Toward a Ludic Architecture

THE SPACE OF PLAY AND GAMES

Architecture

by

STEFFEN P. WALZ

TOWARD A LUDIC ARCHITECTURE

The Space of Play and Games

by STEFFEN P. WALZ

Copyright by
Steffen P. Walz
&

ETC Press
2010

http://etc.cmu.edu/etcpress/

Design & Composition by John J. Dessler

Copyediting & Proofreading: Jenna Krumminga, Samantha Ferrell

ACKNOWLEDGMENTS

Let's play.

PREFACE

You are an architect. Imagine that stones, handles, chairs, handrails, doors, walls, stairs, streets, buildings, halls and towers do not evolve from grasping, lifting, carrying and connecting, but that they are formless, motionless - and symbolically thought - material for games. These games juggle with paradoxes, because logics do not suffice. In an analyzing fashion and for the purpose of construction, these virtualities pervade places, times and materials, and they manifest themselves by the way of movements, forms and, sometimes, tangibly, materially. This extension of architecture into the virtual realm as well as the latter's reconnection into actuality is the foil for Steffen P. Walz's "Toward a Ludic Architecture", an intelligent composition of rhetorical figures that, for the first time ever, succeeds in seriously crossing computer games and built architecture. Congratulations!

Prof. Dr. Ludger Hovestadt

Chair for Computer Aided Architectural Design, ETH Zurich

Zurich, June 2009

CONTENTS

CONTENTS

INTRODUCTION

"Eventually, everything connects."
(Charles Eames, Architect)

"It's all about connecting the dots."
(Ralph H. Baer, Videogame Inventor)

1. Ludic Architecture

This book is a theoretical exercise toward a ludic architecture – i.e., an analytical and designerly understanding of contemporary play and games through the lens of architectural paradigms. Note that this treatise is not concerned with programming or more technologically-inclined topics. Rather, it suggests a discourse of play and games as human practices in space, seeking to conceptually frame these pleasurable practices as architectural categories and places-to-play - *playces*, if you wish. Results from digital game studies are worked into these reflections, creating a basis for an analytical framework of games as architectures. This framework serves as the foundation for critically discussing exemplary spatial formats from which play and games grow. As an introduction – and for your inspiration – read through the following scenes that illuminate the topic.

1.1. Ready!

Unfamiliar with Alan M. Turing's work, Konrad Zuse, the solitary German computing machine pioneer, conceptualized and built the first mechanical component of his *Rechenmaschine*, the Z1, in 1945, nine years before the official inception of

the Electronical Numerical Integrator and Computer (ENIAC) at the University of Pennsylvania. In the end, the Z1 was just a primitive electro-mechanical device, far less reliable than its successor, the Z3 – the first working Turing-complete computing machine. Both systems, however, consisted of a mechanical memory storage component, a calculating component, a command controller unit, a number input, and a number output – core elements of today's computing machinery. The Z1 was programmed using ticker tapes created from expensive 35mm film stock. For the ticker tape to be input into the Z1, a hand-driven - potentially engine-driven - crank had to perform one revolution. Zuse called the unit of ticker tape revolutions needed to process a Z1 command (such as carrying out an addition or a multiplication) *Spiel*, or, in English, game (Rojas 1997).

In 1947/48, Alan Turing developed a chess machine on paper and also conducted experiments with a chess machine prototype, as pointed to in one of his many seminal papers, *Solvable and Unsolvable Problems* (Turing 1954). In 1950, his American colleague Claude Shannon wrote a paper titled *Programming a Computer For Playing Chess* (Shannon 1950), in which he envisions possible use-cases for computing machines based on his game machine. Many of the machines outlined have since come into existence – machines for designing, for regulating, for translating, for music-making, for logical deduction.

Much earlier, in the 19th century, Charles Babbage had already been convinced that his Analytical Engine would be capable of processing a chess game; to demonstrate simpler mechanics, Babbage conceptualized a Tic-Tac-Toe game machine, cf. Pias (2002:198). The world's first computer game, however, may well be Alexander Sandy Douglas' *OXO* game – a single player *Tic-Tac-Toe* game also known as *Noughts and Crosses*. *OXO* is, without a doubt, the first game with a graphical user interface: gameplay was displayed on the 35x16 pixel cathode ray tube space of the

Electronic Delay Storage Automatic Calculator (EDSAC) computer at the University of Cambridge. There, Douglas implemented *OXO* in 1952 as an illustration for his PhD thesis concerning human-computer interaction (Winter 1996). See Figure 1, which shows an *OXO* session running in Martin Campbell-Kelly's EDSAC emulator software.
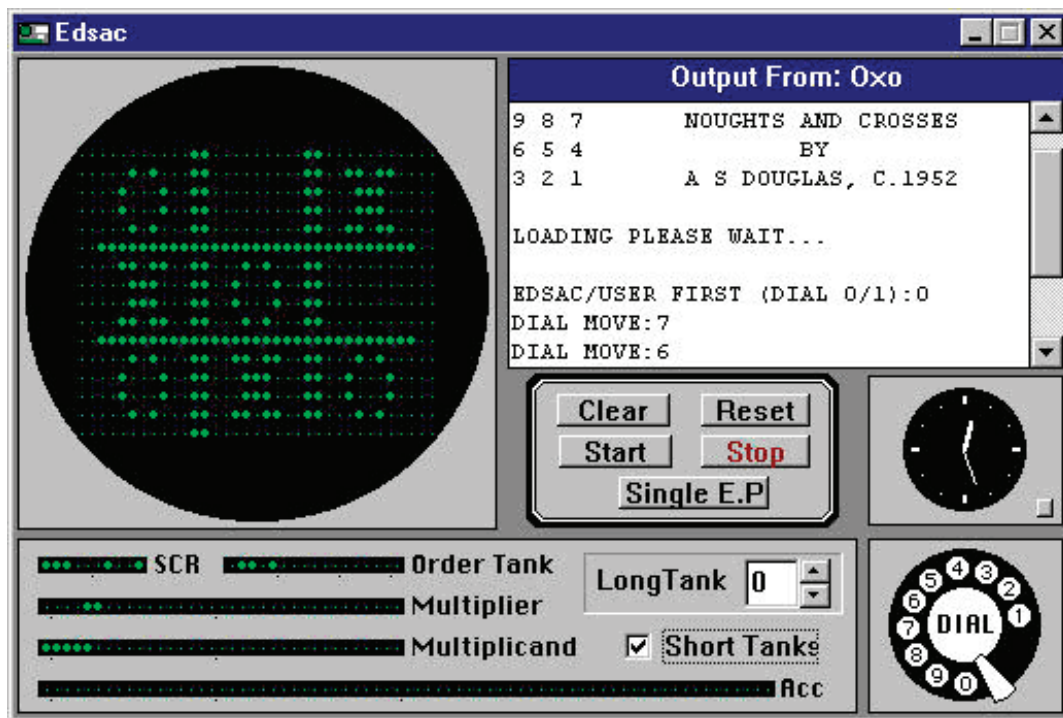
Figure 1
OXO, a Tic-Tac-Toe instance: The world's first computer game using a graphical display, written by Alexander S. Douglas in 1952 for the EDSAC computer at the University of Cambridge. The image shows a screenshot of the game running in the EdsacPC emulator, Version 6 for Windows 95 or later. Reproduced by permission from Martin Campbell-Kelly.

It is no coincidence that Babbage, Zuse, Turing, Shannon, and Douglas spent time thinking about games and how they could be implemented in the computing of

hardware, software, or both. As Claus Pias points out, games – the strategy game of chess in particular – assisted in envisioning the computer (Pias 2002). This historical argument is seconded conceptually by Juul, who concludes that games' "definiteness in the rules" (Juul 2005:38) suggests that there is a basic affinity between games and computers. Why? Mass-market computers are digital machines that use discrete, i.e. discontinuous values (such as binary data) to input, process, transmit, and store information according to formal instructions. Compare this short and certainly superficial definition against the notion that games are rule-bound systems in which conflictive, goal-oriented interaction takes place under seemingly safe conditions for the player, whose "fundamental motivation (...) is to learn." (Crawford 1982/1997:15). That games and computers are similar in the way they manipulate information has led media philosopher McKenzie Wark to conclude that "All games are digital. Without exception. (...) From the start, games were proto-computers" (Wark 2007:79).

Though it could be argued that "Interactiveness is not a binary quantity; it is a continuous quantity with a range of values" (Crawford 1982/1997:11), we can still assume that games are, formally speaking, superbly suited for computational processing and that computational hardware and software architecture represent best-practice instances of ludic application, having much increased the complexity of games and formalized games more precisely than ever before in history. As advanced problem-solving machines with which we can playfully interact, computers are the perfect match for games when we look at the latter as "a problem-solving activity, approached with a playful mind" (Schell 2008:37).

1.2. Steady!

In July of 2001, Electronic Arts (EA) published *Majestic* (EA 2001), a new kind of commercial game that blurred the lines between computer game and everyday life, between virtual space and physical space. A science-fiction conspiracy adventure that included elements of bio-warfare and global terror, *Majestic* integrated a great number of media and technologies with which the player could experience the game: in addition to an application featuring a Buddy List with bots and other players, indistinguishable from one another at first glance, the game also immersed the player through AOL Instant Messaging (AIM), e-mail and video messages, Websites, phone calls, SMS messages and faxes, cf. Taylor and Kolko (2003).

Majestic failed to become a commercial success due partly to technical reasons but also because of some design flaws and unfortunate timing – the game was released six weeks before the terrorist attacks of September 11, 2001, causing the publisher to pause the (downloadable) game service. Still, *Majestic* was a pioneering game – a software-hardware architecture that reached beyond the constraints of the classical videogame console-living room experience or the desktop PC-office mélange. In this, *Majestic* was one of the first games to feature "pervasive" or "ubiquitous" gameplay across diverse media.

1.3. Go!

In the summer of 2007, Anna and Peter, a young couple from Zurich, visit Regensburg, Germany. At the tourist information office, they notice the tourist game of *REXplorer* advertised as a "city-experience" and decide to try it out. At home in Zurich, in preparation for their trip, Peter had visited the Website of the Regensburg Experience Museum REX, watched the *REXplorer* trailer, and browsed the Websites of high-

scoring *REXplorer* players, where images the tourists had taken were shown, as was their path through the city[1]. Anna and Peter rent the *REXplorer* detector and set out to investigate the "paranormal activities" in the city.

As they leave the office to start playing, Anna holds the game controller, which reminds her of a Geiger counter. When they turn the corner of the *Altes Rathaus*, Anna notices a heartbeat vibration indicating that the detector is excited and that the couple has reached a point of interest. Anna knows that there is a spirit here that she can awaken by casting a spell. She looks at Peter, who flips over the brochure map they have with them, looks at the different gestures, and points to "wind." After glancing at the legend to get an idea of the gesture shape, Anna holds down the gesture button and waves the device through the air accordingly.

A passer-by stops and stares, open-mouthed.

Once the spell gesture is complete, Anna releases the button, and a short "tornado" video with audio playback confirms that she has successfully completed the wind gesture. A figure is shown on the detector screen, and a spirit with a friendly but dark voice begins to speak to the players[2]:

> *REXplorer! It's nice to see you. I am a salt trader. People like me used*
> *horses to pull heavy ships full of expensive salt up the river Danube*
> *to Regensburg until around 1820 A.D. Usually, the excursions*
> *lasted four weeks at a time. Yep, my life is tough and dangerous.*
> *Thieves plague the salt trading routes, but I have a loving wife who*

---

1 A trailer and other materials are available at http://rexplorer.arch.ethz.ch.

2 Note that the original voice acting is in German, and that passages from the game have been translated by the author.

*constantly prays in a nearby church for my safe return. Only the fire
of her love keeps me alive. Would you be willing to deliver a message
to my woman? Then show me the appropriate gesture.*

After listening carefully to the puzzle, Anna understands that she must cast the "fire" spell to accept the quest. She looks at Peter and asks: "Which one was fire, again?" Peter shows her the gesture legend and Anna successfully completes the fire gesture to accept the quest. Then she hears:

*I thank you from the bottom of my heart! It pleases me that you are
willing to deliver my love letter to my wife at the St. Ulrich Church
near the Cathedral. Oh! My colleagues are already waiting for me
at the river. Good luck! Take care of yourselves.*

Peter checks the brochure map and quickly finds the next location. He looks to Anna and asks: "Where are we now?" She presses the map button on the detector, which then shows them their current position and the destination of their open quest. After orienting themselves, they start walking towards the St. Ulrich Church to complete their mission. On their way, they stop over at the Regensburg Cathedral, which looks quite beautiful before the bright blue Bavarian sky. They take pictures of themselves and of the monument using the detector's photo function.

After an hour and half, Anna and Peter return the detector, which has told them, in its unforgettable, sardonic voice, that it is starting to grow tired and that walking back to the tourist office would be quite swell. Once back at the tourist office, Anna and Peter return the game controller and receive their refunded deposit. The friendly tourist office staff downloads the couple's gameplay session data from their detector, including their route, completed quests, and photos. From this data, Anna and Peter's

personal, geo-referenced gameblog Website for the session is automatically created. The URL for the blog is sent to their e-mail addresses and printed onto a postcard they receive before leaving the tourist office. Walz et al. (2006), Ballagas and Walz (2007), and Walz and Ballagas (2007) discuss several aspects of *REXplorer* in-depth, such as the game's design, its player-centered iterative development including play-testing, and its inherently persuasive strategies that promote game-based learning. Figure 2 depicts two players enjoying *REXplorer* in front of Regensburg's city core ensemble.

The three scenes described above reveal that today, ludic architectures, which in and of themselves are structurally and representationally digital, have now extended into the realm of physicality, creating a hybrid gamespace in the process. In this age of hybrid, connectivist gamespaces such as that of *REXplorer*, learning(-by-playing) becomes all the more a "process of connecting specialized nodes or information sources" (Siemens 2005:7). Theorizing about ludic architectures, then, means connecting information sources concerned with architecture, play, and games, and examining how all three ultimately manifest as architectural formats

Figure 2
Two players enjoying a *REXplorer* game quest on the Steinerne Brücke in front of Regensburg's UNESCO world heritage protected city core ensemble, including the cathedral.

2. About Games, Play, and Architecture

The scenes presented above demonstrate that digital games have history and a future – when it comes to games, we all "face the development of new typologies of space" (Borries/Walz/Böttger 2007:11[3]): "To choose a game is to choose an architecture" (Wigley 2007:484). This comment has a more profound undertone if you consider that today, commercial games are "the emergent cultural form of our time" (Wark 2007:22) that will eventually surpass even the movie industry and other entertainment media. Games are, perhaps, "architecture's final frontier" (Wiltshire 2007).

We can be relatively sure that games are changing our notion of space and time. This is made clear by innovative urban games such as *REXplorer* that superimpose physical architectures with a digital layer[4] or by other recent games such as *Majestic* that involve different forms of media and sneak unexpectedly into our living rooms.

---

3 Note that throughout this book, texts from the book *Space Time Play. Computer Games, Architecture and Urbanism: The Next Level* will be frequently referenced. In fact, *Space Time Play* – co-edited by this author with two colleagues and published by Birkhäuser Publishers in the fall of 2007 – can be considered a reading prerequisite to and/or a vademecum for this book.

4 Games such as *REXplorer* are often and interchangeably called "ubiquitous" or "pervasive" games. IBM introduced the term "pervasive computing" back in 1998 to describe a research and business concept by which computers are embedded into our surroundings. Ten years earlier, the research concept of "ubiquitous computing" had been introduced by Mark Weiser from XEROX Parc (Weiser 1996). The term encompasses the "third wave in computing" (ibid.), in which one person interacts with many computers – as opposed to both the mainframe stage of computing, during which many people shared one computer, and the PC phase, in which a one-to-one rationale was prevalent (i.e. one computer per person – or, of course, one person per computer if we regarded the computer as a resource). Mattern has described the differentiation of the terms ubiquitous computing and pervasive computing as follows: "While [Mark] Weiser uses the term "Ubiquitous Computing" rather in an academic-idealistic way, describing an unobtrusive, human-centric vision of technology, the term "Pervasive Computing" has been coined by the industry with a slightly different emphasis: This term also centers around the idea of permeating and omnipresent information processing, but with the specific short-term goal of utilizing it in e-commerce scenarios and web-based business processes" (Mattern 2003 cit. after Hinske et al. 2007:24).

Another example is the latest Nintendo console, the Wii, which allows for wireless gestural player input by means of a game controller with built-in accelerometers and a Bluetooth connection. In the tennis game shipped with the *Wii Sports* (2006) set, the player can swing the controller as if swinging a tennis racket to hit an oncoming ball in real time in a 3D representation of a tennis court rendered onto the TV screen to which the console connects (Kelley 2007b:24f.).

Yet the change is also generational. Today, games are not merely for children - they constitute a major adult business, and major architecture is created through them. In the 1970s and early 1980s, the first game generation grew up playing *Space Invaders*, *Pac-Man*, *Frogger*, and *Donkey Kong*. Indeed, the author of this book will admit that he himself spent quite some time playing games on the world's first video console with exchangeable game cartridges, the Atari VCS (Atari 1977); that as a pre-schooler, he was the proud owner of a Philips G7000 (Philips 1978); and that later, while attending secondary school, he played and learned to program BASIC on the Z80 CPU-based budget home computer Amstrad CPC 6128[5] – the European alternative to 8-bit home computers such as Commodore's C64 (Commodore 1982). With the exception of university and high school labs and networks, *PlayNET* (1984), an online service for C64s in the US between 1984 and 1987, was the first computer-to-computer online communication network to utilize graphics and interactive menus and deliver computerized multiplayer gaming through a 300- or 1200-baud modem (Morabito 1985).

PlayNET licensed its networking soft- and hardware solutions to Quantum Link or Q-Link, a US and Canada-only online service provider for Commodore's C64 and C128 computers that changed its name to America Online (AOL) in October 1991 and went on to become one of the driving forces behind the evolution of the World Wide

---

5 In Germany, Amstrad computers such as the CPC 464, the CPC 664, and the CPC 6128 with a doubled memory of 128K were marketed by the Schneider company and branded as Schneider computers.

Web[6]. Thus it was the home computer-based *PlayNET* that helped kick start today's online gaming culture (focused on games such as *World of Warcraft* as well as on increasingly popular free-to-play browser games) that spans social spaces across the planet.

The soft- and hardware of digital games have gone through quite an evolution in the past decades, and scholarly reflection is having a tough time keeping up. But just because games are well suited for rule processing, does not mean all games encompass digital realms. Board games have been played for thousands of years across cultures like analogue rule-processing machines that we players crank, metaphorically speaking, turn-by-turn, movement-by-movement. At the same time, athletic competitions continue to constitute an important aspect of Western civilization. But whether sport competition, computer game, or board game, at the heart of all those formalized, rule-based ludic activities that we call games, is play – an anthropological constant and a phenomenon that is, mind, not exclusive to humans.

If games are indeed architecture's final frontier, then this book aims to contribute to an architectural understanding and appreciation of play and games. The following problem statement details how this will be achieved.

3. Problem Statement

In the past, scholarly discourse has examined games and play, including digitally processed games, from many perspectives in an effort to explain them as cultural artifacts. The so-called narratologists have interpreted games as novel forms of narrative (Murray 1997; Manovich 2001) or texts to read (Bolter and Grusin 2000). The

---

6 See http://www.qlinklives.org for a historical record maintained by one of the Q-Link co-founders.

ludologists have insisted that games should be analyzed *sui generis* (Aarseth 1997), being mainly systems of rules that govern play, regardless of whether they are digital or analogue (Salen and Zimmerman 2004). Others have suggested a middle ground, arguing that the dualism of narratology-ludology is quite artificial and asserting that a ludological perspective cannot exclude the narratological approach (Frasca 2003). Eventually, this approach was formulated into a model that analyzes videogames as a trans-medium that features both a set of rules and a fictional world (Juul 2005).

Thus digital games as cultural artifacts have been alternately understood as rule-bound ludic activities, interactive narratives, trans-medial combinations of the latter, or procedural environments composed of unit-operational software-based objects (Bogost 2006). Each of these attempts implicitly or explicitly assumes that games are, have, or take place in spaces. One could certainly agree that, for example, a rule-bound play activity must take place somewhere; that an interactive narrative immerses the player in a navigable story set in a certain place with certain spatial qualities; and that a unit-operational system creates an environment for the player to play in and with.

With the help of more than 140 authors, the book *Space Time Play* (Borries/Walz/Böttger 2007), co-edited by the author, has broken new ground and attempted to shed light on the relationship between computer games, architecture, and urbanism. So far, however, there is no in-depth treatise that aims to architecturally frame play and games as human practices in space and of space, examining the forms in which ludic activities take place. This book attempts to fill this gap in the academic discourse and to work towards a ludic architecture, i.e. a comprehensive and critical discussion of play and games through the lens of architectural paradigms. Such a contribution is needed to accommodate the development of ludic architectures, particularly when they extend into the physical world as in the *REXplorer* example.

The questions that can help guide us in framing such a ludic architecture include:

- What are the parameters of a conceptual space of play, and how can we consider play as an architectural category? How is play architected? How does it relate to space, and how does it produce space?

- What are the parameters of a conceptual space of digital games – what can we gain from locative, representational, programmatic, dramaturgical, typological, perspectivistic, form-functional, technological, and phenomenological approaches in research literature? Are these approaches adequate for our overall task?

- What does a sketched analytical framework for games-as-architectures sui generis look like?

- In what prototypical spatial types are play and games rooted – what could we learn from these types via critical and episodic inquiry informed by the parameters mentioned above?

4. Methodology and Overview

This treatise on the nature of ludic architecture is structured as follows:

- In the first section, **PLAYSPACE**, we examine the conceptual space of play, seeking to define dimensions that are relevant in looking at play as an architectural category. We differentiate this conceptual space into an ambiguity dimension, a player dimension, a modality dimension, a kinetic dimension (wherein we strive to define play as a relational human practice in space), an enjoyment dimension, and, eventually, a culture and context dimension.

- In the subsequent section, **GAMESPACE**, we first consider play as an essential part of games and vice versa. We then review and update existing notions of space and spatiality in digital game (design) research as well as notions and applications of games in architectural research with the goal of mapping a conceptual gamespace. Finally, we sketch out a preliminary analysis framework for investigating the spatiality of games, in which the playspace and gamespace dimensions are set into relation.

- In **PLAY-GROUNDS: AN ARCHAEOLOGY OF LUDIC ARCHITECTURE**, we apply this framework to critically and essayistically discuss "play-grounds", i.e. prototypical and historically persistent spaces of play and gameplay before and beyond the digital game. These play-grounds are connected by conceptual links that can be explored by users/readers and implicitly suggest ludic trajectories and a spatial discourse.

- We conclude this work with the **GAME OVER! INSERT COIN** section, which offers a summary of our findings and an outlook.

5. Significance and Contribution

This book, which frames play and games architecturally, contributes to a number of fields:

- The disciplines of Game Studies and Game Design, as well as related entertainment media and entertainment technology industries.

- The disciplines of Architecture & Computer Aided Architectural Design (CAAD), contemporary Urban Planning theory and practice, and related industries.

It is hoped that this treatise will help bridge the fields of Architecture and Game Design to the extent that academia will be able to increasingly work at the intersection of both disciplines. Some rough guidelines for achieving joint progress in an academic context are offered below:

- Throughout their university training, architectural students should be taught to consider games as dynamic, innovative, and challenging architectural outlets that can be design results or components of the design process. The field of CAAD in particular can benefit from games as tools and results; Walz and Schoch (2006) demonstrate how this can be achieved by examining a pervasive game class centered on a location-based learning and meeting game for students and faculty of the ETH Zurich that superimposed and accurately reflected pre-existing sites and usages. Other classes on games and architecture have been taught by the author at the Department of Architecture at the University of Stuttgart, resulting in a number of architectural theses that used game mechanics to create or even automate architectural space, cf. Walz (2006a). On the other hand, game design and development students as well as those students learning how to produce, sell or create art for games and other entertainment media should learn from the get-go to consider games in terms of spatial design.

