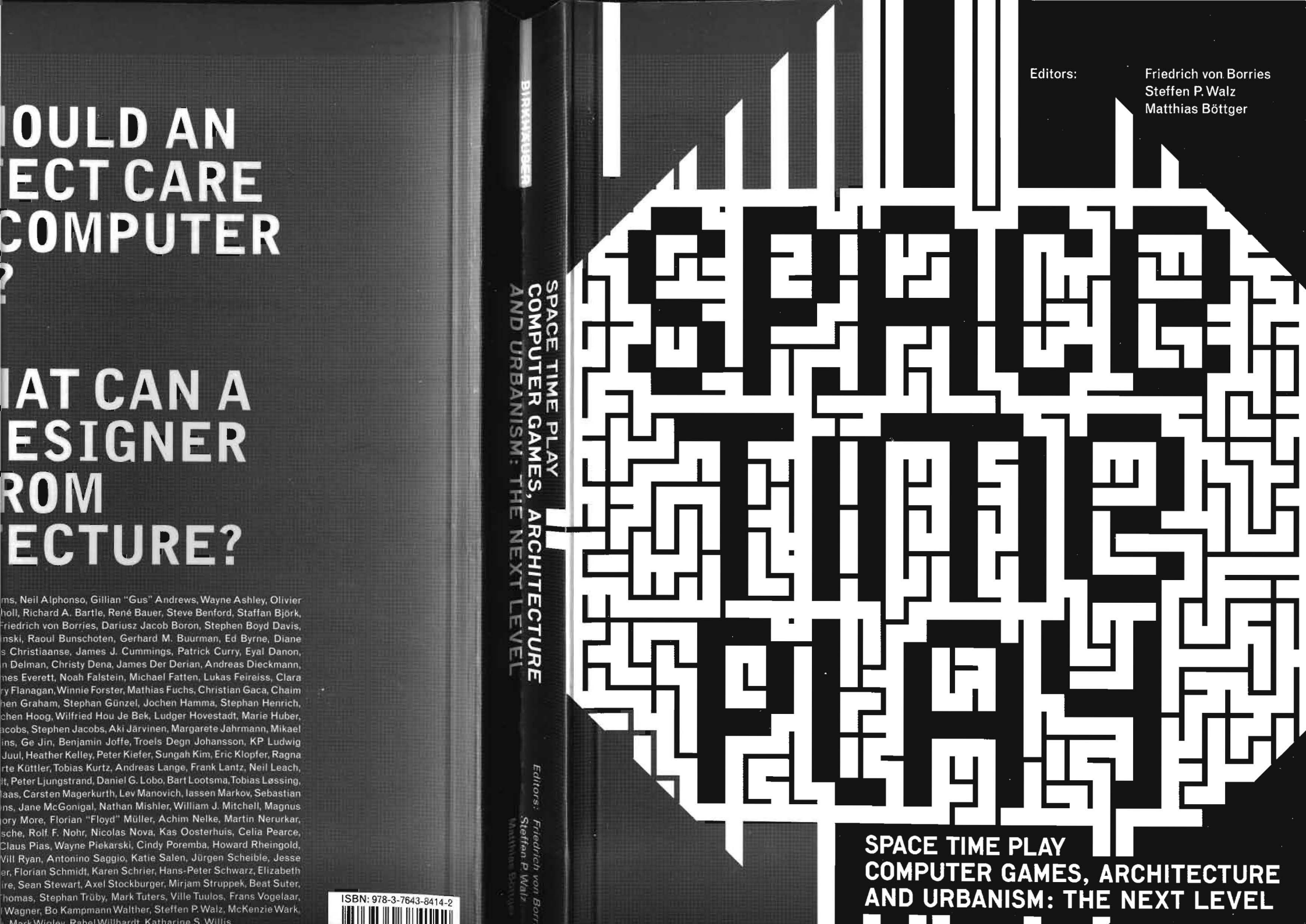

SPACE TIME PLAY
COMPUTER GAMES, ARCHITECTURE
AND URBANISM: THE NEXT LEVEL

Lev Manovich

THE POETICS OF AUGMENTED SPACE

The Art of Our Time

How is our experience of a spatial form affected when the form is used to display dynamic and rich multimedia information? (Think of *urban spaces* such as the shopping and entertainment areas of Tokyo, Hong Kong and Seoul as well as of *any human-constructed space* where a subject can access information wirelessly via cell phone, PDA or laptop.) Does the form become irrelevant, reduced to functional and ultimately invisible support for information flows? Or do we end up with a new experience in which the spatial and information layers are equally important?

Since these environments do not have a recognizable name yet, I will call them *augmented spaces*. Augmented space could be defined as physical space overlaid with dynamically changing information. This information is likely to be in multimedia form and is often localized for each user.

Augmentation and Monitoring

The 1990s were about the virtual. We were fascinated by the new virtual spaces made possible by computer technologies. Images of an escape into a virtual space that exists parallel to our world dominated the decade. This phenomenon began with a media obsession with Virtual Reality (VR). In the middle of the decade, graphical browsers for the World Wide Web made cyberspace a reality for millions of users. During the second part of the 1990s, yet another virtual phenomenon – the dot-com – rose to prominence, only to crash in the face of real-world laws of economics. By the end of the decade, a daily dose of cyberspace became so much the norm that the original wonder of cyberspace was almost completely lost.[1] The virtual became domesticated. To use Norman Klein's expression, it became an "electronic suburb."

At the beginning of the 21st century, there is a new agenda: physical space filled with electronic and visual information. The previous icon of the computer era, a VR user traveling in virtual space, has been replaced by a new image, that of a person checking her email using her PDA/cell phone combo at the airport, on the street or in any other actually existing space. But this is just one example of what I see as a larger trend – namely, technological applications that *dynamically deliver dynamic data to, or extract data from, physical space*:

Video surveillance is becoming ubiquitous; cheap, tiny, wireless and Net-enabled video cameras can now be placed by almost anyone, anywhere. The installment of such technology translates a physical space and its dwellers into data.