- In the research context, academically-minded architects should take advantage of games and entertainment media beyond the visualization and performance power of game engines in order, for example, to investigate how a building or a location can become an interactive partner or a narrative to be explored over time – as in a biofeedback game prototype in which the player is connected to a physical space's functionalities (Walz et al. 2005). At the same time, research in entertainment media and game

design can benefit from ludicly-inclined architects who conceptualize programs geared toward, for example, mobility, place-making, future learning, or problem simulation, regardless of whether the programs are executed virtually, physically, or in hybrid situations, using high or low technology.

PLAYSPACE
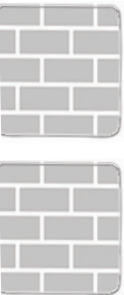
Playing is a special type of human activity – an anthropological constant. In order to think about the nature of play, we must clarify beforehand that there is, of course, a difference between the terms play and games, although languages such as French or German do not differentiate between the two. In German, there is only one noun, Spiel, which is used when speaking of both game and play, and one verb, spielen, meaning both to play and to play a game. Our discussion of play in this book is based on the assumption that play is the foundation of a game, and that neither can exist without the other.

We look at *games and play as human practices in space*, and in doing so, initially examine play in the context of architecture. What are the parameters of play? To what practices does play give rise? How do we design the space of play, and how does play relate to games? What are, in total, the dimensions of a conceptual playspace?

In this section, we outline the dimensions of this conceptual playspace in order to move closer towards answering these questions. The approaches applied vary and include theories and findings from a variety of fields so that throughout the course of the examination, we develop our own definition of play by way of the following subsections:

- **Play as ambiguous category:** The ideologization of the term play is discussed, on the one hand following up on a prevalent academic discussion initiated by Sutton-Smith (1997), and on the other hand underlining that play is subject to contextual and rhetorical uses all across the sciences.

- **Play as subjective experience:** Without the player, there is no play in space, and when designing (game)play, participatory design methods are crucial to creating an enjoyable ludic activity (Fullerton 2008). This subsection elaborates on both these assertions.

- **Play as modality:** Beyond the subjective experience, play takes place either in a physical, imaginary, virtual, or hybrid setting. A model inspired by Bartle (2004) is introduced that organizes these aspects of playspace.

- **Play as rhythmical kinesis:** In this subsection, we develop an architecturally-framed definition of play. Towards this end, we briefly consider notions of movement and rhythm in architecture before examining dance as movement because it allows us to speak of both a spatial and a playful activity. Eventually, with the help of Game Studies pioneer Buytendijk (1933), we propose looking at play as a particular kind of rhythmic movement that can be physical or virtual and that connects the player with the play-environment and a play-other. This way of looking at play allows us to think and speak of it in terms of space and architecture.

- **Play as enjoyment:** Against the backdrop of our kineticist model of play, we reflect on and cross-compare pedagogical, anthropological, and game design taxonomies of play stimuli and player types (e.g. Fritz 2004), deriving an extended model of play pleasure. In addition, we review representative aspects of play enjoyment, including absorption and perceived difficulty.

- **Play as designed phenomenon:** We discuss, representatively, how given physical environments are perceived to be play-suitable and feature positive valence (Hendricks 2001).

- **Play and games – games and play:** We elaborate on the interrelation of play and games in order to bridge to the following section, in which we scrutinize both the formal nature and spatiality of games.
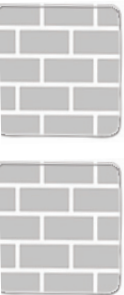
Taken as a whole, this section prepares us to identify and review existing concepts of space and spatiality with regard to games. In this context, games are understood as formalized systems of play.

1. The Ambiguity Dimension

In the past, the phenomenon of play has been investigated by many scholars from a wide variety of fields. In *Homo Ludens*, cultural anthropologist Johan Huizinga argues that human culture itself bears the character of play, suggesting that play is not only of prime importance to, but also a necessary condition for, enculturalization (1939/1971). With regard to the design of the built environment, we read Le Corbusier's oft-cited claim from *Vers une Architecture* that "Architecture is the masterly, correct and magnificent play of volumes brought together in light" (Le Corbusier 1928/2008:102), establishing "stirring relationships" (1928/2008:194). Reflecting on the information age, William J. Mitchell plays on Le Corbusier's belief in progress, stating: "Architecture is no longer simply the play of masses in light. It now embraces the play of digital information in space" (Mitchell 1999:41).

But what is play? Developmental psychology, for example, has long concluded that for human children, play involves imaginary situations mandatory for learning and child development (Vygotsky 1978:93). Indeed, Piaget (1951) found that play is important for deep learning, which has led contemporary educational learning theorists to claim that, generally speaking, "players are also learners" (Becker 2007:24), even more so

when playing well-designed games that are capable of creating intrinsic motivation in the player (2007:25).

In order to better understand play, let us take a step back and consider the words of game design scholars Salen and Zimmerman who point out that many "studies of play focus on identifying the function or purpose of play. The implicit assumption is that play serves a larger purpose for the individual psyche, the social unit, the classroom, the species, and so on" (2004:309). This finding – that play is best explained by demonstrating that it defers to another concept – can be fine-tuned against the backdrop of an already classic study by Brian Sutton-Smith based on "overwhelming evidence that the meaning of games is, in part, a function of the ideas of those who think about them" (Avedon 1971:438). In *The Ambiguity of Play* (1997), the social science of play pioneer and professor of education dissects the varied, rhetorical uses of play across disciplines and purposes. Play, Sutton-Smith argues, is an ambiguous term. It is used in different contexts with different underpinnings, often shadowing activities and describing them imprecisely and vaguely, thereby persuading the audience to think of the process or activity ambiguously. Thus play cannot be explained by defining the way it functions, but by identifying those who use it as a means to convey a certain communicative strategy (1997:3).

An architectural theorist, for example, is likely to bring architectural meaning to the study of games and play and naturally, will want to define and possibly explain playing in terms of space. In his excellent meta-study, Sutton-Smith goes even further, claiming that "practically anything can become an agency for some kind of play" (Sutton-Smith 1997:6). To support this argument, Sutton-Smith lists activities that are said to represent forms of play or experiences of play, ranging from private to very public:
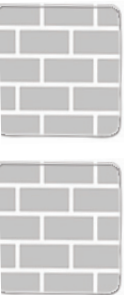
- mind or subjective play;

- solitary play;

- playful behaviors;

- informal social play;

- vicarious audience play;

- performance play;

- celebrations and festivals;

- contests, i.e. games and sports;

- risky or deep play (ibid.).

Based on Sutton-Smith, we could presume that there is no such thing as a biological nature of play, since a given rhetoric of play only serves as a communication strategy – that is, a means to an end. *The Ambiguity of Play* reminds us that whenever someone uses the term play, we should pay careful attention to the context in which the term is used.

2. The Player Dimension

In addition to the ambiguity of play discussed in the past subsection, the playspace we describe here always embodies a player and, by extension, subjectivity. Without a player, there is no play; and even more importantly, subjectivity in play has a particularly important role. Let us briefly investigate this role in the context of both design methods and empirical findings in human-computer interaction.

2.1. The Diversity of Players
and Player-Centric Design

On the one hand, we can derive this special role of the player from the diversity of players: there are infant, preschool, childhood, adolescent, and adult players, all of whom play somewhat differently. There are male and female players. There are gamblers, gamesters, sports, and sports players, and there are playboys and play-girls, playfellows, playful people, playgoers, playwrights, playmakers, and playmates (Sutton-Smith 1997:5f.).

The diversity of players is obvious in less designed and more subjective play experiences, and the audience plays an even more important role in designed play as well as in games. In game design, and in particular in the design of digital games, player-centrism is just one of many approaches – like, for example, market-driven or technology-driven approaches – favored because it usually produces the most enjoyable experiences (Adams and Rollings 2006). A player-centric approach understands and designs ludic activities from the point of view of the player. Fullerton underlines that playtesting – a design method in player-centered design – "is the single most important activity a designer engages in (...). Play testing is something the designer performs throughout the entire design process to gain an insight into how players experience the game" (2008:196).

Whether conducted quantitatively with the help of questionnaires or game-play log files or qualitatively with the help of video taping, narrative interviews, or participant observation and field diaries, playtesting helps to improve a designed ludic activity. In addition to creating a game experience that entertains, a designer of a ludic product must understand, as thoroughly as possible, the player's expectations, motives, and needs. Another duty of the player-centric game designer is to comprehend the player's

background, mindset, and desires and to empathize with the player by imagining what it will feel like to experience the game, cf. Adams and Rollings (2006:38).

In an article about pervasive game design, this author has listed a number of questions that illuminate core challenges in considering the player dimension of playspace at the beginning of a project, even before a design idea has come into being:

- Who is the player? What is the typical player's background? How would you describe the player – as a competitor, a contemplator, a strategist, a socializer, etc.? What kind of medial and technological expertise does the player bring to the game?

- What are the player's primary and secondary activities before, during, and after the expected game situation? What are the player's motives for being where he or she is and doing what he or she does outside of the game? How will the game change this?

- What are potential concerns the player may have with regards to playing? What is the player's "gameness," including allotted time, budget, theatricality, and constraints?

- (When) Does the player have company?

- Where is the player, and how does he or she move about? At what pace? What is the activity space of the player in his or her current location? (Walz 2007:106).

Two historical roots of player-centrism in digital games will be briefly outlined in the next two sections. Understanding these roots is a prerequisite to reflecting on the role of participatory design in architecturally-framed play, as we will see in the last subsection of the player dimension discussion.

2.2. Human-Centered Design and Situated Action

The concept of player-centered design emerged in conjunction with the concept of a "user-centered" approach to design (Norman and Draper 1986). Today, user-centered design is commonly referred to as a human-centered design approach and appears frequently in interactive system design. Both human-computer interaction experts and game designers have long recognized that human-computer interfaces and interactions should be designed iteratively (Buxton and Sniderman 1980; Nielsen 1993; Gould and Lewis 1985; Adams and Rollings 2006; Fullerton 2008) because the requirements for an interactive system cannot be completely specified at the beginning of the lifecycle (Dix et al. 1998). Instead, designs need to be prototyped and tested by actual participants or players so that any false assumptions or unforeseen problems will be revealed. These problems can then be corrected in the next iteration of the prototype, which should then again be tested to ensure that the problems are truly resolved.

The player-centric and human-centered approach are complemented by the concept of "situated action." Together, they have shown empirically that we can only understand human action as the result of a social situation and thus through the subjectiveness of the experience of that situation. This applies to human-machine communication as well. In her book *Plans and Situated Action* (Suchman 1987), Lucy Suchman develops a human-computer interaction theory that takes into account results from cognitive science research and Suchman's own experimental work – including, for example, her studies of and designs for Xerox machine interfaces. In the book, Suchman rejects the view that action is pre-planned and argues instead that plans for acting towards a situation can be seen as resources. Suchman shows that people act not prescriptively, but according to social and material contexts – that in fact, their actions are entirely influenced by their situational contexts. Behavior can thus be described as "situated action." Machines, then, are not just "things," but rather co-creators of this situatedness

(1987:55ff.). Building on Suchman, Reeves and Nass (1996) conducted empirical experiments that popularized the notion that people treat computers, television, and other media as if they were "real" people and "real" environments, taking for granted that which a given medium conveys. In other words, the notion that media have become indistinguishable from real life:

> *Media are treated politely, they can invade our body space, they can have personalities that match our own, they can be a teammate, and they can elicit gender stereotypes. Media can evoke emotional responses, demand attention, threaten us, influence memories, and change ideas of what is natural. Media are full participants in our social and natural world (Reeves and Nass 1996:251).*

Stanford University researcher BJ Fogg – who studied under Nass and Reeves – has taken this kind of research even further. In the context of researching and developing persuasive technologies, Fogg more precisely categorizes how people respond to virtually all computing products: "Interactive technologies can operate in three basic ways: as tools, as media, and as social actors" (Fogg 2003:22).

Both Suchman, Reeves and Nass, and Fogg have empirically demonstrated that to a given audience, a medium or communicative properties of this medium are not perceived, say, on a physical-virtual continuum ("More virtual" – "Less virtual"), but rather in a straightforward situated fashion. In addition, all three parties recommend that designers take these phenomena into account during their design processes.

2.3. Conclusion: The Player in Architecture

The player is central to designing an enjoyable ludic activity. The player is also central to understanding the role of play outside of a particular situation. The player dimension of an architecturally-framed notion of play underlines the humanity of play and challenges architects' thinking about play to include participatory design methods into their repertoire.

Beginning in the 1920s, when increasing urbanization of Western society spawned the systematic research and development of modern design, modernists like Theo van Doesborg of the Dutch art and architecture group De Stijl began calling for a system of art and design based on rationality and objectivity (cf. Cross 2007:41), and architect Le Corbusier proposed that a house is an objectively-designed "machine for living" (ibid.). Cross: "[In De Stijl and Le Corbusier's philosophies], and throughout much of the Modernist Movement, we see a desire to produce works of art and design based on objectivity and rationality; that is: on the values of science" (ibid.).

Yet, this spirit of merely rationalizing the player is slowly changing. Since the 1970s, several approaches have demonstrated how architecture and urbanism can profit from participatory design thereby creating a new kind of proximity between people and the built environment. Recent examples include:

- The *Kaisersrot*[7] research and software developed at the ETH Zurich, which integrates the computer as a "consensus-machine" that generates and optimizes design solutions for both individual buildings and large-scale urban design, processing stakeholder wish lists so that an equilibrial state is reached (Lehnerer 2007).

---

7 Cf. www.kaisersrot.com

- When used for participatory city planning, "scenario games" in the spirit of Buckminster Fuller's World Game can contribute to successful placemaking as well as increase awareness for environmental hazards (Bunschoten 2007).

- Rule-based, participatory urban planning implies "a partial loss of authorship" for architects and urban planners, but gives individuals more freedom to choose and influence sites (Christiaanse and Lehnerer 2007:373).

As the built environment becomes increasingly computationally equipped, the player dimension of playspace will become more and more important for architectural design. Designers should always be aware that they never design the actual player experience, only the framework wherein that experience will take place.

3. The Modality Dimension

As a human activity, the act of playing is naturally subjective. Even in the virtual world of *God of War* (Sony Computer Entertainment 2005), the player "is" the player-avatar Kratos, though really, he or she is only being represented by a graphical and animated figure. Peter Vorderer has summed up this duality of subjective representation, finding that games – and video games in particular – synthesize entertainment media and toys, placing the player in the role of witness on the one hand, and the role of participant on the other (Vorderer 2000:30f.).

Although we introduced player-centrism as a guiding design and analytical principle in the last section, it is still necessary to differentiate player-centrism into several

modalities of playspace representation. This becomes particularly important when we consider the advent of pervasive games, which ubiquitously superimpose physical space with interactable computer-generated interfaces and content.

Inspired by virtual-world design pioneer Richard Bartle (2004), we assume the following modalities:

- **Physical:** Players, spaces, and objects that are material.

- **Imaginary:** That which is not material.

- **Virtual:** That which is not material but has the form or effect of that which is material.

From this model, we can deduce that "Virtual worlds are places where the imaginary meets the real" (Bartle 2004:1). Virtual worlds are implemented by a computer – or a network of computers – "that simulates an environment" (Bartle 2004:1). In our reading, this notion of virtuality includes Web phenomena such as Websites. Pervasive – or, interchangeably, ubiquitous games – pervade virtuality so that play activities are (permanently) superimposed on the physical world. As a result, a new modality emerges, which we propose to describe as follows:

- **Hybrid:** That which is not material but has the form or effect of that which is material mixed with that which is material to the extent that one can no longer be separated from the other without losing its form or intended or emerging effect.

Using these modalities, we can say that a player plays in a physical, imaginary, virtual, or hybrid modality and thereby encapsulate the modality dimension of playspace. From the subjective perspective of the player, though, modality will not matter much as long as the player experience remains playful and unbroken.

4. The Kinetic Dimension

The context in which we will discuss play in this subsection is that of movement; the goal is to show how play, movement, and rhythm interrelate and, based on this demonstration, to formulate a working definition. As mentioned above, this approach also attempts to demonstrate how play and architecture share the properties of movement and rhythm at their core. In order to do so, we will now discuss notions of movement and rhythm in architecture, after which we will take a look at an exemplary notion of movement and rhythm in a field closely related to play – that is, dance – so that finally we can discuss at length the function of movement and rhythm in play itself.

4.1. Notions of Movement and Rhythm in Architectural Theory

By thinking of play in terms of movement and rhythm, we attempt to think of play architecturally as a rhythmic activity tied to and enabled by space and objects in space and itself a producer of space. We hypothesize that implicitly or explicitly, movement and rhythm appear across design ideologies in architectural theory and practice, can be considered to lie at the core of designing a built environment, and serve as a pre-condition for spatiality. In the following section, examples from contemporary and often conflicting architectural theories and practices will prove the truth of this hypothesis. These examples illustrate different ways that we can think about and define movement and rhythm.

In the *Chartre d'Athènes* directed at future architecture and urban planning students, Le Corbusier explains that "Architecture is volume and movement" (Le Corbusier 1962:28). In other words, we wander through architecture, and this modality of movement

determines how architecture is experienced. Movement places the visitor into positions and involves him or her in processes, guides views, enforces velocity, and presents or conceals parts of the whole. The way we move through a designed environment is responsible for our expectations of that environment. Thanks to material and immaterial emphases and the ordering of interior and exterior space, movement affects, shocks, or surprises us, reveals secrets, and, most importantly, asks us to actively participate in a space intellectually, physically, and relationally. Le Corbusier believed in dead architectures and living ones; the latter, he argued, present an interlinking of events – rhythms, i.e. pauses and tempi of space and light – that the visitor experiences. The result is that the visitor is affected by the space and interacts with it (1962:29f.).

Fröbe (2004) finds that the described *promenade architecturale* is the central element in Le Corbusier's architectural and urban designs, programming rhythm into the relationship between user and architecture – a play of volumes-in-light *for* the user, but also *with* the user. From Marxist and Situationist-related philosopher Henri Lefebvre (1991), we have learned to consider this enacted relationship between a human being and an architecture as more than a rhythmical program of movements without social or political connotation that assumed a universal human being void of ideology. Instead of treating space as a mere aesthetical category, Lefebvre proposes that there are different levels of space, ranging from crude, natural, "abstract space" to "social space," the latter brought forth by the interaction between humans and their surrounding space (1991:26).
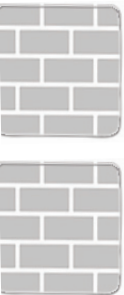
Lefebvre suggests a tripartite constitution of this (fundamentally social) spatiality: the perceived material "spatial practice," the conceived "representation of space," and the "lived" spatiality of the representation itself, called "representational space" (1991:38f.). Lefebvre envisions to evaluate spatial practices with the help of "rhythm analysis" (1991:205), and to experiment with spatial practices rhythmically using the

spheres of music and dance. Consequentially, Lefebvre suggests the creation of a "rhythmanalysis" (sic!) discipline (Lefebvre 1996:219ff.), in which the city is analyzed through, for example, the rhythms created by bodies and their movements, daily sleep cycles, gestures, traffic, exchanges, sounds, sudden events such as accidents, festivities, moods, seasons, weather, light and darkness, colors, smells, the present-absent, tides, and waves.

In a fabulous application of Lefebvrian theory to the ludic-landscapist realm of skateboarding, Borden (2001) investigates the movements of gyrating, gliding, rotating, miming, performing, declaiming, climbing, descending, and traversing as a particular "skateboarding-architecture" produced by and between skateboarder and skateboarding terrain. Citing Lefebvre, Borden concludes: "Like music and dance, skateboarding creates 'repetitions and redundancies of rhythms' and 'symmetries and asymmetries' irreducible to analytic thought" (2001:113). To Borden, the interaction enacted by and between skateboarders and their terrain allows us to think of architecture "not as a thing but a flow" (Borden 2001:9).

Borden thereby suggests that the physical concepts of movement and rhythm relate to the psychological concept of "flow" (Csíkszentmihályi 1975), which many consider to be at the core of gameplay situations capable of absorbing players (Chen 2007). Csíkszentmihályi's understanding of flow includes activities designed to make optimal and, most importantly, enjoyable experiences easier to achieve. Flow-inducing activities such as ritual, play, dance, or art facilitate concentration and involvement by way of controllable rules, skill learning, attached goals, and feedback (Csíkszentmihályi 1991:72) – the type of flow that results, we see, is more related to formalized, game-like activities than to playful activities. We will later return to the concept of flow in order to detail how flow is typically induced. Whereas the psychological state of flow is attached to a kind of deep absorption, architectural flow is based on the assumption that a certain

type of architecture can cause a rhythmic to-and-fro flow, which need not necessarily result in a psychological flow state. The psychological flow concept is thus not the only way to think about the relationship between player and play-other, particularly not in the context of more lightweight, less formalized play activities.

Writing from a far more functionalistic and, like Le Corbusier's, aesthetisizing standpoint, urban planning theorist Kevin Lynch (1960) concerns himself with the look of cities and the way they present themselves to their dwellers as coherent, visible, and clear – in total, as beautiful and highly "imageable." Lynch suggests that certain large-scale design elements can heighten the city's legibility and facilitate, for example, orientation. In Lynch's view, the more easily a city can be read, the more beautiful it is. Lynch's suggested design elements for achieving this "imageability" include clear, coherent, and visible "paths" (e.g. streets, canals, railroads), "edges" (walls, shores), "districts," "nodes" (squares, street corner hangouts), and "landmarks" (points of reference such as towers and domes) (Lynch 1960:46ff.). This choice of elements reflects Lynch's belief that fundamentally, "a city is sensed in motion" (Lynch 1960:107).

In a later work about the semantics of the city, *What time is this Place?*, Lynch (1972) investigates humans' innate conception of time and how it relates to change and reoccurring events – i.e. naturally-generated rhythms such as sunrise and sunset as well as artificial city rhythms in an ever-changing urban landscape caused, for example, by catastrophe, building activities, or demolishing. Lynch finds that time and change create our sense of being alive, and that it is therefore crucial for time and change to be represented meaningfully in the urban landscape. Beyond the timely order created by watches, the rhythm of change must be celebrated and carefully planned – in prototyping environments, for example. Lynch's core idea is thus the "architect of time" who enhances the legibility of time in the city by, for example, visibly layering materials from different eras, planning vegetation in the city, designing shadows that passersby

can watch move, or publicly displaying image and film stock that documents change (1972:248ff.).

In keeping with this metaphor of *city rhythm*, Rem Koolhaas – another, more contemporary European architect (and opponent of Le Corbusier) – glorifies tempo and movement (Trüby 2003), but neither as means to create a relationship between a space and a user nor as means to achieve a Genius Loci, a holistic, site-specific, unique architectural characteristic. Rather, Koolhaas sees tempo and movement as expressions of globalization that assure constant change and the promise of (or excuse for) generic architectures without predefined programs (Koolhaas 2003). For Koolhaas and his concept of the Generic City, it is not only the rhythm of spatial impressions that defines architecture, but also the rapid rhythm of change that dictates how an urbanity should be designed so that it can accommodate both that change itself and the movements causing it.

We can compare Koolhaas' Hollywood-coulisse of the Generic City with Constant's idealistic *New Babylon*, a Situationist and radical draft for a future city freed from utilitarian labor in an oncoming ludic age: "Completely covered, artificially climatized and lit, and raised high above the ground on huge columns. Inhabitants are given access to powerful, ambience-creating resources to construct their own spaces whenever and wherever they desire. Light, acoustics, color, ventilation, texture, temperature, and moisture are infinitely variable. Movable floors, partitions, ramps, ladders, bridges, and stairs are used to construct veritable labyrinths of the most heterogeneous forms in which desires continuously interact" (Lootsma 2007). In the urban game *New Babylon*, the city's very structure is subject to change and movement, and the *Homo Ludens* constantly adventures through this large-scale, inconsistent playground, always on the move.

One current and intriguing example of this vision of mobilizing architectural construction is architect David Fisher's proposal for the *Dynamic Towers*, two high rise buildings – one in Dubai, the other in Moscow – made up of voice-controlled levels that self-rotate on a horizontal axis so that the building becomes its own power plant and a kind of housing toy: "When human and spatial form(s) relationships become interactive, Architecture comes alive" (Naos 2000).