Cellspace technologies (mobile, wireless or location-based media) work in the opposite direction, delivering data to mobile physical-space dwellers. Some of that

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VRML stands for the Virtual Reality Modeling Language. In the first part of the 1990s, the inventors of this language designed it as a means to model and access 3D interactive virtual worlds over the Internet and promoted it as the material realization of the idea of cyberspace. (See, for instance, "Ontos, Eros, Noos, Logos," (Pesce 1995)) As of this writing (May 2007), Internet-based 3D virtual worlds have failed to become popular.

data may come from global networks such as the Internet, some may be embedded in objects located in the space around the user.

We can think of *cellspace* as the invisible layer of information that is laid over physical space and is customized by an individual user. Publicly located *computer/video displays* present the same visible information to passersby.

If we consider the effect of these three technologies on our concept of space – and, consequently, on our lives in so far as they are lived in various spaces – I believe that we will see that the three very much belong together. They make physical space into a dataspace, which can be augmented by data (*cellspace*, computer displays) or from which data can be extracted (surveillance). It also makes sense to conceptually connect the surveillance/monitoring of physical space and its dwellers and the augmentation of this space with additional data because, technologically, these two applications exist in a symbiotic relationship. The close connection between surveillance/monitoring and assistance/augmentation is one of the key characteristics of the high-tech society. *Augmented space is also monitored space.* Augmented space is physical space that is "data dense," as every point in it potentially contains various information delivered to it from elsewhere. At the same time, video surveillance, monitoring and various sensors can also extract information from any point in space, recording face movements, gestures and other human activity as well as temperature, light levels and so on. Thus we can say that various augmentation and monitoring technologies add new dimensions to a 3D physical space, making it multidimensional. As a result, physical space now contains many more dimensions than before, and while from the phenomenological perspective of the human subject, the "old" geometric dimensions may still have priority, from the perspective of technology and its social, political and economic applications, they are no longer more important than any other dimension.