The architects and urban planners, theorists and practitioners cited above are motivated by contradictory design philosophies, but all acknowledge the key role of movement and rhythm in architecture and urban design – whether they understand these as the movement of the user in relation to the built environment, the movement of chance, or the habitual movement of structural play.

We ourselves can clearly see how the consequences of the mobile age have rubbed off on architectural vocabulary – just think of airports, railways, the Autobahn, motels, car-friendly city planning and zoning, modular furniture, etc. Today, movement – or, metaphorically speaking, liquefaction[8] – also impacts the architectural design process and building service and maintenance. The CAAD group at the ETH Zurich, for example, develops strategies and tools to overcome the container-space "dictate" by way of a total computerization and liquefaction of the architectural development and operation chain. Design drafts for buildings are programmed to achieve "individuality through movement" (Hovestadt 2006:78); CNC machines are employed to "print" pavilions; and networked, programmable structures and functions not only solve spatial composition problems, but also allow for emergent and adaptable (we can say: rhythmical) systems in architecture in building services, for example.

---

8 In this context, cf. Asendorf (2004), who discusses movement and the concept of "liquid spatiality" in modern architecture.

The natures of movement and rhythm interrelate, as can be seen from the above examples, drawn from the fields of architecture and urban planning. They can occur relationally, aesthetically, topologically, navigationally, socially – in total: strategically. Yet although these philosophies are distinguishable as design rhetorics, we are proposing that all are implicitly or explicitly based on the following intrinsic assumptions:

Architectural Movement

Architectural movement is a relocation process of one or more subjects, objects, or spaces in space over time.

Architectural Rhythm

Architectural rhythm is the variation of measured movements in space over time.

We have now outlined and defined how movement and rhythm are considered in architectural thinking and design, but before we examine notions of movement and rhythm in the study of play in greater detail, we will make a little excursion into a bridging field that embodies, at a fundamental level, both movement and rhythm (see Lefebvre and Borden) and play: that is, dance.

4.2. Notions of Movement and Rhythm in Dance Notation

Play can become a kind of dance. In fact, Huizinga (1987) argues that dance is a particular and particularly perfect form of play: both phenomena are identical in nature. Because this is the case, and because, Huizinga believes, when we mention play, we

somewhat imply dance, he neglects to explore the topic at greater depth (Huizinga 1987:181). This is an unfortunate decision on the part of the pioneering game scholar, since a proper understanding of dance would certainly shed light onto the nature of play. Caillois, another giant of game studies, goes a little further, subsuming dance as a kind of play and holding that dancing represents a form of disorderly movement that causes pleasure (and giddiness) and that falls under the greater heading *ilinx*, play and games based on the pursuit of vertigo (Caillois 2001:25). More clearly than Huizinga, Caillois points at that which constitutes dance: movement. But what is our understanding of movement and rhythm in the study of dance and in and of themselves?

Perhaps the most representative and movement-focused research approach is that of Kinetography Laban or Labanotation, a movement notation system similar to music notation that "indicate[s] the accurate rhythm of movement" (Hutchinson 1977:3). It is particularly intended for the field of dance and generally aims to analyze and "record objectively the changes in the angles of the limbs, the paths in space, and the flow of energy [as well as] movement motivation and the subtle expression and quality" (1977:4).

Labanotation – originally called *Schrifttanz*, i.e. scribe dance – is named after one of the founders of European Modern Dance and community dancing, the dancer, choreographer, and theoretician Rudolf Laban (1879-1958). Laban developed this visual recording system in the 1920s, distilling basic movements from existing movement sequences and translating these movements into a family of icons. Labanotation holds that movement is the result of the release of energy through a muscular response to an inner or outer stimulus that produces a visible result in time and space. Note that Laban's notation does not record the initial stimulus or the exact muscular response; instead, the change produced by muscular action is recorded. This also includes resulting changes such as the placement of limbs in space-time, body shape, or inner body tensions that

accompany the initial change. Dance is thus understood as a language of expressive gestures. One way to notate movement using Labanotation is the Structural Form, which records the body and its parts, space (i.e. direction, level, distance, and degree of motion), time (i.e. meter and duration) and dynamics (i.e. quality or texture – like, for example, strong, heavy, elastic, accented, or emphasized).

Note how Laban's system assumes that the purpose of any action may be to relate to one's own body, another person, an object, or a space (or part of space). The notion of rhythm, eventually, is linked to translating a basic recurrent beat or rhythmic pattern in music into physical action (1977:16). What does this mean in the context of play?

Because computing technologies allow for the framing and constructing of motion, in real-time digital games, not only does the player prescribe the movements of the player-avatar (or, more generally speaking, the movements of the player-representation), but at the same time, the software program triggers player movements, detecting collision and scrutinizing whether or not the notational instructions are carried out in an orderly fashion. Reflecting on Labanotation, Pias argues that in this context, we can think of gameplay as a kind of dance (2002:34). Based on Pias, but also on Laban, we can propose a more general and more dialectical way to look at play through the lens of dance. First, a stimulus – which can be a solo event, a beat, or a rhythmic pattern – provides the player with something to respond to or with which to synchronize; in response to this stimulus, the player enacts a movement. This movement (or rhythm) places the player in a novel relation to another player, an object, or a space, possibly triggering a response.

Recently, Laban's system has inspired other notational attempts. For example, in her German language doctoral dissertation, Gesche Joost (2006:65ff.) presents a visual notation system as an alternative analysis and information visualization method for a rhetorically oriented film analysis, intended to serve both as a tool and a language

that transcends the composition of an opus. A notational system similar to that of Laban or Joost that would allow for the recording and even designing of play or gameplay has not yet been fully conceived, but will be an important topic in future game design research.

Analyzing the relationship between bodily actions and the corresponding responses from technology in two Sony Eyetoy games for the Sony PlayStation 2, Loke et al. (2007) have applied, among other movement-interaction frameworks, the Structural Form in Labanotation according to Hutchinson and other specialists in the field. Their contribution draws on the increasingly phenomenological philosophy in interaction design that all human actions, including cognitive acts, represent embodied action and that the bodily experience of movement is a way to access the world and objects in the world (2007:692). This stance of a "lived space," of course, can be traced back to Lefebvre.

The analysis of the two games – a martial arts game and a musical beat mimicking game – operationalized gameplay into four basic actions: (a) selection (a wave gesture movement); (b) striking a moving object against a fixed target (a reach or flick movement); (c) striking a fixed target (a slashing or punching movement); and (d) striking a moving target (a slashing, punching, slapping, or swatting movement). The authors found that the existing notation did not allow researchers to capture the "lived movement as performed through interaction with the Eyetoy interface" (Loke et al. 2007:700). Therefore, the authors extended the Structural Form to include interface aspects, differentiating body parts into Hands, Arms, Upper Body, Legs, and Support for the movement transcription. This extension makes it possible to transcribe gameplay performance in reference to what Labanotation classifies as a "Dab" effort – a movement light in weight, direct in space, and sudden in time. For example, game events are represented alongside the body staff: a circle represents a flying CD that emerges from the center of the screen moving towards the upper right corner of the

screen. In particular with regard to pervasive games that increasingly involve physical body movements, Loke et al. demonstrate how to use Labanotation as an analysis tool and potential game design tool.

Given our human ability to move and to both react to and create rhythm, the discussion of play as movement that follows will certainly resonate.

4.3. Notions of Movement and Rhythm in the Investigation of Play

In his time, German idealist philosopher Georg Wilhelm Friedrich Hegel, who was born in Stuttgart in 1770 and who studied – together with Schelling and Hölderlin – theology in Tübingen, developed a radically new form of logic: dialectic. Dialectic thinking embodies a speculative *Denkbewegung* – in English, a thinking movement. This movement begins when one thinks about something that exists. Then, from the starting point, a difference or "other" emerges. The movement eventually manages to overcome this difference, thereby producing new knowledge and a new starting point. Hegel's dialectic thus not only posits how opposites unite, but also attempts to explain the constitutive movement and process of all things, material and immaterial – of existence itself (Ludwig 1997). Hegel, we could say, is not only the philosopher of movement who interprets perfectly designed thinking in terms of movement and, conversely, moving in terms of thinking; rather, he is also the philosopher whose dialectical moving describes a kind of play – that is, a speculation between thesis and antithesis that culminates in the (temporary) fusion through movement of the two initial opposites in a moment of concrete universality (Mitscherling 1992).

Such a philosophical investigation of play-movement could be criticized as either too esoteric or too speculative (though given Hegel's understanding of speculative

philosophy, this would not so much be criticism as praise). Sutton-Smith would maybe dedicate a chapter to Hegel called, "Rhetorics of Idealism." Hegel's identification of the special relationship between play and movement, however, only guided later thinking, helping to pave the path towards a seminal and phenomenological work dedicated to the study of games, play, and movement: F. J. J. Buytendijk's *Het spel van mensch en dier als openbaring van levensdriften* (1932), published in German as *Wesen und Sinn des Spieles* (Buytendijk 1933). In the following paragraphs, the German language version is used to describe Buytendijk's concepts.

This theoretical work by the Dutch comparative psychological anthropologist presents a structural interpretation of children's and animal's play. Offering many behavioral examples, Buytendijk analyzes how both play and games dialectically transcend the opposition between player and play-other, which can take the form of another player, a plaything, or the environment. Note that this form of dialectical argumentation links Buytendijk to Hegel, although the former does not reference the latter. Buytendijk himself, though, is referenced by Johan Huinzga in the opening pages of *Homo Ludens* (Huizinga 1971:10).

There, Huizinga criticizes Buytendijk for explaining play as a seconding vehicle that serves a biological purpose, arguing that this kind of theory fails to investigate the holistic nature of play and games, what and how they are, and what they mean to the player (1971:12). Given Huizinga's general stance, this is certainly a valid judgment: Huizinga proposes that play and games interrelate with human culture, that they are, fundamentally, the base and factor of culture, finding their expression in myths and rituals, law and order, traffic, handicraft and art, poetry, scholarship, and science (1971:13). Perhaps it is because of Huizinga's unfavorable review – and the wide influence of *Homo Ludens* – that Buytendijk's work appears to have never been properly translated into English and is seldom, if ever, cited by researchers.

The impression Huizinga gives us of Buytendijk is, however, to some extent misleading. Buytendijk does indeed ask: "What is play? What are games? And why do we play?" (Buytendijk 1933:9ff.). And in the foreword to the German translation of his work, Kurt Lewin, a leading modern pioneer of social psychology, underlines the work's breadth of perspective; "weltmännisch," Lewin calls it (Lewin 1933:8), in English, "urbane," arguing that it attempts to explicate the general lineaments of play and games. Of course, Huizinga is right about Buytendijk's biologistical argument, which mainly attempts to illustrate how play and games span human (child and adult) and animal behavior, connecting the two, and how play and games can be interpreted psychologically and anthropologically as expressions of life drives in both humans and animals. Huizinga dismisses this framework as common knowledge (Huizinga 1971:11). But like Huizinga, Buytendijk understands "man as player" from childhood to adulthood, always seeking to understand play as passively expecting or actively seeking luck in life (see a late article by Buytendijk that appeared in the architectural magazine *Deutsches Architektenblatt*, in which he examines the meaning of play and games (Buytendijk 1995)). Yet, for Buytendijk, the "primitive" play and the rule-based game both pursue fictional, "as-if" purposes (Buytendijk 1933:159).

That Kurt Lewin wrote the foreword to the German translation of Buytendijk's book is not a coincidence; before we proceed with a presentation of Buytendijk's work, we must first make a small digression to introduce Lewin's relevant ideas and briefly trace the history of their reception. This will allow us to better appreciate the impact of Buytendijk's theory of play and games and the concept of movement therein.

4.4. Excursus: Movement by Valence and Affordance

Kurt Lewin's early work – the portion on which we will concentrate – is concerned with the stimulative nature of objects and environments in relation to a subject. In the 1930s, Lewin tried to develop a formal, non-mathematical heuristic for psychology. The foundations for this language were presented in English in his book *Principles of Topological Psychology* (Lewin 1936), the first in a series of works dedicated to explaining the situational behavior of a person in terms of the forces (or vectors) acting on him or her. Five years earlier, however – that is, two years before Buytendijk published *Wesen und Sinn des Spiels* in German – Lewin had already published (in German) several major ideas inspired by his experiments with children, cf. Lewin (1931/1982).

Lewin's central idea from this time is best paraphrased (and best known) as Lewin's Formula, a highly influential principle in perception and design-oriented areas of the social sciences:

$$B=f(P,E)$$

where Behavior is a function of the Person and the Environment. Basically, Lewin's formula is an approach to explaining the attractiveness of spaces or objects for motivating behavior in an individual. Lewin's formula builds on the assumption that any given situation models a "force field" in which forces – functional possibilities caused by people, objects, or spaces – act upon an individual from different directions and with different intensities while, at the same time, the individual acts back. To describe a single defining force in such situations, Lewin introduced the term "Aufforderungscharakter," or "stimulative nature," usually referred to simply as "valence."

Valence addresses the phenomenon that properties of objects or environments are either positively or negatively motivating actions and that thereby, objects – including toys, the topic of Lewin's research at the time – and environments trigger movement and determine the direction of behavior in any individual (Lewin 1931/1982:177). The valence of objects and environments can be attractive or repulsive to a person, thereby determining situational movement – for example, reaching for a toy or climbing onto something (ibid.). On a larger scale, valence also causes locomotion from region to region within a field or from one field to another. In all cases, valence adheres to an individual's wants and condition. To describe the sum of force fields in a person's life, Lewin later introduced the term "hodological space." This space can be expressed in the form of a psychologically defined topology in which paths and vectors between fields represent not the shortest paths, but the paths of least resistance (Lewin 1982:66f.).

Note that the concept of the stimulative nature of objects and environments was also the inspiration for Gibson's "theory of affordances" (Gibson 1977), which we mention here to demonstrate the historical evolution from Lewin to today. Yet in this work, we will focus more on Lewin's valence theory.

Using the neologism "affordance," Gibson explains that physical objects and environments have latent and objectively measurable "action possibilities" that allow and animate – i.e. "afford" – an agent to perform an action. Affordances, then, can be thought of as natural relationships between an agent and the world. Action possibilities, then, depend on the agent's ability to recognize these affordances and carry them out. Note that Gibson's reading of allowance implies that an object or an environment can become actionable in virtually every way the agent wants it to and is capable of making it. For example, a soccer ball can be rolled or kicked, but also sat on or used for something less obvious. This plethora of possible relationships between agent and object or environment underlines that in Gibson's reading, an affordance need not be visible.

This kind of natural, objective, and visually-based possibility of interactions between an agent and an object's or an environment's gestalt, surfaces, colors, layout, or textures differs from a second, widely popular approach to the principle of affordance. Norman (1990), in a designerly publication, limits action possibilities to an affordance that is easily discoverable by an individual. Such an affordance "suggests" an activity and, according to Norman, can thus be considered "good" design.

The difference between these two understandings of affordance, although not explicitly stated, can be seen in the Affordance entry in the *Universal Principles of Design*. There, Lidwell/Holden/Butler (2003:20) offer the example of round wheels being more conducive to rolling than square ones and of a door handle affording pulling in that it suggests the act of pulling, by the way of form factor, position on the door etc. Whereas in product design, the designer works with physical objects such as door handles that can have both actionable possibilities and perceived affordances, in screen-based design, designers needs to make sure that "clicking on [the] object is a meaningful, useful action, with a known outcome" (Norman 1999:40).

In addition to the principle of perceivable affordance, as exemplified with the door handle, further design principles for so called "user-centered design" (a term coined by Norman 1990) include the following:

- providing a good conceptual model for the participant, featuring a consistent presentation of operations and results and a consistent system image geared towards the goal of assuring understandability and coherence of design;

- making things visible;

- designing good mappings so that the individual can determine the relationship between actions and results;

- providing feedback for the participant concerning the results of actions (Norman 1990:52ff.).

Norman's work has become a major textbook in the disciplines of human-computer interaction as well as in interaction, graphical, and industrial design. His concept of discoverable affordance has, in other words, become commonplace and well-loved for the way it stresses understanding the participant's goals, plans, values, beliefs, prior experiences, and embeddedness as a kind of ecology that can assist in motivating an agent to interact with an object or an environment (Gibson 1979).

In his philosophical quest to discover a way to create the ideal of an experienced serendipitous space for each individual through dwelling, Otto Bollnow (1963) demonstrates Lewin's importance for architectural building. Bollnow extends Lewin's hodological space, which focuses on paths, with the concept of an activity space experienced by the individual via walking paths, a totality of nodes, and, ultimately, human hands that enable the individual to hold on to and grab objects in space (1963:202ff.). This activity space, Bollnow reasons, requires "leeway,"[9] (1963:210ff.) which designers must grant – for only when they do, and man settles in a space to truly dwell in it, trusting both in the building and in the greater context, can "true living" be achieved (1963:310).

This brief digression demonstrates how Lewin's legacy can be traced not only in psychological disciplines, but also in the context of mediated interactions and in architectural theory. It also provides a rough-and-ready preparation for better understanding the relationship of games and space and the impact of Buytendijk's concepts, some of which we consider cardinal for the study and the design of games. Time and again, we will refer to Lewin and the stimulative nature of objects and

---

9   Note that in the German language original, Bollnow uses the term "Spielraum," meaning "play space" or "play."

environments discussed above. And now, we will end our digression and proceed to introduce Buytendijk's ideas.

4.5. Play as Movement and Putty between Player, Object, and Environment

Based on extensive observation of both children and adults as well as young animals, Buytendijk infers that all play and all games are executed through movements. These movements, he further contends, represent not only a means to an end, but also a substantial component of the ludic activity and as such, can be both "real" and "virtual" (Buytendijk 1933:62).

To illustrate this, Buytendijk discusses the game of chess, which seems to be void of physical, or "real" body movement, and instead features "virtual" movements (1933:63f.). This view roughly coincides with the definition presented at the beginning of this book, which, in accordance with Bartle (2004), defined the "real" as that which is, the "imaginary" as that which is not, and the "virtual" as that which is not real, yet has the effect or form of something that is real. According to Buytendijk, the movement of the chess figure is not actually a physical movement of the body, although it could be argued that moving one's arm, hand, and fingers does, in fact, constitute physical movements. But for Buytendijk, the movement in chess is symbolic and, in being symbolic, virtual: the chess pieces symbolize a real king, a real queen, a real battlefield, etc. Although chess is a board game and, as such, not implemented by a computer, it is nonetheless a virtual game that simulates an environment.

In order for play and/or a game to take place, there must be movement. This movement has its roots in *Bewegungsdrang* – in English, an urge for movement (roughly, motor activity) – composed of two related phenomena: liking to move and needing to move'

(1933:67). Buytendijk identifies qualities of these movements, the most important of which follow:

- All play is play *with* something or someone, and togetherness takes place through movement (1933:44). Without an entity to play with (including oneself), there is no movement and no play.

- The dynamic of all play is created through the balanced alternation between tension and termination (*Lösung*, or solution) (1933:122).

- The dynamic of play has its roots in surprise – that is, the "wayward variety" (1933:115) of the entity against or with whom the player plays. Play means not only that a person plays with something, but also that something plays with that person (1933:117).

- In order for play to take place (through movement), there must be repetitive *Hin und Her*, to-and-fro, between player and play-other (1933:70). The nature of play, then, is rhythmic. That is: play comprises ordered measurable movements between player and plaything. This to-and-fro can take place, for example, within the player; or between a chess player and chess figure; or between a soccer player and soccer ball; or between lovers. Qualities of movement include, for example, intensity, pace, proportion, and pattern, taking place during the amplitude between tension and termination (1933:particularly pages 62ff. and 114ff.). In consideration of our earlier discussion about movement and rhythm in architecture and dance, we can state, then, that play and dance are related by rhythm, and that through rhythm, interaction unfolds, like a dance between two entities. Buytendijk himself considers dance to relate to play in that both feature rhythmic movements, but argues that dance,

like swinging and oscillating, is far more rhythmically explicit in the way that its tension and termination are organized (1933:120).

- Play occurs through an internal drive that seeks deliverance and/or is triggered by allurements in the play-other (1933:100) – that is, "juvenile dynamics" (Buytendijk 1933:114ff.). The desire for environmental and object attachment (1933:146) explains why play takes place in the first place. Rule-based play consolidates play-movements so that games become more ordered – become, so to speak, "adulted" play (1933:151f.).

- Every type of play requires some kind of playing field, and many types of play entail play rules (1933:118).

- The playing field defines the outer borders of the dynamic to-and-fro of play and constrains the movements spatio-temporally (1933:118f.). Note how this concept of the playing field mirrors the concept of the magic circle put forth by Salen and Zimmerman (2004), who borrowed the term from Huizinga (1971) and adjusted it to their needs of their argument.

- Play rules are the virtual inner borders of the to-and-fro that define what cannot happen during play (as opposed to defining what has to happen) (Buytendijk 1933:119).

Even if we do not accept the basis of Buytendijk's argument because it seems all too biologistical, and even if many of his assertions are tied to the study of child and animal play, following the communicative strategy of a "progress rhetoric" (Sutton-Smith1997:42), the qualities of play he lists, taken by themselves, are inspiring and contribute significantly to the contemporary (English-language) discourse in game studies and game design, which has always overlooked Buytendijk, the "other" Dutch pioneer.

Bearing Buytendijk in mind, as well as our discussion of movement and rhythm in architecture and dance notation, we can think of play as an activity tied to movement in which we react to rhythm and strive to act rhythmically. This notion is quite similar to the argument that regardless of whether interacting with toy, puzzle, or game, a player strives to recognize and master patterns because "Once we see a pattern, we delight in tracing it and in seeing it reoccur" (Koster 2005:27). If Koster is correct in saying that "Fun in games arises out of mastery. It arises out of comprehension. It is the act of solving puzzles that makes games fun. In other words, with games, learning is the drug" (Koster 2005:40), then we can elaborate on Buytendijk's work and say that playing is a fictional practice.

4.6. A Kineticist Definition of Play

Let us reconsider the widely cited definition that "play is free movement within a more rigid structure" (Salen and Zimmerman 2004:304) now that we have examined Buytendijk's observations and discussed movement and rhythm in the preceding subsections. Is the definition valid for our attempt to present an architecturally framed definition of play? We propose an alternative view, for which we borrow some of Buytendikj's concepts, sans biologism and drive argumentation. From Lewin, we borrow the idea of valence. And from architecture and dance notation, we borrow the understanding that movement always implies a relation to a particular space, and that in play, it is subject to a possible rhythmization.

To prepare for our definition, we will first discuss the special role of movement in the context of play, following which we will discuss the formal nature of play rhythm.

4.6.1. Play-Movement

In order to strictly differentiate the term "movement" from the concept of "play-movement," we will henceforth refer to the latter as "kinesis", derived from the Greek "κίνησις", meaning movement or motion. Let us look briefly at two alternative uses of the term.

In physics, objects – such as a soccer ball that has been kicked – have extra energy when in motion. This type of energy is called kinetic energy. It is a physical quantity and a function of velocity co-located with the object; it depends both on the inner nature of the object and the relationship between object and so-called inertial frame of reference. Our soccer ball, in other words, is subject to gravity, and when kicked, kinetic energy changes the gravitational field of the ball. In cell biology, the term kinesis denotes the non-directional movement or the illusion of directed movement of a cell or an organism in response to a stimulus like, for example, temperature or humidity; it can also denote a change of activity in that cell or that organism.

In play and the study of play as proposed herein, kinesis refers to all movements, physical or virtual, that a player enacts to relate to a play-other, i.e. another player, a play object, or a play space. Without a play-other, there is no kinesis, and without kinesis, there is no play relationship. At its core, kinesis is a spatial activity because all play-movements imply space. And as opposed to a mere movement, a play-movement is always an attempt to relate to someone or something else. Kinesis thus comprises, for example, pointing, flicking, grabbing, holding, clicking, dragging, pulling, pushing, punching, constructing, maneuvering, walking, running, jumping, stretching, sneaking, ducking, climbing, rotating, aiming, kicking, hitting, combating, assisting, and cooperating, as well as more verbal movements such as trading, bidding, bluffing, negotiating, and, always, imagining.

Unlike creative media such as books or films, digital environments represent space that we can move through: "The computer's spatial quality is created by the interactive process of navigation" (Murray 1997:80). We believe that movement is indeed a central feature of play as a human practice in space that makes it possible to think of play and digital environments such as computer games as being constituted through relational movements.

4.6.2. Play Rhythm

Play rhythm can come into existence via kinetic interactions between player and play-other. In certain cases, the player adjusts to an outer rhythm. Note that the concept of play rhythm differs from the concept of valence. Valence describes positive or negative stimuli. A rhythm describes the process of to-and-fro kinesis between player and play-other.

In our earlier discussion of movement and rhythm we proposed to detail general rhythm types from the point of view of the player. Play rhythmic types, then, indicate how the play rhythm comes about formally, not motivationally. Play rhythmic types express the general play rhythmic relationship between a player and a play-other. We can divide this relationship into the following types:

- **Self-created rhythm:** A player creates a sequence of measured movements over time (for example, whistling).

- **Co-created rhythm:** Together with another person, an object, or a space, a player jointly creates measured movements over time (for example, finger wrestling, playing the piano, playing ball).

- **Extrinsic rhythm:** A player, an object, or a space creates or exhibits measured movements over time (for example, a beat, a pumping, an opening/closing, a landscape for skateboarding).

Play rhythm types are not mutually exclusive and can intermix during play, when, for example, an extrinsic rhythm becomes the basis for co-created play rhythm. Extrinsic rhythms in particular can be either proposed (the player volunteers to adjust movements to a sequence of measured movements) or imposed (the player is forced to adjust movements to a sequence of measured movements). For example, in the videogame *Rock Band* (2007), the player is forced to adjust movements to a sequence of measured movements imposed by the bundled play-object of the console, controller, and display. The difference between proposed and imposed play can be traced in the ways that game rules tightly structure kinesis, creating predetermined gameplay (so called "hard rails") or non-linear gameplay. Jenkins and Squire describe how in the 3D platforming game *Rayman 2* (1999), caverns, bridges, tunnels, paths, and ledges have been designed as "narrative rationales for various constraints on our movement" (Jenkins and Squire (2002:69), imposing the rhythm of spatial exploration. In the case of imposed play rhythms, the tension and termination amplitude will tend to match the waveform of the play rhythm.

Kinetic to-and-fro and play rhythm can emerge in player-player interactions, like the jump interaction between two of the author's students from Tsinghua University's Academy for Art and Design in Beijing, who demonstrate a childhood activity during a pervasive game design workshop. See Figure 3.

Figure 3
Kinesis among participants in a perva-
sive game design workshop conducted
by the author at Tsinghua University in
Beijing in 2007.

Play rhythm can also emerge from kinesis between an individual and an environment.
In the *SimCity* series (since 1989), for example, the player, like a child sitting cross-
legged in a sandbox, is either "attempting to build a city like the one on the [game]
box or actively destroying a successful town with one of the game's built-in disasters"
(Thomas 2007b:211). Alternatively, play rhythm can emerge from kinesis between the
player and an object. This is the case in all toy-play, and in the way children learn to
interact with the world by playing (see Oerter (1999)).

Play rhythm in games can also emerge from interactions between space and space. Consider, for example, the Nintendo GameCube and Nintendo DS game *Animal Crossing* (2002), in which "the gameworld is synched to the console calendar and clock so that events in the game occur simultaneously with events in the real world, including major holidays, weather, seasons and the transition between night and day" (Kelley 2007a:180). Physical toy objects such as Sony's robotic dog *Aizo* react to the player's kinesis of stroking, but also interacts with its environs in that, for example, it perfectly navigates alongside house walls, never walking into them.

Eventually, play dynamic is created from the way that play rhythm relates to the amplitude of tension and termination. In the *Rock Band* predecessor game *Guitar Hero* (2005), the player must tap buttons on a guitar-neck-like controller along to the rhythm of a song represented by dots on "guitar string" lanes. Playing a song thus becomes paying attention to the play rhythm. In this case, the external play rhythm matches the tension and termination amplitude between the buttons, the tension and termination amplitude defined by the song length, and, finally, the smaller (amplitudinal) portions of the song, such as verse, chorus, and bridge parts.

In a first-person shooter, eliminating a rapidly approaching enemy bot requires play-rhythmically firing bullets, understanding the play-rhythmic movements of the bot, and many other kinetic factors, but differs from the overall tension and termination amplitude created by the bot. The overall spawning frequency of bots as well as their distribution in relation to the spatial layout of the game map, however, creates a play rhythm closer to the tension and termination amplitude.

The kinetic processes described above explain how play rhythms are formed. Let us now look at how these formations can be organized alongside the concepts of player, space, and object. If we take space to mean any type of medium, there is a correlation between this three tier model of player-space-object and human-computer interaction

research that empirically investigates how people use or respond to virtually any computing product: "Interactive technologies can operate in three basic ways: as tools, as media, and as social actors" (Fogg 2003:22). Fogg's research is a continuation of the widespread notion that people treat computers like real people, real places, and real objects (Reeves and Nass 1996). Reversing the quotation, we can assert that tool, media, and social actor are the fundamental categories into which we can classify play rhythm.

Such an elementary first-order scheme for play rhythm agency has been organized in Table 1. Note that the arrows express the kinesis between player and play-other: The arrows visualize kinesis, which in turn output kinesis from the play-other. For the purposes of this table, player A plays by herself or himself, engaging, for example, in an intellectual play activity. Meanwhile, player B plays with herself or himself or with an object or space. The table, in other words, understands spectatorship as a play pleasure.

	Player A	**Player B**	**Space**	**Object**
Player A	Player A ⇄ Player A	Player A ⇄ Player B	Player A ⇄ Space	Player A ⇄ Object
Player B	Player B ⇄ Player A	Player B ⇄ Player B	Player B ⇄ Space	Player B ⇄ Object
Space	Space ⇄ Player A	Space ⇄ Player B	Space ⇄ Space	Space ⇄ Object
Object	Object ⇄ Player A	Object ⇄ Player A	Object ⇄ Space	Object ⇄ Object

Table 1
An elementary first-order scheme for play rhythm agency.

Our concept of play rhythm relates to the notion of interactivity in games and play. Sellers (2006), for example, describes interactivity in the context of soft- and hardware:

> *A computer program (or any other device) can be said to be interactive if it: presents state information to the user, enables the user to take action indirectly related to that state, changes state based on the user's action, and displays that new state. (2006:13)*

From a less computer-centric, more ludic perspective, Salen and Zimmerman argue that play implies interactivity in that playing is interacting: when someone plays with someone or something, he or she inherently interacts with that other person or thing[10] (Salen and Zimmerman 2004:58). Based on this assertion, we propose looking at interactivity in play as the potential for a play rhythm.

Our first-order play rhythm matrix can be extended into n-order play rhythms matrices. For example, in order to interact with an object, another object may be needed. Figure 4 shows a dear colleague at an arcade, playing a high-striker attraction called *King of the Hammer*, teaming up with a giant plastic mallet object to strike *King of Hammer's* rubber padded lever object. This situation can serve as an example of second order interactivity.

---

10 Although often defined, interactivity is an ambiguous term whose exact meaning can be hard to capture; a comparison of the very different definitions that have been offered over time reveals as much. In the ground-breaking German book *Interaktivität. Ein transdisziplinärer Schlüsselbegriff*, edited by Leggewie and Bieber (2004), researchers from diverse backgrounds discuss the concept from their individual scholarly perspectives, which range from the anthropological to the psychological. By comparing the book contributions, Leggewie and Bieber find that the term itself is fuzzy, yet profound, varying in definition and usage from article to article. Although their book reveals a lack of definitorial grip, Leggewie and Bieber identify three key terms which appear throughout the contributions and which can function as interactivity's *begriffliche Objektträger* (2004:14), in English, conceptual slide (Raum, Körper und Interface (ibid.), in English, Space, Body, and Interface (translated by spw)). Note how the three conceptual lenses of player, space, and object correspond with the differentiations we have identified in our discussion of movement and rhythm in architectural theory, in dance notation, and in the section dedicated to the notion of play-as-movement and to-and-fro between player and play-other as proposed by Buytendijk.

Figure 4
An exemplary possibility of second order interactivity: A player in action at a high striker attraction, using a plastic mallet to strike the rubber padded lever.

Let us abstract the concept of a second-order play rhythm (which we can then also use to represent any n-order play rhythm) so that we can work with it in design processes. Consider a hypothetical case in which a player plays with an object through another player: i.e. Player → Player → Object. This could be the case in, say, a role-playing multi-player game in which player 1, called *Tinuviel*, asks player 2, *Ragnar*, to please pick up a healing potion on her behalf because *Tinuviel's* inventory is overfilled. To render our notation more exact, we would need the following:

> S = Space
>
> P = Player
>
> O = Object
>
> p = physical

$v = $ virtual

$\rightarrow = $ kinesis

where

S1 (p) $\rightarrow$ P1 (p) $\rightarrow$ O1 (p) $\rightarrow$ S (v) $\rightarrow$ P1 (v) $\rightarrow$ P2 (v) $\rightarrow$ O2 (p) $\rightarrow$ P2 (p) $\rightarrow$ O2 (p) $\rightarrow$ S (v) $\rightarrow$ P2 (v) $\rightarrow$ O3 (v).

Read aloud, this sequence expresses that over time in a physical space 1 (a living room), a physical player 1 (seated on a comfortable couch), who is situated in the virtual world of a game (*World of Warcraft*), uses a physical computer system (a notebook on the lap) to ask a player avatar played by player 2, who sits at his office desk on the other side of the planet, to please consider picking up the healing potion over there as a favor, which, after some consideration, player 2 eventually does. With games that increasingly cross media and are played in both computer-simulated and physical spaces, such a notation can be helpful to describe interaction sequences for both design specification and project documentation purposes.

In this book, this notation serves as a rough sketch and as an example for the many possibilities we have for recording play rhythm over time. Much more thorough future research must be conducted to further develop these ideas.

4.6.3. Play Defined

In conclusion, we propose the following human-centric definition of play, which we will use for building on our prior discussion throughout the remainder of this book.

Play

Play has four dimensions:

- Whether physical or virtual, play is grounded in and executed through movement: The nature of play is kinetic.

- Kinesis bridges a player with one or more players, play-objects, and/or play-environments (or combination thereof) that feature some kind of valence and, in their own ways, play back.

- This dialectical to-and-fro creates and/or adjusts to a play rhythm, which relates to alternations between tension and termination: From both, a play dynamic emerges.

- Play takes place on a play-ground and simultaneously defines that play-ground (i.e. by defining its boundaries in space and time).

Our kineticist and play rhythmic model differs significantly from Salen and Zimmerman's model of free play within a more rigid structure. The model that has been developed here

- explicitly differentiates between physical and virtual types of movement, thereby making it possible to analyze both mediated play and physical play within one framework and from one starting point – namely, motion;

- underlines the relationship of player and play-other (e.g. another player, an object, an environment, or a combination thereof);

- helps us to understand how that with which the player plays has properties that make it more attractive or less attractive to play with;
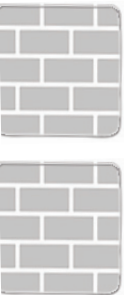
- expresses the rhythmical nature of play dynamics;

- ties the activity of play to a playing-field, giving it space and time;

- enables, from the very core of ludic activity, a discourse about play and games in relation to an architectural design understanding.

4.7. Summary: Kinetic Playspace

In our definition, kinesis defines the real or virtual movement that is embodied and co-located with play. Based on this definition of play, and loosely referring to Lewin's special form of hodological space, we can conclude that every play situation creates a lived kineticist space over time. This kind of time-based space is created by the sum of tos-and-fros between all play elements. If one accepts the condition that "Architecture is the art of moving through space" (Naos 2000), one could even argue that such a kineticist space sculpts a kind of architectural play-frame; at the very least, one can visualize this first and fundamental conceptual dimension of playspace.

We can imagine a number of images that allow us a glimpse at how to capture kinesis, although none of them were produced with the concept of kinesis in mind. Rosemary Fiore has done a number of these long exposure shots of classic arcade games, taping one second of gameplay per frame; in one of her art pieces, we see the kinetic space co-created by the player and the game system of *Tempest* (Atari 1980). To illustrate how the spatial layout of a game such as *Asteroids* (Atari 1979) changes during the course of a level, Jesper Juul contributed similar long exposure shots to *Space Time Play*, cf. Juul (2007:34), see Figure 5. Finally, Figure 6 portraits golfer Natalie Gulbis and the path of her golf swing displayed in a long exposure shot; this image, of course, only visualizes the proximate kinesis of the golf player and golf club, leaving out the golf course and the golf ball's trajectory.
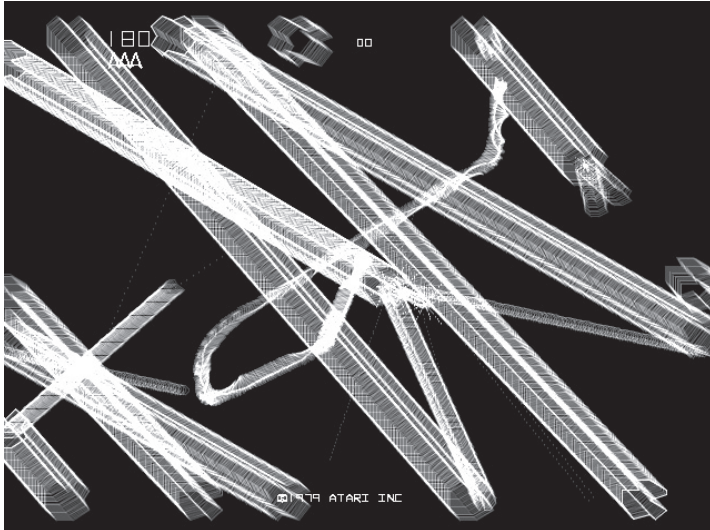
Figure 5
A time-lapse image of the classic video game *Asteroids*, illustrating how the spatial setup changes across a game level. Reproduced by permission from Jesper Juul.

Figure 6
Long exposure shot of professional golfer Natalie Gulbis, showing the path of her golf club. © Donald Miralle. Photo reproduced by permission.

5. The Enjoyment Dimension

The terms "fun" "pleasure," and "enjoyment" are similar in meaning, are often used interchangeably, and appear frequently in conversations about play. In a semantic study comparing their meanings, Blythe and Hassenzahl (2003) find that enjoyment is a context-specific and superordinate term. We therefore use this term in our section's title, in an effort to emphasize the enjoyment dimension of our conceptual playspace. Blythe and Hassenzahl further note that fun is culturally and experientially connotated as a form of distraction, whereas pleasure is connotated in terms of absorption. Nevertheless, the body of research we are using to investigate play uses pleasure as an agreed-on term not only to describe absorption, but also to describe more lightweight attractions. Therefore, we use pleasure throughout this book to imply both fun and "deeper" kinds of enjoyment.

On the basis of the kinetic model of play proposed in the preceding section, we can now pose certain questions that will aid our discussion of the enjoyment dimension: What types of play pleasures can we distinguish? And how can these distinctions help us?

By differentiating among types of play, we can investigate how player and play-other relate – that is, how kinesis can be further operationalized. We do this because we assume that particular play types oblige the player's motivational expectations in a specific fashion[11] (Fritz 2004, on the basis of Lewin's valence and force field theory); that, in other words, understanding play types lets designers please certain player types through design and thereby create suitable playspaces and gamespaces. Towards this design purpose, a number of relevant models are introduced and cross-compared, and a play pleasure model is developed and related to the kineticist argument.

---

11 German: "kommt durch seine Reizkonfiguration den motivationalen Erwartungen der Spieler in spezifischer Weise entgegen" (Fritz 2004:47).

To round up the discussion, other aspects of the enjoyment dimension are highlighted. Three questions are briefly discussed:

- What role does technology have in play enjoyment?

- What types of emotions are triggered by playing?

- How do players become deeply absorbed in a play dynamic; what makes playing enjoyable over time?

All three questions contribute to an architectural framing of play. The first question points out that play often embodies or is created with the help of some kind of technology. The second question underlines the fact that play is an activity that causes types of enjoyment. And the third question reminds us that in order for play sessions to take place over time and truly absorb players, certain requirements must be met.

5.1. Caillois' Play Typology

In his seminal work *Man, Play, and Games*, Caillois (1962) put forward an oft-cited model of four fundamental play categories that builds directly on Huizinga's *Homo Ludens* and attempts to understand play culturally and as a phenomenon that exists both "in and out of games", as Salen and Zimmerman (2004:82) put it. In the book, Caillois divides ludic activities into agôn, games of competition, *alea*, games of chance, *mimicry*, games of simulation and role-play, and *ilinx*, games of vertigo and rapture. Caillois combines the four categories with a conceptual pair that helps to differentiate between wild, freestyle, improvisational play, which Caillois calls *paida*, and *ludus*, or rule-bound, formalized play (1962:27). Table 2 reproduces Caillois' classification of play and games in a simplified fashion, with some examples taken from *Man, Play, and Games* for each cell in the grid.

	AGÔN (Competition)	ALEA (Chance)	MIMICRY (Simulation)	ILINX (Vertigo)
PAIDA	Unregulated sports	Counting out rhymes	Children's initiations, masks	Children whirling, horseback riding
LUDUS	Sports, chess, billiards	Betting, roulette, lotteries	Theater and spectacles	Skiing, mountain climbing

Table 2
Simplified classification of play and games after Caillois (1962).

According to Caillois, *agôn* – which comes from the Greek word αγων, meaning competition – is the domain of play into which activities such as racing and wrestling, but also chess, football, and sports in general fall – i.e. competitive play and games, featuring elements such as combat, confrontation, rivalry, contest, or dueling. All games of *agôn* share the feature that players playing them seek to demonstrate their superiority in specified areas (1962:14).

Alea, from the Latin word for dice, is used to characterize any play that is subject to chance. In games such as betting, roulette, and lotteries, as opposed to games of agôn, "winning is the result of fate rather than triumphing over an adversary." Less structured *alea* activities include, for example, counting-out rhymes (1962:17).

Mimicry describes games and play activities of imaginary milieus and illusory characterizations, in which the player "makes believe or makes others believe that he is someone other than himself. He forgets, disguises, or temporarily sheds his personality in order to feign another" (1962:19). Typical *mimicry* activities include putting on masks, or staging theater plays.

Lastly, *ilinx*, is used to describe play whose aim is to achieve vertigo, i.e. games "which consist of an attempt to momentarily destroy the stability of perception and inflict a

PLAYSPACE

64

kind of voluptuous panic upon an otherwise ludic mind. In all cases, it is a question of surrendering to a kind of spasm, seizure, or shock which destroys reality with sovereign brisqueness" (Caillois 1962:23). *Ilinx*, then, is meant for games or activities that alter one's perception like, for example, dancing or skiing.

5.2. Caillois' Model and Kinesis

Taking into consideration our general play definition and the concept of kinesis, we can trace particular types of kinesis in all of Caillois' categories:

- **Agonal kinesis** includes, for example, athletic movements. Play dynamic is created by the to-and-fro between e.g. a running athlete and a tartan track as well as between competing athletes who watch their moving opponents;

- **Alea kinesis** includes the virtual movements of chance, the movement fate imposes on players, and the to-and-fro between chance results, probabilities, and the player's risk-taking;

- **Mimicry kinesis** includes theatrical movements to stage an illusory character, virtual movement to convert something into make-believe, and the to-and-fro between character(s) and audience that creates a make-believe situation;

- **Ilinx kinesis** includes movements that cause vertigo in the player (such as descending a ski slope), movements made by the player in order to experience vertigo (such as spinning), and the to-and-fro dynamic between, for example, the skier and the steep mountain.

As can be seen, Caillois' categorizations can be framed by the concept of kinesis. In turn, the concept of kinesis fits into and in fact fills out Caillois' four categories. Caillois thus provides a useful foundation for distinguishing play types. And yet, from a designerly point of view, the connection between play, player, and play-other can be further specified. In the succeeding subsection, we will take a look at how.

5.3. Contemporary Models of Play Stimuli and Player Types Cross-Compared

In this subsection, a number of models of play and interrelated player types are presented that both are based on and go beyond Caillois. These models are cross-compared, resulting in a new model, which is then set into relation with the concept of kinesis.

Jürgen Fritz, whose works have never been translated from German into English, has conducted decade-long empirical research into both non-mediated and mediated play and games, using qualitative methods such as player interviewing and playability observations. Based on this research, Fritz has extended and further differentiated Caillois' model of *agôn*, *alea*, *mimicry*, and *ilinx* in an effort to understand why players play. For this purpose, Fritz introduces an empirically based theory, which holds that play and game situations should be seen as "play constructs" combining, in varying intensities, eleven important sources of stimulus. These play constructs, Fritz suggests, can be described as "Reizkonfigurationen" – in English, "stimulus configurations" (SCs), or combinations of stimuli found in the play construct that oblige "the player's motivational expectations in a specific fashion" (Fritz 2004:47). Stimulus configurations can be found in fellow players, in objects, or in spaces (2004:45ff.). Playing, then, is a means of pleasing expectations; and play stimuli can also rouse play.

Fritz' dialectical theory resembles and also corresponds to Buytendijk's play dynamic without referring to it. Buytendijk's to-and-fro conforms with the Fritzian bonding between stimulus configuration and the player's motivational expectation. At the same time, Fritz' argumentation bears striking similarity to Lewin's concept of the positive and negative stimulative nature of object or environmental properties, which was introduced earlier to demonstrate the similarity of Buytendijk's thinking with the development of major design principles in human-computer interaction and general interaction design. In fact, Fritz (2004) mentions Lewin once, on page 171, but only in the context of cultural forces that define how a player experiences play and games. Fritz's model extends Caillois' and merges it with Lewin's, with Buytendijk, metaphorically speaking, standing by.

Fritz's eleven stimuli are described below; Caillois is referenced when appropriate. These stimuli can also be read with the kinetic model in mind: try and imagine what types of play-movement the individual stimuli imply.

- **Contesting:** Fritz suggests placing sports games such as soccer into this category, which Caillois referred to as *agôn*. First-person shooter games also fall into this category, particularly multiplayer game maps.

- **Risk-taking:** This type of play stimulus embodies courage or adventure.

- **Leaving it to chance:** Caillois calls this play type *alea*, but Fritz assigns it its own category.

- **Amusing:** The play situation caters to the player's humor and provides entertainment with, for example, the help of comedy elements.

- **Pursuing vertigo:** Caillois calls this *ilinx*; one example of which is riding a roller coaster.

- **Meditating:** With the help of biofeedback sensors and meditation exercises, games such as the meditation game *The Journey to Wild Divine* (Wild Divine Project 2003), measure player generated psycho-physiological output such as heart beat frequency and skin conductivity as a means of training relaxation.

- **Collecting:** This stimulus centers on completing and/or systematizing a collection.

- **Role-playing:** Caillois calls this category *mimicry*.

- **Savoring:** Fritz means aesthetic and sensual experiences triggered by atmospheres; this category also includes gazing at landscapes and performance situations.

- **Creating:** According to Fritz, the source of this stimulus is the possibility of "transcending oneself"[12] (Fritz 2004, S. 46); in other words, a player can generate, construct, and design.

- **Problem-solving:** A play situation contains a puzzle, a mental challenge, or something to unravel.

Fritz's play stimuli can be compared to the four basic player types that Richard Bartle, designer of the first multiuser dungeon (MUD), has suggested: achievers, explorers, socializers, and killers. In a study, Bartle (1996) found that players often have a primary play style and will only switch styles if it suits them. Whereas achievers want to overcome obstacles and accumulate rewards, explorers want to discover and understand the

---

12 Note that the German term Fritz uses is *Selbstentäusserung*, which would literally translate to self-disposal and which, in both English and German, can also have a negative connotation. In fact, Fritz means to describe a positive feeling and implicitly refers to the concept of flow, which, as we have described, can cause self-detach-ment, cf. Csizszentmihalyi (1990).

gameworld and its mechanics, while socializers want to interact with other players and possibly role-play and, finally, killers want to cause distress to other players or the system. In a Website experiment entitled "playce," conceptualized and launched by the author as an online portfolio in October 2006 at http://spw.playbe.com, Bartle's four basic player types were translated into four miniature arcade games. The playce website is a place to play – hence the name, which combines the words "play" and "place." At the same time, the name is also a play on words. The name of one of the author's companies is "playbe", making playce the natural progression if one follows the western alphabet.