Augmentation and Immersion

I derived the term "augmented space" from the already established term "Augmented Reality" (AR).[2] Coined around 1990, Augmented Reality is normally used in opposition to VR. In a typical VR system, all work is done in a virtual space; physical space becomes unnecessary, and the user's visual perception of it is completely blocked. In contrast, an AR system helps the user to work in a physical space by augmenting that space with additional information. This is achieved by laying information over the user's visual field. An early possible AR application developed by Xerox PARC, for example, involved a wearable display for copier repairman, which overlaid a wireframe image of the copier's insides over the actual copier as it was being repaired.

Today, additional AR scenarios for everyday use can be imagined – AR glasses for a tourist, for example, which layer dynamically changing information about the sites in a city over the tourist's visual field. Military and artistic applications are also being developed, as presented, for instance, in the exhibition showcasing AR projects developed by Ars Electronica Futurelab (Ars Electronica Festival 2003). In this new iteration, AR becomes conceptually similar to wireless location services. The idea that governs both is that when a user is in the vicinity of particular objects,

2 > For AR research sites and conferences, see http://www.augmented-reality.org

buildings or people, information about those entities can be delivered to her. But while in *cellspace* this information is displayed on a cell phone or PDA, in AR, the information is laid over the user's visual field.

The decrease in the popularity of VR in mass media and a slow but steady rise in AR-related research in the last five years are two examples of the ways in which the augmented space paradigm is now overtaking the virtual space paradigm. Interestingly, this reversal was arguably anticipated in the very origins of VR. In the late 1960s, Ivan Sutherland developed what came to be known as the first VR system. The user of the system saw a simple wireframe cube whose perspectival view would change as the user moved his head. The wireframe cube appeared over whatever the user was seeing. Because the idea of a 3D computer graphics display whose perspective changes in real time according to the position of the user became associated with subsequent virtual reality systems, Sutherland is credited with inventing the first one. It can be argued, however, that this was not a VR, but rather an AR system because the virtual display was laid over the user's field of vision without blocking it. In other words, in Sutherland's system, new information – a virtual cube – *was added* to the physical environment.

In the case of VR, the user interacts with a virtual simulation; in the case of AR, she interacts with actual things in actual space. Because of this, a typical VR system presents a user with a virtual space that has nothing to do with that user's immediate physical space; in contrast, a typical AR system adds information that is directly related to the user's immediate physical space. But we don't necessarily have to think of immersion in the virtual and augmentation of the physical as opposites. On one level, whether we think of a particular situation as immersion or augmentation is simply a matter of scale – i.e. the relative size of a display. When you are playing a computer game on a game console that is connected to a TV, you are hardly aware of your physical surroundings. You are immersed in virtual reality. But when you play the same game on the small display of a cell phone, the experience is different. You are still largely present in physical space, and while the display adds to your overall phenomenological experience, it does not take it over. Thus whether we should understand a particular situation in terms of immersion or augmentation depends on how we understand the idea of addition: we may add new information to our experience or we may add an altogether different experience.

Augmentation as an Idea

What is the phenomenological experience of being in a new augmented space? What are the possible poetics and aesthetics of an augmented space?

One way to begin thinking about these questions is to approach the design of augmented space as an architectural problem. Augmented space provides a challenge and an opportunity for many architects to rethink their practice, since architecture will have to take into account the fact that from now on, virtual layers of contextual information will overlay built space.

But is this a completely new challenge for architecture? If we assume that the overlaying of different spaces is a conceptual problem that is not connected to any particular technology, we may begin to see that certain architects and artists have

already been grappling with this issue. The layering of dynamic and contextual data over physical space is a particular case of a general aesthetic paradigm: how to combine different spaces. Of course, electronically augmented space is unique; because the information it contains is personalized for every user, it can change dynamically over time, and it is delivered through an interactive multimedia interface. Yet it is crucial to see the problem of combining spaces as conceptual rather than just technological and thus as something that in part has already been featured in other architectural and artistic paradigms.