Figure 7 shows a screenshot of the Website's main menu, with stills of the four mini games. There, the visitor can explore projects the author has been involved with during the past years. The visitor can either navigate the playce with a classic navigation / menu bar (on the bottom of the screen) or choose one of the four play modes on the left side of the screen to access the design spaces for which the author has created projects, such as CD-ROM, World Wide Web, or TV series in development. Each game's mechanic caters to a certain type of player while simultaneously serving as a way to navigate the playce Website. In other words, one browses the site by playing, a procedure which could be called, for example, "navigaming" or "playvigating." Once the visitor has carried out a mechanic successfully (e.g. killed, achieved, explored, socialized), she will be taken to her selection. Mind that the visitor can interrupt a play dynamic by moving the mouse from the left side of the screen, where the play action takes place, to the content zone on the right side. The Website combines game and interaction design with media experimentation, all the while posing the question of how play types may serve as interfaces to content, or, put another way, how typical application processes can be made more accessible through the use of game-like interfaces. More generally speaking, the Website is one example of how mini games and play types can be used to serve purposes beyond mere entertainment.

Figure 7
Main menu of the author's portfolio website at http:// spw.playbe.com. Four miniature arcade games let visitors navigate the content by catering to their preferred 'playvigation' mode.
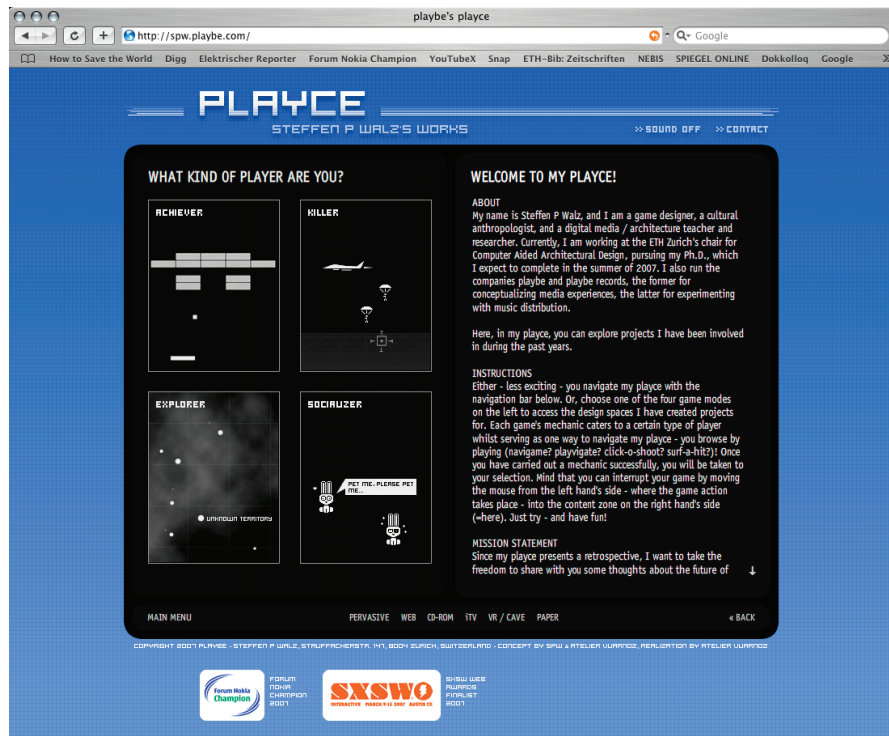
The author did not draw on any explicit navigational inspiration for the Website in the World Wide Web. The Website's interaction metaphor, however, was certainly inspired by a research project carried out in 2001 by Dennis Chao from the University of New Mexico[13]. In the project, Chao modified the popular first-person shooter video game *Doom* (1993) so that it could be used as an interface to an operating system administration task. The mod, called PSDoom, displays representations of UNIX processes instead of letting the system administrator use standard text-mode UNIX tools to view and manipulate these processes. For example, the system administrator

---

13 Cf. cf. http://www.cs.unm.edu/~dlchao/flake/doom/chi/chi.html.

turns into a player who shoots at processes – i.e. "bloodthirsty mutants" – so that eliminating the mutants "kills" the UNIX process. In another example, just hitting a mutant in the game would lower the process priority.

The playce Website takes the idea of using a game-like interface for a certain application task into the realm of the World Wide Web, applying it to the everyday task of navigating – that is, seeking and choosing menu items and content on a Website. In toto, Bartle's player types have been an inspiring model for the playce Website, which has translated the types into navigational patterns.

Another way of differentiating among player types was suggested by Fullerton (2008:92) in reference to a three-part TV series by Kennard, Brown, and The Institute of Play (2000), which addressed player types and pleasures of play by assuming the perspective of the player. Fullerton mentions that her list – which has been fully reproduced here as it appears in her book *Game Design Workshop* – is not exhaustive, and that some of the player types have not been equally addressed by digital games, leaving many new areas of play open for designers (Fullerton 2008:93):

- **The Competitor:** Plays to best other players, regardless of the game

- **The Explorer:** Curious about the world, loves to go adventuring; seeks outside boundaries – physical or mental

- **The Collector:** Acquires items, trophies, or knowledge; likes to create sets, organize history, etc.

- **The Achiever:** Plays for varying levels of achievement; ladders and levels incentivize the achiever

- **The Joker:** Doesn't take the game seriously – plays for the fun of playing;

there's a potential for jokers to annoy serious players, but on the other hand, jokers can make the game more social than competitive

- **The Artist:** Driven by creativity, creation, design
- **The Director:** Loves to be in charge, direct the play
- **The Storyteller:** Loves to create or live in worlds of fantasy and imagination
- **The Performer:** Loves to put on a show for others
- **The Craftsman:** Wants to build, craft, engineer, or puzzle things out (2008:92)

As can be seen, Fullteron's categorization is similar to both Bartle's and Fritz's; Fullerton herself even mentions this similarity to Bartle (ibid.) and explicitly builds on Caillois, whom she discusses in a preceding section. These overlaps make possible a cross-comparison of player types and pleasures, which the author has visualized in Table 3. The table sets the aforementioned categorizations into relation with one another, using Fritz's model as an anchor. At the same time, the table combines Fritz's list with other play and player types derived from both Bartle and Fullerton, as well as new pleasure types, which are written in bold italics. Note that like Fullerton's model, this classification is not exhaustive, but rather represents a listing of major types. There are unlimited ways to ambiguate human activity as play activity; see also our discussion of the ambiguity of play earlier in this section.

Some explanation is needed concerning the play pleasures introduced here:

- **Adventuring:** Like Bartle's explorer, who wants to discover and comprehend the workings of the gameworld, The Explorer in Fullerton's

Caillois (1962)	Fritz (2004)	Bartle (1996)	Fullerton (2008)
Agôn	Contesting	Killer	The Competitor
	Risk-taking		
Alea	Leaving it to chance		
Mimicry	Role-playing	Socializer	The Performer
	Amusing		The Joker
	Meditating		
	Collecting		The Collector
Ilinx	Pursuing vertigo		
	Savoring		
	Creating		The Artist The Craftsman
	Problem-solving		
	Adventuring	Explorer	The Explorer
	Achieving	Achiever	The Achiever
	Directing		The Director
	Storytelling		The Storyteller

Table 3
A cross comparison of player types. Newly identified stimuli in the spirit of Fritz (2004) have been italicized. Note that The Craftsman and The Artist as a person who enjoys producing something new have been joined in this table, since their common goal is to create; however, certain elements of the craftsman (who "wants to puzzle things out") can also be found in the problem-solving category suggested by Fritz.

- listing loves to adventure. This leads us to assume that there is a play pleasure of adventuring.

- **Achieving:** Players who are motivated by incentives and who play to achieve are driven by the play pleasure of achieving.

- **Directing, storytelling:** These play pleasures are those not covered by the other categorizations, but they are mentioned by Fullerton. It seems appropriate to consider narrative and steering pleasures in the context of play as well.

We are only slightly anticipating our discussion of the nature of games when we mention here that our list of play pleasures illustrates the emergence of (digital) game genres. Genres reflect re-occurring combinations of play stimuli. In action games, for example, we find contesting and achieving; in adventure games, exploration and storytelling; and in role-playing games, role-playing or directing.

But let us forget about games for a moment and return to our current subject, play. We will now conclude this subsection by relating the pleasures of play to the principle of kinesis.

5.4. Play Pleasure Spaces

Caillois (1962) suggested four fundamental categories for each free-form and rule-bound play; Bartle (1996) examined four basic player types; Fullerton (2008) listed player types with dominating play preferences; and Fritz (2004) proposed a play stimulus model that we extended in the previous section by complementing it with the stimuli missing from the work of the other authors mentioned here.

From our definition of play as a kind of movement that bridges player and play-other and affords space, it follows that each type of play must embody some kind of play-movement, i.e. kinesis. Table 4 shows a listing of representative kinetic types that correspond to our play pleasures. When enacted during play, they create distinguishable play pleasure spaces, which are listed in the right column.

Play stimulus	Exemplary type of kinesis	Play pleasure space
Contesting	Any movement aiming to outmatch, e.g. hitting or racing.	Contest space
Risk-taking	Movements with limited predictability (i.e. movements whose results are hard to foresee).	Risk-taking space
Leaving it to chance	Movement is only to some extent controlled by participant; instead, play-movement is *imposed*, cf. to the earlier discussion on rhythm in dance notation.	Chance space
Role-playing	Make-believe movements with an assumed self executed, against a backdrop, before the background of an ordinary self, and the condition of knowing the differences between both selves.	Role-playing space
Amusing	Laughing[14].	Amusement space
Meditating	Virtual movements of focusing mind and body.	Meditation space
Collecting	Point to point movement.	Collection space
Pursuing vertigo	Spinning or sloping, for example.	Vertigo space
Savoring	Moving the eyeballs; being moved.	Savoring space
Creating	Movements needed for originating.	Creation space
Problem-solving	Movements that break something down into smaller problems; brainstorming movements; simplification movements.	Problem-solving space
Adventuring	Exploring and boundary seeking.	Adventure space
Achieving	Leveling up.	Achievement space
Directing	Steering and controlling.	Direction space
Storytelling	Conveying events orally, or otherwise.	Story space

Table 4
A listing of representative kinetic types that correspond to our play pleasures.[14]

14 Concerning the "laughing" entry in the Table: it is worth mentioning that in countries like India and China, laughing clubs train members to indulge in "forced" laughter for stress relief. See, for example, http://www.china-daily.com.cn/china/2006-11/08/content_728096.htm.

5.5. Interimsic Summary: Play Pleasures

So far in this subsection, we have determined play pleasure types that cater to the motivational expectations of the player. These pleasure types are the fundamental building blocks for designing play, and they also represent a second dimension of playspace, underlining the feelings of fun commonly associated with play. Whether experienced individually or in combination, play pleasures and their associated kinesis types are important triggers in the emergence of a given playspace. We have collected these play pleasure spaces in Table 4.

Other factors also help define the enjoyment dimension. Three of these will be discussed in the remainder of this subsection:

- The enjoyment of technology.
- Enjoyable emotions caused by playing.
- The enjoyment of absorption (in the sense of immersion).

5.6. Pleasures of Technology

In the introductory countdown section of this treatise, we demonstrated that today, the increasingly digital nature of games coincides with the ubiquitization of digital technologies. Later, in the preceding section, we outlined play as a human, kinetic practice in space. But naturally, we must also consider the role of (computing) technology in the enjoyment of play; that is, consider pleasures induced via technology. Here, we will focus on several representative aspects of this relationship between player and technology:

- The pleasure of the collective unconscious: Technologized play as a way to digitally recycle myths.

- The pleasure of toy-medium: Technologized play affording activity possibility and necessity.

- The pleasure of enabling technologies that allow for "enchanting" novelty.

- The pleasure of exploiting the affinity between computers and games.

The pleasure of the collective unconscious. Is J.C. Hertz correct when she writes that "Videogames are where technology melts into the occult. This is a place where missile launchers and mojo are both legitimate weapons. All the old monsters, harpies, dragons, and divinities are excavated from their mythological sediment, sampled, looped, remixed, crossfaded, and digitally recycled" (Hertz 1997)? Of course, Hertz is referring to Jungian psychology (though without directly mentioning it), which holds that there is a kind of psychic inheritance, a collective unconscious, which consists of so-called archetypes or mythological images. Jung's archetype of the shadow, for example, comprises those monsters and dragons about which Hertz writes. The shadow is an archetype of instinct and irrationality and is therefore innocent because it knows no morals. The shadow archetype first seems to represent the dark side of our lives. But in fact, it allows us to live out and store that which we cannot admit in everyday life. The shadow can be both evil – think of Dr. Jekyll's Mr. Hyde – or a source of creativity. Unsurprisingly, Jung's shadow typically appears in dreams and visions as the ego's opponent (bear in mind that Jung was writing before the advent of the age of personal computers and videogames) (Jung 1990). In this reading, technologized play – and, indeed, play in general – is seen as an ego's unconscious counterpart.

The pleasure of toy-medium. The book *Funology. From Usability to Enjoyment* (Blythe et al. 2004) considers enjoyment from a human-computer interaction perspective and discusses how technologies can cause, support, or lead to enjoyment. In this line of thought, media psychologist Klimmt (2001) considers the stimulative nature of computer game software, finding that interactive entertainment can be considered a synthesis of medium and toy, which, generally speaking, affords the player action possibilities as well as action necessities. Though Klimmt does not investigate the enjoyment that computer hardware or technological form can provide, we would argue that the product design of the hardware also caters to the player's motivational expectation, e.g. in that its form factor affords to hold it in a certain fashion. Learning from product designers, human-computer interaction designers conduct empirical research on how to create emotional reactions with their products, seeking to satisfy, to please, or to appeal (Hassenzahl 2004:41).

Whether explained with the help of Jungian psychology or gestalt psychology, which is most interested in how we relate to objects and environments during play, it is noteworthy that "most of the technology now used in videogames had its origins in military research. When you trace back the patents, it's virtually impossible to find an arcade or console component that evolved in the absence of a Defense Department grant" (Hertz 1997:129).

The pleasure of enabling technologies and the affinity between computers and games. The intimate relationship between games and technology is not the result of military funding alone. Two examples of a computer-game "coupling" serve to highlight this relationship:

- **Enabling coupling:** Technologies drive game development and vice versa. A new technology can enable the development of a new type of gameplay or gameplay element, which can then afford pleasure to its

users. This is particularly true for the not yet consolidated, growing field of pervasive computing, which gives rise to new innovations in sensing, locating, or networking almost every day. For example, traditional gamepad-based input for video games has been revolutionized, and not just for an audience of hardcore gamers; the primary controller for the Nintendo Wii video game console, the Wiimote (short for Wii Remote), can be thought of as a pervasive computing technology. The Wiimote is a three-axis, rotational position, motion-sensing device designed for one-handed wireless (i.e. remote control-style) use. The major technologies used to achieve this form of human-computer interaction are:

- Bluetooth, which enables communication between Wiimote and console;

- an accelerometer and an image sensor built into the Wiimote;

- a Sensor Bar, a second component wired to the console and placed on top of the TV display to enable visual feedback. The sensor bar emits infrared light detected by the Wiimote's image sensor, thereby allowing for accurate positioning and pointing (Wisniowski 2006).

In addition to its input capability, the Wiimote features audio and rumble output capabilities, which enhance controller-based immersion, as well as some memory storage. Although the elements themselves have been around for a while, merging and combining them with well-designed hardware, software, and a gameplay situation involving the player, the player's physical context, and other factors have served to create technological enchantment.

- **Reciprocity coupling:** The most substantial type of relationship between game (as formalized play) and computing technology is a reciprocal one. Juul argues that there is "a basic affinity between games and computers" (Juul 2005:5) in that computers are particularly fit for processing formal play. Wark goes even further, arguing that "all games are digital. Without exception. (...) From the start, games were proto-computers" (Wark 2007:79). The affinity between games and technology affects the way we look at technology: if a formal play situation is perceived positively, then the technology it represents will be perceived positively too. In other words, enjoyment of software influences enjoyment of hardware and vice versa.

5.7. Play-Actuated Emotions

One of the most convincing empirically derived categorizations of the types of fun players experience in games has been suggested by Nicole Lazzaro and her player experience research company XEODesign. Lazzaro and XEODesign focused on what players enjoy most about their experiences of play and how games inspire emotion without using story elements (Lazzaro 2004). Although this book is primarily dedicated to games, we are inserting this subsection here to illustrate that play has a positive effect on players and that this effect is not just the result of play stimuli.

Using qualitative data including video recordings of players playing, player questionnaires, and verbal and non-verbal emotional cues during play, 30 adult players were observed for 90-120 minutes while they played at their regular play locations. A total of 15 friends and family members of the participants remained nearby during the observation sessions and were interviewed. Players played a wide range of popular,

commercially available and professionally produced video and computer games. This meant that the play they experienced was framed by a defined situation not only in terms of playing locale (i.e. living room, console, and virtual gameworld), but also in terms of game rules, input / output possibilities, etc. This kind of well-defined – that is, well-designed – situation is entirely different from the play we have been discussing up until now. Fritz et al. have been trying to come up with a system that allows for a general classification of play, whereas Lazzaro works with commercial products designed to entertain. Still, we are looking at her findings because they allow us to bridge key types of play with experiences of pleasure caused by systematized playing.

Lazzaro's data material was grouped using affinity analysis methods, leading to four key assumptions about player behaviors as well as about processes facilitating or inhibiting enjoyment (2004:2):

> • **Hard fun:** Creates emotion by structuring experience around the pursuit of a goal. Typical players enjoy overcoming challenges, solving puzzles, and strategizing, often aiming for "fiero," or personal triumph.

> • **Easy fun:** Inspires emotion that results from the sheer enjoyment of playing and of being immersed in the play activity. Typical players enjoy intrigue, exploration, and adventuring as well as unusual situations.

> • **Serious fun or Altered states:** Creates emotion through player-internal sensations triggered by the experience of playing, such as excitement, relief, or simply a respite from the everyday.

> • **People fun:** Creates emotions such as amusement or schadenfreude via social experiences such as competition, collaboration, or bonding (2004:4ff).

Returning again to our play pleasure types, we see that some of them fit into the above model, which seeks to categorize players based on the way they experience pleasure. Lazzaro's model, in other words, complements our play pleasure types. Future research could attempt to merge both models with the help of empirical findings.

5.8. The Pleasure of Immersion

The psychological concept of "flow," which was introduced by psychologist Mihaly Csikszentmihalyi (1975, 1990), attempts to explain how a person can become deeply and delightfully absorbed in an activity and thereby sense true pleasure. As discussed earlier, the concept is vaguely echoed in Iain Borden's analysis of the lived skateboarding architecture, which holds that architecture, when enacted by and between a skateboarder and his or her terrain, is "not a thing but a flow" (Borden 2001:9).

Csíkszentmihály observed that people can reach an enjoyable state of mind in which they are maximally productive only if the challenges they must overcome are not too easy. If the challenges are too easy, people tend to become bored; if the challenges are too hard, people become apprehensive. Csíkszentmihály found that an experience of flow is accompanied by the following[15]:

> 1. Clear goals, i.e. one's expectations are attainable and the rules of the situation are discernible.
>
> 2. Concentration and focus, so that no other activity interrupts the immersion.
>
> 3. A loss of feeling of self-consciousness.

---

15 Note that Csíkszentmihály proposes that not all of the factors need to be present in order for a person to experience flow.

4. Distorted sense of time: one's experience of time is altered.

5. Direct and immediate feedback, so that one can adjust behavior according to apparent successes or failures.

6. Balance between ability level and challenge.

7. A sense of personal control over the situation or activity.

8. The activity is intrinsically rewarding, i.e. actions become effortless.

9. People become absorbed in the activity – action and awareness merge.

<div align="right">(Csíkszentmihály 1975:72)</div>

Csíkszentmihály's notion of flow is an oft-cited, almost common denominator for managing difficulty in play and game situations. In order to maximize player enjoyment, and in order to enable players to enter into a state of peak productivity, game designers seek to balance anxiety and boredom, often dynamically over time. Adams and Rollings (2006:376ff.) suggest that this can be achieved by adjusting the perceived difficulty of the game by programming the intrinsic skill required by a challenge, the stress of time pressure, the amount of power the game gives to the player to overcome a challenge (e.g. the avatar's resistance to damage), and the player's in-game progress and gathered experience in dealing with challenges and interface.

The model of flow, and particularly the way Adams and Rollings adapt it (though only for the particular case of formalized, complex play), underlines the fact that a playspace can come about not only in terms of movement, rhythmic relation, positive valence, and caused emotions, but also in terms of perceived difficulty, shaping tension, and termination amplitudes.

6. The Culture and Context Dimension

So far, we have noted that play – or even a play rhythm – occurs if an expectation is met or an emotion is roused by a play-other, which can be another player, an object, or a space. We have categorized play and categorized pleasures resulting from play, and we have also discussed how enjoyment of play is subject to difficulty level and that enjoyable play results in distinguishable emotions. But what role does the context of the play-other play in the enjoyment of play, and more generally, the existence of play at all?

To answer this question, play-ground designer Barbara Hendricks assists us. In a (landscape) architectural approach to designing playgrounds, Hendricks (2001) points out that play for children should be designed from a "child's eye" view of the world. She writes:

> *Good design for children's outdoor play is possible – but it means challenging many of the prevailing adult ideas about outdoor landscapes. Designers find it difficult to talk or write about their plans and expectations in terms of children's behaviour at play. They are trained to work with and think about physical structures and facilities rather than about the behaviour of the user of these spaces. Professional designers often see their role as educating the "unsophisticated" public.*
>
> *When we look at the kind of places children choose to play in when it is possible to choose, these places tend to have an appearance of being forgotten or vacated by adults. They look somewhat unkempt. They may be places that have just grown up with little or no help from a landscape designer. Children seem to like places that look un-designed. That children*

> *choose these places is not to suggest that children prefer environments*
> *with a lower quality of material or that they have a preference for nature.*
> *Children also love to play in garbage dumps if they are allowed to do so.*
> *What they like is the non-predictability of these non-designed landscapes*
> *(Hendricks 2001:90f.).*

Hendrick's finding reminds us not only of the importance of player-centric design and of how predictability can influence the child – and adult – player.[16] Hendricks also underlines how an environment pleases a player's motivational expectation through a phenomenon, which we will subsume under the general heading designedness of valence. Given our identification of three distinct play-others – another player, a play-object, and a play environment – we can now address the following three questions:

- How does the designedness of another player affect play via, for example, acquired patterns of thought, behavior, or taste, which are expressed, for example, in habitual use of language, dress codes, etc.?

- How does the designedness of an object affect play?

- How does the designedness of an environment affect play?

The three questions are formulated to provide the designer-reader with a kind of checklist. But for the sake of the argument's flow and as a result of our concentration on the conceptual play-space, we will here focus only on the last question.

One way to frame the designedness of a given space with regards to its attractiveness as a play-ground is to identify design properties. These properties interplay with the concept of valence in that they set the stage for valence possibility. In the case of

---

16 Note that console games are, at least visually and aurally, fully designed environments wherein even unpredictability is predictable given that the player knows and comprehends the rule base and event catalog of the game.

environments, these properties can be, for example, aligned on a continuum of opposites. Continua for the designedness of an environment include:

Natural - Designed.	Loose - Firm.
Pre-existing - Purpose-built.	Unsheltered - Sheltered.
Vegetated - Unvegetated.	Unlined - Lined.
Deserted - Crowded.	Unmarked - Marked.
Accessible - Inaccessible.	Disproportioned - Proportioned.
Silent - Performed.	Uncomposed - Composed.
Odorless - Scented.	Unstructured - Structured.
Daylighted - Artificially lighted.	Rural - Urban.
Naturally shaded - Artificially shaded.	Private - Public.
Unkempt - Maintained.	Outdoor - Indoor.
Inhabited - Abandoned.	Dangerous - Safe.
Empty - Filled.	Physical - Virtual.
Sparse - Dense.	

Note that these continua are non-exclusive; that means that a rural environment can be quite composed – think of plow furrows and how they draw patterns into the ground. Also, note that this exemplary list of continua is not exhaustive, and that there is no point trying to prove non-empirically how any of these pairs of opposites work as an attraction or repulsion factor in play situations. Yet designers need to consider these opposites when designing for play and also to consider potential conflicts, especially when working with pre-existing environments.

For example, a pre-existing physical urban environment that is maintained and inhabited will be used according to certain programs. A European pedestrian city core, for example, is typically home to several public plazas, several flat green spaces, often with fountains, several broad, often tree-lined streets with seating possibilities, and numerous restaurants, stores, and public as well as company buildings alongside them. Such an environment affords certain activities such as, respectively, meeting and gathering, relaxing and gazing, leisurely walking, standing, and gazing, lunching/dining, shopping, and going to work. From a play-ground perspective, a green flat lawn also affords "running, games, throwing balls, a place to build up something, a place to lay in the sun, a place to talk with friends" (Hendricks 2001:93).[17]

The inherent play stimuli of the green space conflict with the aspects of its regular, city core program. No wonder that in urbanized areas, play has been confined to dedicated, controllable playgrounds (see for example the DIN EN 1176 / 1177 standards, which regulate the construction, safety testing, and maintenance of playground surfacing and equipment in most EU countries[18]). In fact, in Germany, larger housing projects must be planned to include a playground facility. In the inventory of "play-grounds" introduced later in this work, children's playgrounds are discussed in more detail.

Most importantly, the designedness of an environment – or an object or another player – is not only a question of design culture, but also of how the potential playground is embedded into a certain culture of norms, values, and other more everyday behavioral scripts. In that, the designedness dimension of our play-space also reminds us of the cultural dimension of play – of how a space is always embedded into contexts.

---

17 Video game designer Keita Takahashi, creator of the PlayStation 2 ball-rolling puzzle-action game Katamari Damacy (2004) – from the Japanese 塊魂, or Katamari Damashii, literally, "clump spirit" – envisions designing undulating physical playgrounds in order to overcome the traditional playground's flatness (cf. Hermida (2005)).

18 Cf. http://www.din.de.

7. Conclusion: Playspace

In the preceding section, we developed a new theoretical model of play that is architecturally framed, psychologically based, and formulated along dimensions of a conceptual playspace.

We highlighted the ambiguous nature of play as well as the special role of the player; then, we investigated how play has its roots in and is executed through movement by and between player and play-other, creating play rhythm, and that play always has boundaries in time and space. In addition, we derived the notion of movement and rhythm from the fields of architecture and urban planning as well as from dance research and from the pioneering work of F. J. J. Buytendijk (1933).

We then developed play pleasure types by way of a cross-comparison of classical and current play pleasure and player type models. We thereby illustrated that play not only caters to the player's motivational expectations, but that it also interrelates with the technology through which it is presented. Eventually, we examined how play actuates emotions and discussed the fact that the enjoyment of play depends on the activity's degree of difficulty and on the designedness of the play-other. In the latter discussion, we looked at exemplary factors that define the context and culture, i.e. designedness of potential "play-grounds."

On the basis of this new model of playspace, we can now move on to frame games architecturally, thereby approximating a conceptual gamespace.

GAMESPACE

Games and play are interrelated phenomena. Salen and Zimmerman, for example, argue that games are a subset of play in that they formalize play, on the one hand, and on the other hand, that play is an essential game component (Salen and Zimmerman 2004:303). Without one or more players, there is no play; and without playing, the formal system of a game is not set in motion, but sits idling. This reciprocity is complemented by the concept of "meaningful play": in games, players can participate with "designed choices and procedures" (2004:60), and these programmed choices are made explicit to the player, like following the rules of a board game or using a game controller to move an avatar. Player choices result in game system outcomes, and the relationships between actions and outcomes are specified by rules. In digital games, these rules "are buried in layers of program code and are often difficult to identify" (2004:148). From these action, outcome units, interactive meaning, and, in turn, meaningful play arise (2004:63).

Other research further complicates the peculiar relationship between play and games.

Game theorist Jesper Juul, for example, holds that games contextualize play actions, and that in games, rules facilitate actions by differentiating between potential moves and game occurrences (2005:18f.). Raph Koster, lead designer of the massive multiplayer role playing game Ultima Online, suggests that playing a game implies pattern recognition, and that playing a certain kind of game involves recognizing and learning to master a particular kind of pattern (Koster 2005:36). In a likewise pattern-based approach to game design research, researchers Björk and Holopainen write that "playing a game can be described as making changes in quantitative game states, where each specific state is a collection of all values of all game elements and the

relationships between them" (Björk and Holopainen 2005:8). Rules, in this reading, limit the actions a player can take while playing as well as limiting the game's boundaries, thereby governing how game components are instantiated in the game (2005:15). Furthermore, players perform actions in a game through varying modes of play, which are associated with goals, achievements, and other game components.

For example, in the game *Pac-Man* (1980), the player can play either in a single- or two-player mode. The player moves the ever-moving Pac-Man up, down, left, or right to change direction, or until a wall is hit; on a higher action level, the player avoids ghosts, eats pills, and hunts ghosts after eating power pills. Direct interaction gameplay and cut scenes after loss of a life offer alternating modes of play (2005:28f.).

Maybe it is precisely because the relationship between play and games is quite staggering that there are so many definitions of games, each with its own shortcomings and strengths, as Björk and Holopainen note. They themselves refrain to define games and instead offer an entire game design pattern systematics and all its implicit assumptions (Björk and Holopainen 2005:8).

What is the solution to this jungle of definitions? To add another definition? How can we architecturally approximate games?

From our model, we see that the conceptual game-play relationship builds on how the kineticist relationships between player and play-other are regulated and limited and how valence triggers play. Salen and Zimmerman's aforementioned model of meaningful choice somewhat resembles our concept. In our discussion, though, we have accentuated the notion of space:

> - We have derived our definition of play from movement in space and the way that the player plays with a play-other (which can be a space).

- We have shown that the concept of play rhythm is spatial at heart in that it builds on measured movements over time.

- We have demonstrated that fundamentally, play-as-movement affords a space where play takes place over time.

Taking this architecturally framed notion of play as a starting point, the following relational roadmap traces a plausible path towards the architectural framing of games:

a.) In the following section, we will first review and update existing notions of space and spatiality in digital games based on recent game and game design research as well as on architectural research. The goal is to map a conceptual gamespace.

b.) We will then suggest an analysis framework for investigating the spatiality of games, in which the filtered dimensions are set into relation with the dimensions of playspace.

c.) Finally, in the main section, we will use this framework to critically and essayistically discuss "play-grounds," i.e. prototypical and historically persistent spaces of play and gameplay.

Throughout the discussion, we will refrain from explicitly defining games. But by the mere fact of following this roadmap, we are creating a defining spatial discourse that leads toward a ludic architecture.

1. Approaches to Space in Game Design Research

Given that games formalize play (a *human practice in space*): What are the dimensions of a conceptual gamespace? In order to answer this question, in this section we will frame gamespace by reviewing recent and architecturally relevant works in the field of game design research as well as by looking at architectural research concerned with the role of space and spatiality in games. The goal of these reviews is twofold: To filter the major existing contributions towards a spatial understanding of games, and to identify the shortcomings of those contributions.

We will focus on the following approaches from the field of game studies and game design research:

- the concept of the **magic circle** in which games take place as well as a game's **space of possibility** (Salen and Zimmerman 2004);

- the notion of spatiality in digital games as an **allegory** of physical space (Aarseth 2007);

- the view of games as **narrative architectures** (Pearce 1997; Jenkins 2007; Murray (1997));

- the understanding of digital games as the art of **contested spaces** (Jenkins and Squire 2002);

- attempts towards a **typology** of computer gamespaces (Wolf 2002; Boron 2007);

- the discussion about the role of **perspective** in digital games (Manovich 2001; Schwengeler 2008);

- the use of architecture as a tool to **analyze the spatial qualities** of games (McGregor 2007);

- **functionally** inspired frameworks of gamespace (Adams 2002; Küttler 2006).

Note that the body of research in this area is still limited. All cited discourses are based on publications in conference proceedings or book chapters or sections. So far, there is no integrated, full-length theory of spatiality or space in games, not to mention an overview like the one we are about to present. Nitsche (2008), albeit a major achievement, focuses on the use of 3D graphics in video games, asking how and through which qualities particularly the third dimension achieves to generate fictional environments in the player's imagination." Also note that the term spatiality is used particularly in relation to the Lefebvrian and associated notions of lived space (Lefebvre 1991).

Next, three recent approaches from the world of architectural research are highlighted:

- A rhetorical discourse claiming that architectures turn into games.

- An experimental approach that uses game technologies to create architectural virtual reality models.

- A cross-disciplinary discourse meant to pair the two design disciplines of game design and architectural design, framed with the help of the book *Space Time Play* (Borries/Walz/Böttger 2007), which was co-edited by the author.

1.1. Space of Possibility and Magic Circle

In their magnum opus *Rules of Play. Game Design Fundamentals*, Salen and Zimmerman (2004) developed two spatially inspired concepts that are relevant to our discussion.

1.1.1. Space of Possibility

A game designer creates game rules and a game structure and defines the context of a game. The designer thereby constructs, indirectly, a "space of possibility" (Salen and Zimmerman 2004:67). Salen and Zimmerman coin this term to express a number of concepts:

- the nature of a game as a designed context;

- all possible game actions that can occur during gameplay;

- all possible meanings that can emerge from the game design;

- all possible relations between game elements that render a system;

- the interactive functioning of this system, which allows for navigation and exploration (ibid.).

The space of possibility, in short, describes the fact that games are interactive systems that create meaning through player action and that a game structure can play out in many ways, some of which are unpredictable. Salen and Zimmerman do not provide a more formal or mathematical definition of their umbrella term; the space of possibility, although charming as an image, remains vague, as it mixes a variety of dimensions that would be hard to compute or visualize. Therefore, the concept – which represents

so holistic an approach that it can no longer really be applied in a concrete way – will not be further exploited in the following sections.

1.1.2. Magic Circle

The magic circle is an idea introduced by Dutch anthropologist Johan Huizinga, adapted by Salen and Zimmerman (2004:94ff.) and since then widely discussed and accepted in game studies and game design research, cf. Adams and Rollings (2006:7). In *Homo Ludens* (1971), Huizinga writes that

> *All play moves and has its being within a play-ground marked off beforehand either materially or ideally, deliberately or as a matter of course … This arena, the card-table, the magic circle, the temple, the stage, the screen, the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e. forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to the performance of an act apart (Huizinga 1971:10).*

Although the magic circle is only one example in Huizinga's list of "play-grounds" and is referred to as an equivalent of ritualistic spaces, Salen and Zimmerman use it as a shorthand to describe how games create special – we could say contractual, i.e. rule-bound, voluntary, and agreed upon – distinct places in space and time that feature boundaries. The concept of the magic circle adumbrates "in a very basic sense (...) where the game takes place" (Salen and Zimmerman 2004:95).

The concept of the magic circle may seem vague at first, but can be exemplified: Games as a framed reality of their own safeguard the player from an external reality; see Crawford, who asserts that "Conflict implies danger; danger means risk of harm;

harm is undesirable. Therefore, a game is an artifice for providing the psychological experiences of conflict and danger while excluding their physical realizations. In short, a game is a safe way to experience reality" (Crawford 1982/1997:Chapter 1). When entering the reality of a game, a player crosses the frame, i.e. the boundary of a game. When pausing a game and resuming it shortly thereafter or a year thereafter, the player steps out of the magic circle of the game and its formalized activities (Salen and Zimmerman:95). Thus within or inside the magic circle, there is a game; without or outside the magic circle, there is no game.

Notice how the concept of the magic circle seems to serve as a means of separating the "real" world from the "gameworld," as if games were safe havens. In fact, this protectionist view declares games to be non-secular, special, and ultimately, holy. Oerter (1999:17f.) argues that games and rituals are related phenomena and that we can observe overlaps between the function of rituals in games and the function of rituals in religious practice. Rituals are signified by both repetitive behavior and self-aggrandizement; they appear to have clear phylogenetical roots – that is to say, they are biologically founded. Paradoxically, rituals set up a rigid, secondary structure prescinding us, Oerter argues, from the uniformity of everyday life in order to help us deal with our existence. Quotidian uniformity is therefore temporarily and spatially replaced by ritualistic uniformity expressed through existentially heightening activities such as playing or worshipping.

Salen and Zimmerman's concept of the magic circle is the equivalent of our kineticist notion of the play-ground that springs forth from the activity of play. But Salen and Zimmerman reserve the magic circle category solely for rule-based play, thereby diminishing the role of playing for the sake of formalization. Still, we can name this approach to space in games the **locative** approach to gamespace.

1.2. Allegory

Pioneering ludologist Espen Aarseth has stressed that "the defining element in computer games is spatiality" (Aarseth 2007:44), arguing that computer based games are essentially concerned with representing and negotiating spaces and, more to the point, that spaces in digital games are allegories of physical space: "They pretend to portray space in ever more realistic ways, but rely on their deviation from reality in order to make the illusion playable" (2007:47).

Aarseth does not expand upon the original meaning and usage of the term allegory, but we will now do just that, as it is important for this discussion. In the classic academic discipline of rhetoric, the allegory – from the Greek *eirein*, meaning to speak – is the rhetorical figure of false semblance, i.e. of extended and sustained metaphor. The metaphor, for its part, can be defined as a comparison made by referring to one thing as another. A textual example of a metaphor is, "Life is a beach."

An allegory, by rhetorical definition, is an extended or sustained comparison made by referring to one thing as another. In Roman rhetoric, the allegory was known as the Latin words *allegoria* or *permutatio*, and Quintilian, an orator and course book author of the 3rd century A.D., considered the allegory a conceit (Fuhrmann 1990:129). Allegories often appear over the length of a whole discourse or piece of content. To return to our previous example, "Life is a beach," consider that a novel about life would take place at a beach and, in describing beach situations, would actually refer to life situations such as birth, sleep, hunger, love, and death.

According to Aarseth, a gamespace is but a reductive operation that leads to a representation of space that is not spatial in and of itself, but symbolic and rule-bound. A computer game, then, represents a set of automated rules expressed in space. This

reductive operation, which constitutes the gameworld always as an allegory of space, has one objective, argues Aarseth: to serve (and to defer to) gameplay (2007:45). In more architectural terms, we could say that a given gamespace renders the game's rule base and programs gameplay. Adams suggests that "Games, whether computerized or not, may be thought of as lying along a continuum between abstract and representational. The more abstract the game, the more it relies on arbitrary rules to define the game world and the gameplay. The more representational it is, the more it relies on similarities between real-world situations familiar to the player, and game-world situations." (Adams 2003:2).

As we work towards achieving our goal of framing gamespace, we will term this approach the **representational** approach to gamespace.

1.3. Contested Space

"(...) most often, critics describe games as narrative art, as interactive cinema, or participatory. But perhaps we should consider another starting point, viewing games as spatial art with its roots in architecture, landscape painting, sculpture, gardening, or amusement-park design (...). Game worlds are totally constructed environments" (Jenkins and Squire 2002:65). Putting aside the question of whether or not computer games can be qualified as "art", as we are not concerned with it here, let us focus on the fact that Jenkins and Squire consider the totally constructed digital environments of games to be hybrids of the following "contested spaces" (ibid.):

- Sports, in which players often contest over goals or respective positions on a field.

- Board games, in which contests are won and lost depending on movements on the board.

- Literary and cinematic works that climax in spatial contests such as shoot-outs or space battles (ibid.).

Jenkins and Squire further argue that computer gamespaces, as totally constructed environments of contest, offer affordances, encourage activities such as exploration, provide resources, effectively evoke emotions, and, overall, provide a stage that programs play. We agree with many of their observations, some of which resemble, from the point of view of play, topics that have already been discussed, such as play pleasures. From a narratological perspective, their suggestion that games constitute a mix of sports and story is all the more convincing when highlighted by another source: "The most common form of game – the agôn, or contest between opponents – is also the earliest form of narrative (...). The Greek word agôn refers to both athletic contests and to dramatic conflicts, reflecting the common origin of games and theater" (Murray 1997:145).

Being less etymologically minded, we consider it highly questionable that all digital games contain contests, especially considering of our discussion of play pleasures. We are also skeptical of the assertion that all games are inspired by sports. Consider, for example, activities such as role-playing or exploration, which do not necessarily involve the attempt to beat an opponent.

The most valuable observation, in my opinion, is made by Jenkins and Squire when they argue that some games have "hard rails" while other games have "soft rails." The former tightly program the player's movements, while the latter allow for multidirectional play (2002:69). Some games consist of predetermined paths that a player must follow in order to reach an objective; others program the player to explore solutions using many different paths and often feature various alternate endings. Game environments, in other words, can be divided into proposed promenades and imposed promenades.

Overall, however, Wigley is right, even where emergent gameplay is concerned: "To choose a game is to choose an architecture (...)" (Wigley 2007:484). If we think of digital games as totally constructed environments, we can think of this approach towards gamespace as the **programmatic** approach, the approach closest to Le Corbusier's *promenade architecturale* in that it traces the actual process of gameplay during a game – traces, that is, how kinesis and play rhythms are organized over time.

1.4. Narrative

It has been argued that not all games have stories and that though many games have narrative ambitions, it is unlikely that they will tell stories the way other media do. In the pioneering *Interactive Book. A Guide to the Interactive Revolution* (Pearce 1997), my colleague Celia Pearce coins the term "narrative architecture". Pearce argues that architects, when designing a building, knowingly or not, create "nonlinear experiences with variable paths or outcomes." (1997:26) Pearce extends her argument, looking not only at physical architecture as a medium - a "spaceplay" (ibid.) the designer has come up with – but also at virtual spaces, multimedia works and games; the latter which, from her perspective, can be aligned with theme parks. Players, so to say, enter an environment, visit locations in a certain order and begin to make use of the space so that it comes alive. Games can thus be seen as narrative spaces in which storytelling takes places environmentally (Jenkins 2007). Jenkins claims that there are at least four ways that "spatial stories can evoke preexisting narrative associations; they can provide a staging ground on which narrative events are enacted; they may embed narrative information within their mises-en-scène; or they provide resources for emergent narratives" (2007:57).

Jenkins not only points out that narrative possibilities can be mapped onto and into gamespace, but also that games are often embedded into larger narrative systems that

communicate story information with the help of books, comics, films, and other media (2007:57f.). This model reveals that the narrative space of games unfolds within the games themselves, but also around the games and that the way a game's story is told environmentally has both functional and structural implications.

In *Hamlet on the Holodeck*, Murray argues that digital environments such as those in digital games feature four unique and essential properties: they are procedural, participatory, spatial, and encyclopedic (Murray 1997:71). According to Murray, digital environments are procedural because the defining, intrinsic ability of the computer is "to execute a series of rules" (ibid.), which are fed into the computer engine in the form of algorithms and heuristics. Murray further holds that digital environments are participatory because they are responsive to input – an observation that, when considered together with computers' inherent capacity to process rules, "is what is most often meant when we say that computers are interactive" (1997:74). Digital environments represent space we can move through: "The computer's spatial quality is created by the interactive process of navigation" (1997:80). Finally, the infinite expanses of digital environments, all potentially networked, enable their fourth characteristic – namely, that they induce encyclopedic expectation whereby "all the world's resources seem to be accessible, retrievable, immediate" (1997:84). Both Jenkins' and Murray's framework allow us to look at digital games as narrative, dramaturgical spaces.

Pioneering adventure games such as *(Colossal Cave) Adventure* (1976/1977) or *Zork* (Infocom 1980; originally developed by MIT students 1977-1979), for example, are presented entirely textually and serve as outstanding examples of the way game uncertainty is organized spatially and fictionally and the way a game can be viewed as an integrated narrative gamespace. Both *Adventure* and *Zork* exemplify Jenkins' claims that spatial stories can evoke preexisting narrative associations. In *Zork*, for example, the player encounters a text-only interactive underground world filled with technological and fantasy elements. "The surroundings particularly enrich the game and

give context to the puzzles and figures encountered, providing backstory and helping to defamiliarize the everyday" (Montfort 2007:65). Both *Zork* and *Adventure* can be said to be strongly narrative in that they are quite textually descriptive and that their stories are embedded into their mises-en-scène. Though Jenkins doesn't mention it, there is also a technological explanation for the latter phenomenon: both *Adventure* and *Zork* took advantage not only of the then prevalent command line paradigm, but also turned a weakness into a strength by turning the uncertainty created by the textuality of both games into a positive experience of exploring both game narrative and gamespace.

Murray analyzes *Zork* in the context of her properties of digital environments, considering the game to be a fantasy world of dungeons that responds to typed commands. Based on *Zork*, Murray suggests that the key to creating a compelling participatory narrative world (something we would call positive valence) is to script the interactor – in our terms, to provide a formulaic, comprehensible, and usable repertoire of play-movements like, for example, "Go north," "Open the window," and "Drink water," and to further extend this repertoire (Murray 1997:79). At the same time, *Zork* is traversable; its space is navigationally created by the interactor (1997:80). An event in *Zork* such as a trapdoor crashing shut after the player has gone "Down" through it is directed at and caused by the player – that is to say, the play-other responds in a surprising way. Together, participation and navigation on the basis of the computer processing rules co-create dramatic power, or that which we could call the **dramaturgical** approach to gamespace.

In contemporary digital games, we can find an abundance of Murray's encyclopedic property. In the interactive and cross-media fictions of Alternative Reality Games, players visit Websites to find clues, use databases to research puzzles, and chat with other players to collaboratively solve the fiction's challenges. In fact, these games require that all the world's resources be accessible, retrievable, and immediate in order for the narrative to successfully unfold.

1.5. Typology

In a manner similar to Jenkins and Squire (2002), who were mentioned earlier in the Contested Space section of this book, Wolf examined screen-based digital gamespaces, concentrating on gameplay modalities reflected by visual representation (2002:51ff.). Though later, Boron critically extended Wolf's observations (2007), Wolf was the first to attempt to set different representations and particularities of gamespace into relation, and name them. In the chapter "Space in the Videogame" of his book *The Medium of the Videogame*, Wolf lists eleven types of gamespaces, ranging from no visual space/all text based, to interactive three-dimensional environments:

- One screen, contained.

- One screen, contained, with wraparound.

- Scrolling on one axis.

- Scrolling on two axes.

- Adjacent spaces displayed one at a time.

- Layers of independently moving planes (multiple scrolling backgrounds).

- Spaces allowing z-axis movement into and out of the frame.

- Multiple, nonadjacent spaces displayed on-screen simultaneously.

- Interactive three-dimensional environments.

- Represented or "mapped" spaces.

Wolf's typology is inconsistent, although it manages to comprehensively map the historical evolution of gamespace from text spaces to one-screen spaces to 3D environments. In an attempt to formulate a spatial taxonomy, Wolf mixes qualities of gamespaces such as depth of space and point of view or traversability/navigation and representation of space. But though he mixes diverse spatial qualities of game experiences within his analysis, Wolf does not foresee or at least discuss mixed types, i.e. hybrids. Combinations of types 4 or 5 with 6 are, however, quite frequent, in this case serving as the basis of a typical sidescrolling Jump-and-Run game. Boron (2007:28), for example, complements Wolf's rather rigid – but, all in all, helpful – typology by introducing more types of gamespaces, like, for example, isometric yet 3D-look-alike gamespace.