Augmented space research gives us new terms with which to think about earlier spatial practices. If we consider the case of a past architect, fresco painter or display designer working to combine architecture and images or architecture and text, we can now say that all of them were working on the problem of augmented space – the problem, that is, of how to overlay physical space with layers of data. Therefore, in order to imagine what can be done culturally with augmented spaces, we may begin by combing cultural history for useful precedents. I have chosen two well-known contemporary figures as my examples. The first is Janet Cardiff, a Canadian artist who became famous for her "audio walks." She creates her pieces by following a trajectory through a space and narrating an audio track that combines instructions to the user (e.g. "go down the stairs") with narrative fragments, sound effects and other aural "data." To experience the piece, the user dons earphones connected to a CD player and follows Cardiff's instructions.[3] Even though Cardiff does not use any sophisticated computer, networking or projection technologies, her "walks" represent the best realization of the augmented space paradigm so far. They demonstrate the aesthetic potential of laying new information over a physical space. Their power lies in the interactions between the two spaces.

3 > I have only experienced one of her "walks," one that she created for P.S. 1 in New York City in 2001.

The Jewish Museum Berlin by Daniel Libeskind can be thought of as another example of augmented space research. Libeskind uses existing dataspace to drive the new architecture that he constructs. After putting together a map that showed the addresses of Jews who lived in the neighborhood of the museum site before World War II, the architect connected different points on the map and then projected the resulting net onto the surfaces of the building. The intersections of the projected net and the museum walls gave rise to multiple irregular windows. Cutting through the walls and the ceilings at different angles, these windows evoke many visual references. Just as in the case of Cardiff's audio walks, here the virtual becomes a powerful force that re-shapes the physical. In the Jewish Museum Berlin, dataspace is materialized to become a sort of monumental sculpture.

The Poetics of Discontinuity

Before we rush to conclude that the new technologies do not add anything substantially new to the old aesthetic paradigm of overlaying different spaces together, let me note that in addition to their ability to deliver dynamic and interactive information, the new technologically implemented augmented spaces also differ in one important aspect from Cardiff's walks, Libeskind's Jewish Museum and other similar works. Rather than laying a new 3D virtual dataspace over the physical space, Cardiff and Libeskind overlay only a 2D plane or, at most, a 3D path. In

contrast, augmented space technologies define dataspace – if not in practice, then at least in theory – as a continuous field that completely extends over and fills in all physical space. Every point in space has a GPS coordinate that can be obtained using a GPS receiver. Similarly, in the *cellspace* paradigm, every point in physical space can be said to contain some information that can be retrieved using a PDA or similar device. And as far as surveillance goes, while in practice video cameras, satellites and other technologies can so far only reach some regions and layers of data, but not others, the ultimate goal of the modern surveillance paradigm is to be able to observe every point at every moment. It is important to note that in practice, dataspaces are almost never continuous: surveillance cameras look at some spaces, but not at others, wireless signals are stronger in some areas and nonexistent in others and so on. The contrast between the continuity of *cellspace* in theory and its discontinuity in practice should not be dismissed. Rather, it itself can be a source of interesting aesthetics strategies.

I think that we can give a provisional answer to the questions I posed at the beginning of this essay. The arrival of augmented space does not mean that physical form has or will become culturally irrelevant. On the contrary, as the work of Cardiff and Libeskind shows, it is through the interaction of physical space and data that some of the most amazing art of our time is being created.

This is a short version of a longer text. A full version is available at: www.manovich.net.

◆ Pesce, M. (1995), "Ontos, Eros, Noos, Logos," Keynote Address, *International Symposium on Electronic Arts 1995*, Montreal, Canada. Retrieved from http://www.xs4all.nl/~mpesce/iseakey.html