Still, a **typological** approach to gamespaces should reflect the many different ways a game can take place with or without the assistance of computing technologies. Note that the cited authors discuss digital display-based, i.e. visual spaces only. Adams (2003:4f.) mentions that even in digital games, we cannot think of visual space without auditory, tangible, olfactory, or other sensually evoked spaces. And in a pioneering study, Stockburger (2007) reflects on how sound affects the spatiotemporal nature of games, finding that in each game, there is an intrinsic rhythm that creates a sonic space that "aurally traces and defines the outer borders of the gameplay process and thus links the player's body to the machine" (2007:112). Type, then, can be analyzed according to the following two major inquiries:

What are the primary physiological – i.e. exteroceptive and proprioceptive – methods by which the player perceives the game? For humans, exteroceptive possibilities include vision, audition, gustation, olfaction (see, for example, the Noble prize winning paper by Buck and Axel (1991), whose research opened the door for the genetic and molecular analysis and design of olfaction), tactition (see Robles-De-La-Torre (2006), who investigates the role of touch technology in several application scenarios),

equilibrioception (i.e. balance), and, although not everyone may be able to perceive fluctuation in magnetic fields, magnetoception. Proprioceptive methods include the way a game is perceived body-internally, mainly by the relative position of the body and/or limbs, independent of vision (again, see Robles-De-La-Torre (2006)). Other senses are called interoceptive senses. One example of such a sense is nociception, i.e. pain reception, a term coined by Charles Sherrington in *The Integrative Action of the Nervous System* (Sherrington 1906), offering a design space for games that has been successfully examined with the help of the *PainStation* (2001) game machine installation. *PainStation* penalizes players of a *Pong* arcade game using heat impulses, electroshocks and a miniature lashing whip built into the machine.

1.6. Perspective

Panofsky's (1927) influential essay tied the idea of perspective to the idea of how an artistic image depicts space, how the image is produced technically, and how it is perceived, as opposed to classifying the depicted form. What role does perspective take on in our context?

It could be argued that our eyes render a physical space as a series of images, that this stereoscopic image projection can be mathematized, and that like everything else we see, it is subject to perspective. However feasible this argument, speaking of a physical experience solely in terms of an image experience – which, if one takes pervasive games into consideration, can be partially computer generated, thus complicating the issue – seems far too narrow to explain the experience of (formalized) play practices. In the context of digital games, we can, however, discuss the way that a space and a navigator through this space together produce types of perspectives. Naturally, this discussion would resemble Le Corbusier's discussion of the *promenade architecturale* as well as our discussion of play as a co-created activity.

Schwingeler (2008) focuses on the way perspective is rendered in computer game "images," adapting Wolf's typology for demonstrating the concept of perspective games and building theoretically on Manovich, who contends that

> *Computerization of perspectival construction made possible the automatic generation of a perspectival image of a model as seen from an arbitrary point of view – a picture of a virtual world recorded by a virtual camera" (Manovich 2001:389). And further: "The perspective algorithm, a foundation of both computer graphics and computer vision, is used to generate perspectival views given a geometric model and to deduce the model given a perspectival view (Manovich 2001:395).*

So according to Manovich, geometric, i.e. algorithmic vision, is subject to automation. Schwingeler suggests a name for this hyper-subjective view of the player in games: arbitrary perspective (2008:140ff.). Perspective in videogames is simulated and fully mathematized, as Wolf and Boron demonstrated. Manovich and Schwingeler, for their part, show that in comparison to Renaissance perspective, the construction of perspective in videogames engenders infinite possible points of view. This finding can, in turn, be related back to Salen and Zimmerman (2006), who commented that "space, it seems, is in the eye of the beholder" (2006:67).

Taking all this research together and relating it to our modality dimension of play, we suggest three possible **player perspectives** for primarily visually transported games or play situations:

- A **first-person perspective** for fully physical experiences.
- An **arbitrary perspective** for fully computer-simulated, i.e. virtual experiences.
- A **hybrid perspective** for experiences involving both physical and virtual experience.

1.7. Qualities

McGregor (2006) suggests that we use architecture as a tool for analyzing the spatial qualities of games. She furthermore outlines (2007) a collection of six dominant, recurring patterns of spatial use in screen-mediated games. The following patterns, McGregor claims, represent overarching configurations of gameplay and gamespace, and the six serve to "describe the majority of gameplay and game space interactions" (2007:539):

- **Challenge Space:** Where the environment directly challenges the player.

- **Contested Space:** Where the environment is a setting for contests between entities.

- **Nodal Space:** Where social patterns of spatial usage are imposed on the game environment to add structure and readability to the game.

- **Codified Space:** Where elements of gamespace represent other non-spatial game components.

- **Creation Space:** Where the player constructs all or part of the gamespace as part of gameplay.

- **Backdrops:** Where no direct interaction between the gamespace and the player occurs.

McGregor herself realizes that there are major correlations between Caillois' typology and her patterns of spatial play. However, she only considers these correlations to be overlaps that "remind us that videogames are both play and a space to play" (McGregor 2007:1). Let us look at McGregor's patterns in more detail.

Overt challenge spaces, McGregor argues, are "present in our urban environment yet for practical and safety reasons are isolated from everyday spaces. (...) In challenge spaces architecture is an adversary and the landscape an opponent" (2007:549f.). Küttler (2007), on the other hand, mentions the adversarial potential of gamespace – for example, in skateboarding – as a possible gameplay enabling function.[19]

This comparison between challenge-space-as-function and challenge-space-as-enemy demonstrates that when space itself becomes the player's challenge, it can be viewed from at least two perspectives. The first is the game designer's perspective on gameplay, in which the spatial trope of space-as-challenge is a function of the design that blocks unhindered movement. The second is the player's perspective on gameplay, in which the function turns into an adversary and the hindrance is recognized only partially – that is, from challenge zone to next zone. Designers use space to model activity; players play in order to experience space (in addition to other elements that shape the play experience). McGregor's patterns are interesting, yet serve mainly to spatialize Caillois' basic model. In addition, by stating that "videogames display recurrent patterns of spatial use, taken from reality, formalized and altered by the demands of gameplay" (McGregor 2007:8), McGregor echoes Aarseth's finding that computer games are fundamentally concerned with forms of spatial representation with which we are already familiar; in short, that the spatiality of computer games is always allegorical (Aarseth 2007:44ff.).

There are, however, two interesting exceptions in McGregor's model, that go beyond Caillois. These are codified space and backdrops.

Codified space, argues McGregor, serves gameplay as a conduit. In strategy games, for example, data is spatialized as terrain, building, or object. Terrain, building, or object

---

19 Compare this to Borden's analysis of skateboarding architecture as an entity co-created by skater and built landscape.

are then used as menus that can be accessed by the player precisely because they all represent forms of spatialized data. By manipulating the spatial representation, the player manipulates the data. McGregor herself realizes that the concept of codified space can be linked to Henry Jenkins' concept of the embedded narrative, according to which elements of narration are read through spatial elements (2007:6). If we accept codified space as a category of its own neither derived from Caillois nor covered by our play pleasure categorizations, then the question is: What kind of other stimulus or stimuli can stand in for this playspace? Or is this category based on a unique, as yet unidentified play type?

On the one hand, it could be argued that the first and foremost play pleasure in strategy games is by definition strategizing, which means testing tactics over time. On the other hand, it could also be argued that all games, unless they contain elements of chance, require strategizing in that during gameplay, the player must continually test out actions that may or may not help reach an objective.

It could also be argued that strategy games feature the play stimuli of problem-solving, directing (as in managing), and achieving in equal measure to strategizing and that codified data manipulation is not a gamespace pattern per se, but an activity prevalent when playing a computer game, in which each individual activity – say, riding a horse – represents the manipulation of data – in the case of the horse, horse data. All objects in computer games are subject to data manipulation, and all are, formally speaking, represented by something other than themselves. In videogames, visible architecture is, as is argued in *Learning from Las Vegas*, neither a duck symbol nor ugly and ordinary (Venturi/Scott Brown/Izenour 1977), but a rendered and more or less interactable and/or navigable entity made of data.

Backdrops are architectures that neither affect nor form gameplay directly; there is no direct play rhythm that springs from them. McGregor thus calls them "spatial pastiches"

(McGregor 2007:8). As a category for speaking about gamespace and game spatiality, McGregor's backdrop is a valuable conceptual contribution. We suggest, however, that one instead look at atmosphere in the context of function, as outlined in the following section. In summary, McGregor's approach can be called a **qualitative** one in that it studies how gameplay and gamespace interact to generate re-occuring spatial qualities.

1.8. Function

In this subsection, we will briefly introduce and critically discuss what we will call the functional view of ludic space, exemplified by Adams (2002) and Küttler (2006), who expands and modifies Adams' model.

1.8.1. Primary and Secondary Functions of Ludic Space

In an article for online game development portal Gamasutra.com, Adams (2002) introduces the concept of architectural functions to the discussion of space and spatiality in videogames. In a hands-on discussion mainly directed at professional level and game designers, the term architecture is used to connote the "traditional role of designing constructed edifices and landscapes" (Adams 2003:3). According to Adams, then, architecture embodies graphically constructed ludic space in videogames.

Adams distinguishes between two different functions of architecture in videogames. The first function is to present the player with challenges and shape and support the actions available; in other words, to support the gameplay of the game. The secondary function, on the other hand, is "to inform and entertain in its own right way" (ibid.). Table 5 paraphrases the most important forms crucial to each function. From our perspective, these functions are kinetic properties that determine how play rhythms come into being. Note that the "exploration" fails to describe what Adams means in architectural

terms; as a substitute, we suggest using the term "orientation," which also embodies the concept of disorientation (i.e. that the spatial situation affords limited orientation or none at all).

Adams (2002): Functions of architecture in videogames	
Primary function	Gameplay role
Constraint	Provide boundaries; guide player; constrain player; challenge.
Concealment	Offer protection to player; hide game elements from player; surprise player.
Obstacles or tests of skill	Challenge player's logic and observation; challenge player's hand-eye coordination.
Exploration	Orient player; help player understand gamespace; in mazes: disorient player - orientation
Secondary function	Gameplay role
Familiarity	Offer place and event related cues to the player.
Allusion	Refer to real architectural styles to evoke mental images.
New worlds	Create a sense of unfamiliarity.
Surrealism	Warn player about game's surreal rules.
Atmosphere	Inspire an emotion via an object that gives visual form to that emotion.
Cliché	Set scene and establish / meet player expectation, but without referring to real-life architecture (see familiarity).

Table 5
An overview of functions in relation to their gameplay role after Adams (2002).

One could argue that Adams' general view of architecture as landscape and structure, as well as his view of architecture in videogames, seem quite conventional. Although Adams himself even suggests as much, it is undeniable that his contribution has been highly valuable, at least for the field of game design, in that it helped establish a

vocabulary of spatial configurations and their effect on gameplay. In our opinion, the underlying assumption of Adams' model can be traced to the father of architectural modernism, Lewis H. Sullivan, and his widely known design law, derived from natural observation, that "form ever follows function" (Sullivan 1896). So how does Adams relate to Sullivan?

We can illustrate the relationship between the two by applying Sullivan's "law" to an *ideal* videogame. A design brief for such a hypothetical game would likely mention that the desired result should:

- have a form that makes clear to the player what type of game it is (for example, an action-adventure game);

- express to the player both its inner life – "the native quality" (ibid.) that many would agree is the game's rule-base – and the nature of its materials, construction, and purpose;

- reveal its structure when played;

- avoid unnecessary decoration (cf. Sullivan 1896).

Although (or because) Sullivan's "law" may indeed be somewhat conventional and has been widely criticized as a principle of a biologistic Modernism, it is part of the accepted architectural discourse and a compulsory topic in architectural and other design schools.

1.8.2. Additional Primary Functions

In her German language master's thesis in architecture at the University for Applied Sciences Bochum, Küttler (2006) refers to both Sullivan and Adams – so implicitly to the former, explicitly to the latter. Küttler expands Adams' model and makes some valuable

observations that complement his functional hold on gamespace. Unfortunately, Küttler dismisses Adams' orientation function without clearly explaining why.

We can understand Küttler's categorization as a hands-on and helpful approach to aspiring designers for considering kinetic forms embedded into the gamespace. Because Küttler argues descriptively, often forsaking a structured and obvious system of sub-classification, we have here supplemented her categorization with the italicized terms:

- **Boundaries:** Adams calls this category constraint, cf. Adams (2002). A game needs borders. These can be macro borders that define the gameworld (e.g. an ocean shore as the end of the world) or micro borders that guide, restrict, or divert the player (e.g. a street, an open door, obstacles blocking the player's path). In a very concrete sense, boundaries are representations of the demarcational concept of the magic circle.

- **Game content and game goal:** Architectural design and urban planning can be both the content and objective of a game. The game's main function, then, is designing, constructing, and managing, all of which are embodied in the "creation" play stimulus, as mentioned earlier (Fritz 2004). Adams and Rollings (2006) suggest a whole genre for this function, which they call "construction and management simulations." Likewise, Küttler, Adams and Rollings cite Sim City as the most typical computer game that represents free-form construction and construction from default settings (Adams and Rollings 2006:596).

- **Challenge and opponent:** Adams calls this category "obstacles or tests of skill" (Adams 2002). Küttler means that architectures in games often represent challenges that must be overcome by the player or sometimes

even opponents that must be vanquished by the player. Küttler offers the example of the *Tony Hawk* skateboarding game series, in which a player must look for a ramp on which to perform an ideal stunt; for that player, the environment actually becomes the opponent against which one must play. In her contribution to the book *Space Time Play*, Küttler reviews *Tony Hawk* and, in doing so, clarifies the terminology. When architecture in *Tony Hawk* becomes the challenge of the game and topography the opponent, Küttler explains, the role of architecture can also serve as ally. When the player spots a perfect edge for carving (Küttler 2007:125), for example, the environment is not longer foe, but friend. Küttler suggests we call this phenomenon an utilizability function. But is Küttler's characterization sufficiently precise? Not all environmental challenges, topographical or not, automatically render an environment an opponent. Thus we suggest differentiating between degrees of functional opposition. Depending on the type of kinesis involved, these degrees could be characterized as follows:

- **Challenge:** The gamespace or property thereof minimally challenges the player (for example, a gap to jump across).

- **Opposition:** The gamespace or a spatial property thereof opposes the player in a problem situation for which a solution exists.

- **Antagonism:** The gamespace or a spatial property thereof strongly oppose the player throughout gameplay or for a portion of gameplay.

- **Assailantism:** The gamespace or a spatial property thereof attacks the player.

- **Protection:** In Adams' model, this is known as "concealment" (Adams 2002). As the player's ally, the gamespace can protect or support the player in performing an activity. For example, environmental shading in stealth games serves the protection function. Similar to the degrees we have defined for functional opposition, we can also detect varying qualities of spatial support, which we can term functional support. We suggest some exemplary, architecturally sound terms to describe positive interactions between player and gamespace: alliance, adjustment, support, etc.

- **Symbol:** Like McGregor (2007), Küttler recognizes the symbolic function architecture can have in gameplay and cites construction simulations in which functionalities are symbolized by architecture.

- **Game progress reward:** Graphical representations can serve as a reward and, simultaneously, an incentive. In both *God of War* PlayStation 2 games, the lavishly beautiful graphics encourage the player to keep on playing, to explore the next section in the game. The same can be said of the architecture in *ICO* (Team Ico / Sony Computer Entertainment 2001). Pre-rendered cut scenes serve a similarly encouraging function.

- **Architecture as an interface to player reality:** In designated digital environments such as *Second Life* (Linden Research 2003), player-created content such as clothing, houses, vehicles, animations, or games is not only permitted, but constitutes the basis of the world's attraction. Today, we understand that a game such as *Spore* (2008) takes the idea of player creation much further, letting clients create not only world objects, but also creatures, which can then be

shared with other players during gameplay. Players create their own gameplay and gameplay world within the constraints of the game's design. Because Küttler's term is a bit clumsy, we suggest renaming this category player-created architecture.

1.8.3. Summary: A Merged Model of Functional Forms

Küttler (2006) provides four new functional categories for how architecture in games supports gameplay, while paying no further heed to Adams' "exploration" function. If we merge both models, insert findings from other researchers, and include the suggestions presented in our own critical discussion, we can identify eight primary functions in the construction of ludic architecture:

- Constraints and boundaries
- Concealment and protection
- Opposition
- Orientation
- Objective
- Symbol
- Reward
- Player creation

Secondary functions, as can be seen from Adams' list, are functions that program mindset and emotion in the player. As Fullerton argues (2008), they serve dramaturgical ends, whereas primary functions serve formal ends. Secondary functions are thus

responsible, for example, for what can be called spatial premise. We will thus call primary functions **formal functions** and secondary functions **dramaturgical functions**. The latter assist in arousing feelings of association and curiosity in the player, to which the gameplay then caters. Stylistically speaking, the expectations raised by dramaturgical functions can be ignored, rather than met. For example, it can be charming to set a game in the desert, give it a Western feeling, and then merge it with an alien zombie theme.

It is thus clear that the list of dramaturgical functions suggested by Adams can be extended endlessly and that the inscenation of gamespace is, rhetorically speaking, a question of stylistics discussed, as it were, throughout *Space Time Play* (Borries/Walz/Böttger 2007).

1.9. Summary: Space and Spatiality in Game Research

In this section, we gathered major academic and design approaches for explaining how space in games is constructed and how it constructs games. Based on these approaches, we can conclude here by offering several typical questions one should ask about games when considering their spatial construction and programming. These questions should be helpful for anyone analyzing or designing games. Table 6 provides an overview of the concepts introduced, each concept's major inquiry, and a classification of the various types of approaches. The table sums up the dimensions of our conceptual gamespace from a game research perspective; these are the locative, the representational, the programmatic, the dramaturgical, the typological, the perspectivistic, the qualitative, the form-functional, and the form-emotive dimensions.

Concept	Contributor(s)	Inquiry	Approach
The Magic Circle	Salen and Zimmerman (2004)	Where and when does a game take place, and how is it demarcated or does it demarcate itself from the everyday?	Locative
Allegory	Aarseth (2007)	How does the digital game represent and implement space and with the help of what kind of physicality deviation?	Representational
Contested space	Jenkins and Squire (2002)	How are the game environment and game elements implicitly and explicitly constructed to program kinesis and play rhythms (i.e. gameplay)?	Programmatic
Narrative	Pearce (1997); Murray (1997); Jenkins (2007)	What experience does a spaceplay designer intend to bring forth? How is the narrative embedded into the game? How can the player participate? And how can the story be navigated?	Dramaturgical
Type	Wolf (2002); Boron (2007); spw	What are the primary physiological methods by which the game is perceived, and what are the main spatial qualities these methods use?	Typological
Perspective	Manovich (2001); Schwingeler (2008)	Which of the theoretically infinite number of perspectives does the player take on to play the digital game, over time?	Perspectivistic
Quality	McGregor (2007)	How do gameplay and gamespace interact, and what kind of re-occurring qualities do they generate?	Qualitative
Primary & secondary function	Adams (2002); Küttler (2006)	How is the gameplay of a videogame supported and instantiated by game architecture, and how does this architecture affect the player?	Form-functional and form-emotive

Table 6
An overview of introduced gamespace concepts and a classification of the various types of approaches.

Our table illustrates that the wide variety of computationally driven as well as coming hybrid ludic spaces can be approached from a number of perspectives. Eventually, the table also underlines that for both designerly and analytical purposes, a more wholesome view of space and spatiality in games is needed; this will address a game situation from at least the standpoints we have identified.

2. Approaches to Games in Architectural Research

Recent digital game-related university research in architecture can be roughly divided into the following classifications:

- A rhetorical discourse claiming that architecture is a game.

- Experimental approaches using game technologies for creating architectural virtual reality models.

- A cross-disciplinary discourse aiming to pair the two design disciplines of game design and architectural design.

Note that we will not examine forms of game applications that are explicitly aimed at providing play pleasure. We also do not spend much time investigating the use of game technologies like 3D game engines. The main interest here is to frame play and interactive entertainment architecturally in a research context.

2.1. The Rhetoric of "Architecture as Game"

The first research discourse we will mention is the investigation of "architecture as game." It is being spearheaded by experimental architect Kas Oosterhuis from the TU Delft, where Oosterhuis' Hyperbody Research Group conducts research into the interactivation of building structures and components. The group examines, for example, the degree to which prototypical computer controlled physical building structures change their shape or move themselves with the help of tube structures and "muscle" joints, often as a consequence of an interaction with a human participant. Consequently, at the first *Game Set and Match* conference organized by Oosterhuis and his group, it was proclaimed that "Architecture becomes a game being played by its users," whereby users set the parameters of the built "science fiction" environment designed by architects (Oosterhuis 2006:3f.).

Similarly, at the second *Game Set and Match* conference in 2007, Oosterhuis and Jaskiewicz (2007) called for cooperative, "multiplayer design" in architecture, which they believe will accelerate the design process of "single-player design" and enable the exploration of all potential design alternatives: "Designing architecture is serious play. It is a game whose goal is to create a great building. It is a game designer's need to play according to the rules of physics, economy and society. It is by nature a multiplayer game in which many specialists need to work together to increase their prospects to win" (2007:358). Regardless of the impressive projects created by Oosterhuis' group, such as the interactive and kinetic *Muscle Tower* – the **rhetoric** set out in the words cited underlines Sutton-Smith's thesis that fields tend to use play rhetorically if they aim at persuading. This kind of ideological arguing is usually palpable in the more artistically oriented design disciplines, and Oosterhuis and his team are no exception.

In toto, we can conclude an ideological dimension of game-space, as it is not clear which goal the proclaimed game of architecture serves - what rules it is played by; whose purposes it defers to etc.

2.2. Games for Architectural Experimentation and Visualization

From very early on, first-person shooters such as *Doom* (1993) and, in particular, their level editors, have been used in Computer Aided Architectural Design research and teaching as a means by which to explore and construct virtual realities that exist within the constraints of a computer display, cf. Engeli (2003).

In the discourse that has emerged regarding this topic, games and game technologies are framed as vehicles used to realize spaces that are not intended to be mere gamespace, but rather as demonstrations of how space can be virtually realized. Given their performance power and unsurpassed programming flexibility, it should come as no surprise that the interaction and rendering possibilities of game engines are widely used to virtually experiment with space and to create walkthroughs for clients. Because the discourse on this subject focuses mainly on the usage of game technologies, it can be said to contribute a technological dimension to gamespace literature.

Let us contextualize this dimension. More broadly speaking, "Entertainment is a key driver for the development of technology" (Cheok et al. 2007:128). We can turn this argument around and state that technology development is also a driver for digital game development and, by extension, that game technologies are increasingly used outside of the game industry. Because technologies are constantly evolving, new models of gameplay are being constantly introduced at the concept level, during the prototype stage, for beta games, and, finally, for full-blown game experiences. In the

future, novel game **technologies** will constantly contribute to architectural and CAAD experimentation.

2.3. "Space Time Play":
Game Design and Architecture

A third discourse – by far the most relevant contribution not only to the fields of architecture/CAAD and urban planning, but also to game design and game studies – is represented by the book *Space Time Play. Computer Games, Architecture and Urbanism: The Next Level* (STP), co-edited by the author. STP, which is often cited throughout these pages, is an attempt to bring together game designers, scholars, architects, and urban planners in a discussion on the relationship between space and digital games. The book's concept and structural organization will be briefly discussed in the following section. This discussion serves as a complement to the preceding review of spatiality concepts in game studies and game design, adding what can be called the "uniqueness" approach to the picture. STP's dedication to bringing together experts from various fields is reflected in the two questions that precede the book's introduction:

- Why should an architect care about computer games?

- What can a game designer take from architecture?

Compared to the research presented in the preceding sections, the book provides an explicitly stated dialectic perspective. STP not only inquires into the unique way that space configures gameplay and vice versa, but also asks how games can be useful to architects and urban planners either as a source of technology, a method of simulation during the design process, or an actual design result – or any combination

thereof. In many ways, STP was intended to serve as a vade mecum to *Toward a Ludic Architecture*, and has been quite effective in doing so. In the following section, the intent and structure of STP are briefly outlined, as is its role in this book.

2.3.1. Book Concept

STP was conceptualized as a journey through the spaces of computer and videogames in the form of a book. It was intended as an exploration of the unique spaces experienced in games – the spaces collaboratively and playfully generated in digital networks and the hybrid ones created through the overlapping of the digital and the physical. Starting from scratch, we editors aimed to produce a comprehensive and interdisciplinary compendium on the subject, one that would examine the history and present of digital gamespaces and thereby provide diverse perspectives on the future of our media-influenced conceptions of behavior and space and on the game culture of tomorrow.

The title of the book was inspired by Siegfried Giedion's 1941 book, *Space, Time and Architecture: The Growth of a New Tradition*, which puts modern architecture and its typologies in their social and chronological context. Conceptually, STP attempted to show that as in Giedion's day, we again face the development of new typologies of space – spaces that are found in videogames, spaces that emerge from the superimposition of the physical and the virtual, and spaces that are constituted by the convergence of "space," "time," and "play."

2.3.2. Outline

In STP's introductory outline, we argue that computer games are part and parcel of our present, and that the audiovisual language of games and the interaction processes associated with them have worked their way into our everyday lives. Yet without space,

we point out, there is no place at which, in which, or even based on which a game can take place. Similarly, the specific space of a game is bred from the act of playing, from the gameplay itself. We editors propose that the digital spaces so often frequented by gamers have changed and continue to change our notion of space and time, just as film and television did in the 20th century.

Games create sustainable environments that go beyond the realm of film and television. With the spread of the Internet, online role-playing games have emerged that are often less focused on winning and losing and more focused on the cultivation of social communities and human networks that are eventually extended into "real" life. Equipped with wireless technologies and GPS[20] capacities, computer games have abandoned their original home – the stationary computer – and made their way into physical space as mobile and pervasive applications. So-called Alternate Reality Games cross-medially blend together, such as, the Internet, public phone booths, and physical places and conventions in order to create an alternative ludic reality. Architects and urban planners are using game engines to visualize their models and fabricate walkthroughs. Games serve as methods during the architectural design process or can even result from design processes – when, for example, various physical monuments are overlaid with a virtual component that connects the monuments with the help of game mechanics. Games can trigger and support both utopian and dystopian thinking, and we STP editors argue that it is up to architects, urban planners, and game designers to forge the future of ludic interactive space-time (Borries/Walz/Böttger 2007:11ff.).

20 Short for Global Positioning System. GPS is a satellite navigational system formed by 24 middle earth orbiting satellites and their concurrent receivers on earth. GPS was developed and is still maintained by the U.S. Department of Defense, though it was originally named NAVSTAR (Navigation System with Timing and Ranging). By exchanging data among themselves and with a receiver (mounted, for example, in a car), a minimum of three satellites enable the GPS system to calculate the longitude and latitude of the receiver, as well as its height (what does it mean to calculate the receiver's height?). You can find a variety of GPS and geodetic related resources at the U.S. Department of Commerce's National Geodetic Survey Website: http://www.ngs.noaa.gov/geodetic_links. shtml.

2.3.3. Dramatic Structure

With STP, we dramatized the fact that the spaces of computer games range from two-dimensional representations of three-dimensional spaces to complex constructions of social communities, to new conceptions of, applications for, and interactions between existent physical spaces. The synergies between computer games, architecture, and urbanism are reflected upon from diverse perspectives in essays, short statements, interviews, descriptions of innovative projects, and critical reviews of commercial games.

2.3.4. Formal Structure

STP contains five "levels" – that is, chapters that address the topic through a number of lenses:

- In the first level, *The Architecture of Computer and Videogames*, the contributors outline a short spatiotemporal history of the architecture of games. They seek to answer two questions: What are the elements that constitute spatiality in games, and what type of interaction do they afford? Also in this section, architects express a great deal of interest in the spatial qualities and characteristics arising from milestone computer games and the ways in which these could impact contemporary architecture.

- In level two, *Make Believe Urbanism*, the contributions focus on the social cohesion of game-generated spaces. Authors focus on two general questions: How are digital metropolises constructed, and how are their community spaces produced and maintained?

- The third level, *Ubiquitous Games*, demonstrates how physical space changes and expands when it is metamorphosed into a "game board,"

a new locality, or a place-to-play (which, on other occasions, has been referred to as "playce," cf. Walz and Ballagas (2007) as well as Walz (2007)).

- *Serious Fun* is the name of the fourth level, which presents examples of games that serve both architects and urban planners as instruments for designing and planning.

- The concluding fifth level, *Faites Vos Jeux*, reflects upon the cultural relevance of games today and in the future; contributors examine the current and future desirability of certain gamespaces.

To navigate the book, a reader does not need to adhere to the proposed level structure. Though STP is formally organized into the aforementioned "levels," its table of contents also offers a structural overview of the book's content organized according to format (i.e. essay, interview, etc.).

It is important to note that no contribution exceeds a length of six pages. This represents a conscious effort on the part of the editors to keep the reader browsing and to provide a bricolage perspective on the questions that guide the book. The length limitation on contributions also forced authors to streamline their arguments and be as straightforward as possible.

One of the book's central messages is visually expressed by the block of author names featured on the back cover – namely, that the total conceptual space of a game is formed by many unique contributions, and that the spaces we find in games are unique not only by design, but also because each player uniquely experiences those games during each game session. This "uniqueness approach" complements the other approaches to digital gamespace, as discussed earlier in this book.

In toto, the final collection of contributions in STP can be thought of as the empirical data on which *Toward a Ludic Architecture* is built.

2.3.5. Summary: The Genius Loci of a Game

STP brought together game studies scholars and game design researchers in an effort to catalog and critically discuss the new typologies of space resulting from computer games. In addition to managing a wide array of voices, the book celebrated an approach towards games as unique architectures; these can be seen as its two primary accomplishments. This "unique architectures" stance, then, can be considered the final dimension of our conceptual gamespace: the consideration of game worlds as autonomous world phenomena governed by specific game rules that produce specific combinations of play stimuli and play rhythms in order to entertain users.

In the spirit of Norberg-Schulz (1980), who vehemently argues that places both natural and artificial should be understood as totalities – that is, as aggregate phenomena of qualities irreducible to single idiosyncratic features – we call this the genius loci dimension of gamespace. Even if computer games thus far only feature a limited set of repetitive fantasy and science fiction motifs, game architecture is always unique in the sense of Norberg-Schulz's "phantastic" and, as an allegory of physical space, mysterious. The *promenade architecturale* in games is not only ludic; it is magical.

STP Levels 3 and 5, in particular, demonstrate how the fictional play-worlds of games are being increasingly superimposed onto physical architecture, a process that results in the creation of the next level of game architecture. In order for this process to evolve, architects must concern themselves with computer games, and game designers must be willing to learn from architecture.

2.4. Summary:
Games in Architectural Research

We have identified three major gamespace dimensions from an architectural and urban planning perspective. These have been gathered together in Table 7, which provides an overview of the rhetorical, technological, and Genius Loci dimensions.

Concept	Contributors	Inquiry	Approach
Architecture as a game	Oosterhuis (2006)	Where and when does a game take place, and how is it demarcated or does it demarcate itself from the everyday?	Rhetorical
Game technology as vehicle of architectural experimentation	Engeli (2003)	How can games and game technology be used for research and teaching in architecture and CAAD?	Technological
Game Genius Loci	All contributions to Borries/Walz/Böttger (2007)	Why should architects care about computer games, and what can game designers learn from architecture?	Phenomenological

Table 7
An overview of the approaches identified from architectural research.

3. Conclusion: Gamespace

In the previous section, we mapped out the dimensions of a gamespace. For this purpose, we reviewed and updated major research advances in the fields of both game studies and game design, as well as architecture and urban planning. The dimensions derived based on this information represent ways to become aware of, to analyze, and even to conceptualize gamespace.

In conclusion, we will relate the gamespace dimensions to the playspace dimensions, for the purpose of formulating useful and meaningful questions that can assist game researchers as well as architects in analyzing ludic activities as human practices in space and to frame their analyses architecturally.

The sketch presented here – see Table 8A - 8B – represents a first attempt to consider the next level of architecture and game design and should be treated as a draft, not a final copy. It is hoped that in the future, this framework will be further specified and optimized and will serve as a bridge between the disciplines of game design and architectural design / CAAD. Note that the matrix below does not incorporate the playspace dimension of ambiguity nor the related rhetoric dimension of gamespace; Sutton-Smith has treated these topics at length, and the field of serious and persuasive games is interesting, but not related to our discussion. We also neglect to include McGregor's categorizations, as they are covered by other dimensions.

Our exercise of moving toward a ludic architecture will now be completed by applying ideas from our conceptual playspace and gamespace to existing play-grounds – inventories of spatial configurations that can be viewed as a kind of archaeology. In other words, we will now take an historically motivated look at the play-grounds we play on.

DIMENSIONS OF GAMESPACE	**DIMENSIONS OF PLAYSPACE**	
	Player	**Modality**
Locative	Where in the game is the player, and where is the game for the player?	In what modalities of location, when, and for how long does the game take place?
Representational	How is the player represented in the gamespace? How is the game represented to the player?	What kind of spatial representation is chosen for which modality and vice versa?
Programmatic	What does the player do in the game, and how does the player do it?	How does gameplay vary over modalities? How are transitions handled, and is consistency achieved?
Dramaturgical	How does the player traverse the narrative space? How does the narrative affect the play experience?	How is the narrative designed for each modality, and how does modality affect the narrative?
Typological	How does the game locale affect or determine the way the player perceives the game?	How do play modalities affect or determine the way the game is perceived?
Perspectivistic	How does the perspective affect the way the player is present in the game?	How does perspective change from modality to modality, and how are the changes designed?
Form-functional & form-emotive	How do spatial functions affect the player?	How are functions spatially relayed? Using what modality?
Technological	How do technologies affect the player spatially, and how can the player affect game technologies in space?	How do technologies enable facets of modalities and new types of space, and how do modalities affect technologies?
Phenomenological	What makes the game a unique space for the player?	What is the sui generis quality of the game achieved with the help of modalities?

Table 8A
A draft framework for analyzing and potentially designing ludic activities as human practices in space.

Kinesis	Enjoyment	Context and Culture
How does the location affect kinesis and play rhythms between player and play-other and vice versa?	What is the play pleasure set of the game's locale? What emotions does the site inspire? How does the enjoyment define the locale?	How do the context and culture of the play site affect the play site?
How does the game's spatial representation affect and determine kinesis and play rhythms between player and play-other?	How and to what extent is the spatial representation responsible for enjoyment? How does enjoyment affect representation?	How does the spatial representation affect the culture and context and vice versa?
What are the rules of the game? How are kinesis and play rhythms formalized?	What part of gameplay triggers what kind of play pleasure?	How do culture and context determine the gameplay of a game?
In what way does the narrative unite player and play-other? How does the narrative relate to (or purport) play rhythms?	What part of the story embodies what type of play pleasure? How does enjoyment affect the drama?	How do context and culture affect the narrative? How does the narrative affect or relate to context and culture?
Through which channels do player and play-other relate?	What kind of perceptive channel is associated with each play pleasure? When does a sensation become unpleasant?	How do context and culture affect the choice of the primary physiological channel and vice versa?
In what ways does the perspective bind or connect player and play-other and enable play rhythms?	How does the perspective influence the enjoyment of the game? What types of play pleasures are preferable?	Do culture and context determine perspective? How does the perspective affect the game's context?
Which functions cause specific types of kinesis and play rhythm and vice versa?	How are primary and secondary spatial functions coupled with enjoyment types?	How do context and culture determine the game's functional structure?
How do technologies enable kinesis and play rhythms?	Which technologies and technological products are enjoyable for which type of play pleasure?	How do color and context affect the application of technologies? How do game technologies affect the space of culture?
What kind of unique kinesis and play rhythms do we trace?	How does the gamespace achieve a singular play pleasure?	How have context and culture affected the uniqueness of the game, and how does that uniqueness impact culture and context?

Table 8B
Draft framework continued.
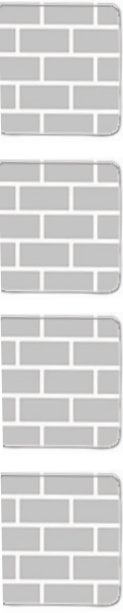
PLAY-GROUNDS: AN ARCHAEOLOGY OF LUDIC ARCHITECTURES

"There is a long cultural tradition of spatial games – games like hide-and-seek and treasure hunt (...) which, of course, go back centuries before the computer" (Mitchell 2007:408). Are spatial games, then, only to be thought of in terms of hide-and-seek and treasure hunts?

In the following pages, a number of architectural formats are presented and considered as spaces that allow for or embody play activities or even games – in other words, ludic practices in space well beyond treasure hunts and hide-and-seek. To a certain extent, this short inventory also serves to illustrate precursors to (ubiquitous) games – these precursors can serve as design metaphors that designers can consider for their work. Yet, the role of computing technologies is not the main focus of these discussions; games are sometimes referenced, but not always. Rather, we intend to present an archaeology of playspace and gamespace as a means to achieve the overall goal of formulating a ludic architecture – a non-exhaustive pool of possible spaces that represent ludic qualities. Pay special attention to links between entries, which are **bolded and underlined** to indicate that they represent interesting trajectories.

One inspiration for this episodic organization are the writings by Georges Bataille, the brilliant, crazy, and highly entertaining poet-theorist who interpreted architectural metaphor and form as means to cement an existing order and "literal manifestation of social structuration" (Leach 1997:20). In light of this view, architectural theorist Neil Leach deems Bataille "a theorist against architecture." But Leach is mistaken; Bataille,

especially in the short and episodic entries in his still-incomplete *Documents* dictionary, aimed to express, often drastically, the way that architectures in and of themselves can express the soul of a given society – a kind of space, that is.

We call the following ludic constructions of space play-grounds, a term we borrow from Huizinga (1971:10) and prefer to the concept of the magic circle or Buytendijk's playing-field mentioned earlier in this work. Using the magic circle concept would be inappropriate, for our discussion aims to discuss the ludic qualities of physical spaces rather than analyze these spaces as gamespaces. In the following episodes, games are only referenced where appropriate. As Alberto Iacovoni points out in *Game Zone*, a marvelous pamphlet on the interplay of play, games and architecture:

> *The term playground generally indicates the areas that are set aside in gardens and urban parks for children to play: delimited, controlled spaces that are protected from the intrusion of the adult world by a high rail fence (...). The desolation of these playgrounds is the mirror image of a society which leaves very little space to playing, unless it is behind a fence, beyond the box office of a theme park, imprisoned and neutralized within the confines of "free time" (Iacovoni 2004:19).*

In this book, by contrast, the term play-ground expresses the possibility that play can take many forms and take place in many locations. Note that play-grounds are not immediately game-grounds, which is why we refrain from applying Salen and Zimmerman's concept of the space of possibility to our discussion.

The inventory of architectural formats is structured as follows:

- first, we discuss the role of the previously outlined concepts of game spatiality in this inventory;

- we next discuss the overarching spatial principles of play-grounds in the context of the phenomenological ideas of utopias, heterotopias, and dystopias;

- finally, we present the inventory in list form organized according to the ludic quality of each play-ground – for example, what type of play does the play-ground program? Often, the form of the entry is that of a collage: it is linked to other entries or presented as a compilation of remarkable features. This allows readers, in a certain sense, to play and be inspired. The general organizational rule for the entries is architectural scale – from the mind to XXL scale (the **World**), and beyond.

1. About Play-Grounds

In the following discussions, we will, time and again, include aspects from the analytical framework that combine playspace and gamespace dimensions. This means that we will refer to categories of enjoyment, to kinesis and play rhythms, and to aspects of game spatiality such as allegory, contest, narrative, type, perspective, and function. We consciously apply the latter despite the fact that it is derived from digital games because we consider play-grounds as being subject to the inherent digitality that games entail, and as being subject to an overall computerization of physicality as has been demonstrated with the game of *REXplorer*.

Before we begin our discussion, however, we will offer a few words on the concept of allegory. From Aarseth's (1997) point of view, the concept may only be used as a lens through which to view computer games. Yet, physical spaces can be allegories of other spaces as well. This is certainly true of built environments created during the Baroque

epoch, where allegorical architecture symbolizes a structure of complexity wherein images and meaning are interwoven like a net to create illusionary spaces (Burgard 2000). Baroque architecture and landscaping – and the allegory as the epitome of Baroque design – are particularly interesting for us and will appear frequently throughout our discussion.

How, you may ask, did we choose which entries to include in this inventory and which to exclude, especially given that the inventory is by no means intended to be exhaustive? Sometimes entries were chosen for their architectural expressiveness (e.g. the **Trompe l'œil** or **Folly**), sometimes for their unique designs (e.g. the **Tessellation** or the **Panopticon**). Some were chosen for chronological reasons, (e.g. **Cave**, **Labyrinth (and Maze)**), others for their ability to specifically express play, (e.g. **Stadium**, **Kindergarten**, and **Playground**), yet others for their imageability as cultural myths (**"Nature"**). All entries are archetypical, and their uniqueness is therefore discussed. Some of the entries encompass more than one type of play-ground. The **Casino**, for example, embodies qualities that can be found at the midway, the tavern, or the arcade; Bogost (2007) mentions this as well. Other major play-grounds may seem to be missing from our inventory, but are, in fact, present. The street, for example, is mentioned in the context of the urban **Playground** entry, and the (pleasure) garden and rollercoaster fall under the **Amusement Park** heading. The inventory is thus a play-ground in and of itself: its interconnections must be questioned and puzzled over by the reader, by you. Note that the results of the design and playtesting phase of *REXplorer* are woven into the play-ground entries where appropriate, as are some game prototypes the author has been designing over the past years.

This game-like linking of play-grounds represents an application of the connectivist learning theory introduced by Siemens (2005) and mentioned in the introduction of this work. Our ludic trajectories also take into consideration the videogame inspired learning

theory of "conceptual playspaces" introduced by Barab/Ingram-Goble/Warren (2008), which suggests using game(-like) mechanics for structuring educational content.

1.1. Utopia

A utopia is a counterspace, an ideal society that is either intentionally established (Sternfeld (2006), for example, collected contemporary quasi-utopianist attempts in the USA in a beautiful photography book) or theoretically conceptualized, typically in a piece of literature. Early texts on the topic of utopia include Plato's *De Republica* and Jewish, Christian, and Islamic religious writings about the Garden of Eden, all of which can today be considered forms of political and religious utopianism. But the term *utopia* itself was coined by a book of the same name, written by Sir Thomas More and published in 1516.
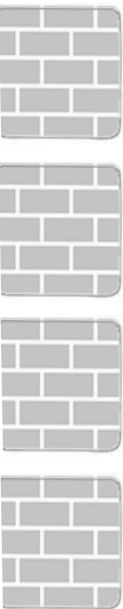
In the book, the imaginary island country of *Utopia* – derived from the Greek ou-topos, meaning not-place – is described by a traveler. The island is home to a society based on a perfect socio-political and legal system. All aspects of communal living are perfectly programmed, there is no such thing as private property, religions are tolerated, and atheism is outlawed.

Two aspects of *Utopia* are most relevant to our context. The first of these is More's explicit intention to provide delight, which is expressed in the actual and full title, originally in Latin: "On the Best State of A Commonwealth and On the New Island of Utopia. A Truly Golden Handbook, No Less Beneficial than Entertaining."[21] The second is the way that the island's capital Amaurotum was not only societally, but also spatio-constructively designed as an allegory of the perfect city. We would thus content that

---

21 Translation taken from the revised Logan-Adams translation of *Utopia* published by the Cambridge University Press in 2002.
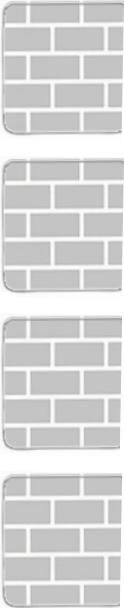
Utopia is a piece of fiction whose goal is to delightfully immerse the reader in the rules of a perfectly organized game. Utopia describes not only a physical space meant to entertain those who read about it, but also a perfect living space meant to delight those who inhabit it. A utopia programs perfect behavior and therefore, perfect enjoyment.

Zinsmeister (2004:78f.) traces the way that *Utopia* not only directly inspired Renaissance literature and design, but how the urbanistic designs depicted in the book also anticipate the ideal of the modular, gridded, controllable city, which, in combination with Leonardo da Vinci's *Homo Vitruvianus*, still informs an architectural politics of total functionalism and measuring. In a 2001 keynote address to the London based Sustainable Placemakers Forum, architect Bernard Hunt reminded his audience that "Such people as Ebenezer Howard with his book *Garden Cities of Tomorrow*, Le Corbusier with his *Ville Radieuse*, and Frank Lloyd Wright with *Broadacre City* set out utopian visions of a better world made possible by man's progress in placemaking – and, for better or worse, their thinking inspired their times and profoundly influenced the shape of development in the 20th century" (Hunt 2001).

Venturi/Scott Brown/Izenour (1977:134) state that Vitruvius held that architecture is a question of firmness, commodity, and delight, and that Gropius – or maybe only his Bauhaus followers – taught that firmness (structure) plus commodity (program) equals delight (form). In this reading, then, form is equal to delight. But can applying the suburbanizing principles of social reformist Howard actually and inherently produce delightful dwelling? We can tell that Howard's garden city model inspired Walt Disney's original urban designs for a city in Florida called EPCOT, in which everyone "will have the responsibility to maintain this living blueprint of the future" (Disney 1966). And let us consider: Do Le Corbusier's principles of seriality and modularity (Le Corbusier 1975:59) really guarantee environmental enjoyment in the sense of a play or game experience?

At least one thing is sure: functionalism caused the Situationists to break the rules, to invent and practice their own rules and thereby create psychogeographically-reflected play-grounds for the drifting player-flaneur of dérive (see also the **Society** entry in the inventory below). Hou Je Bek (2007) describes how computation can take hold of this practice and become a critique to functionalized space in itself: The Universal Psychogeographic Computer (UPC) suggested by the Dutch group socialfiction.org lets participants solve a jigsaw puzzle or calculate the number Pi while taking a walk: during the walk, participants follow walking instructions written in pseudo computer program code (Hou Je Bek 2007:308f.).

There is a clash between, on the one hand, play-grounds that only allow for delight and playing because they have been totally functionalized and therefore exist perpetually on the brink of dystopia and, on the other hand, play-grounds that come into being because they are intended to serve as a critique of the other, quasi-dystopic play-grounds. And yet neither type of play-ground can exist without the other. This conflict can be traced in movies such as *The Truman Show*, which "anticipates the computer game *The Sims* (...) and thematizes the closed and fully controlled space of life-simulation on the basis of a normative canon of values and consumerist strategies for success" (Nohr 2007:470).

The conflict is certainly embedded into the way we design nature and the way we feel overwhelmed with the designedness of our environs. The PS2 game *Shadow of the Colossus* (2005) features a twist on this conflict. In it, a battling player-hero must climb, fight and slay harmless colossi that are completely non-assailing, often with the help of the surrounding environments of ruins and geological formations, see Figure 8. The game, then, is really about "man versus nature, the player versus the environment as represented by the colossi" (Thomas 2007a:461); it has been described as "perhaps the most extraordinarily and unearthly of evil videogame architectures (…). Lairs within

lairs." (Rossignol 2009). Because the player avatar kills the behemoths, one could argue that the player becomes the evildoer himself, transforming an untouched utopian setting into a dystopian one by the way of playing the game. However, because in order to play the game, the design of the game *forces* the player to kill (and, in the very end, punishes the successful player for his wrongdoings with death), it is the game designers who ultimately induce evilness and moralistic dilemma into the player's actions, interweaving them with the game's architecture.

Figure 8
The player versus the environment as represented by the colossi: A seemingly utopian, but utterly dystopian conflict from the PlayStation 2 video game Shadow of the Colossus. © 2005 Team Ico / Sony Computer Entertainment. Reproduced by permission.

That colossi, albeit less (or presumably) evil ones, are intended to please and astound the masses has been shown by the utopianist drafts of French Revolution architects such as Étienne-Louis Boullée and Claude-Nicolas Ledoux. Whereas Ledoux's *architecture*
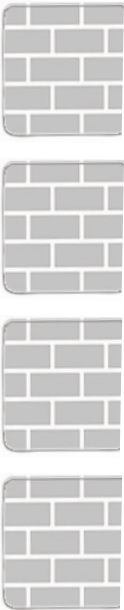
parlante has been accused of being representative of the *Ancien Régime* (which funded his work to a great extent), Boullée preferred the grand and abstract yet still playful and revolutionary design gesture. His 150 meter (500 ft) high perforated Cénotaphe sphere for Sir Isaac Newton (Figure 9), which simulates the spherical surface of the starry sky, stands out as an example of an architecture expressive of its purpose and as a stage of enlightenment that offers play pleasures such as vertigo, adventuring, and problem-solving. It is an allegorical dramaturgy that is also a technological statement of utopianist *immensité*.
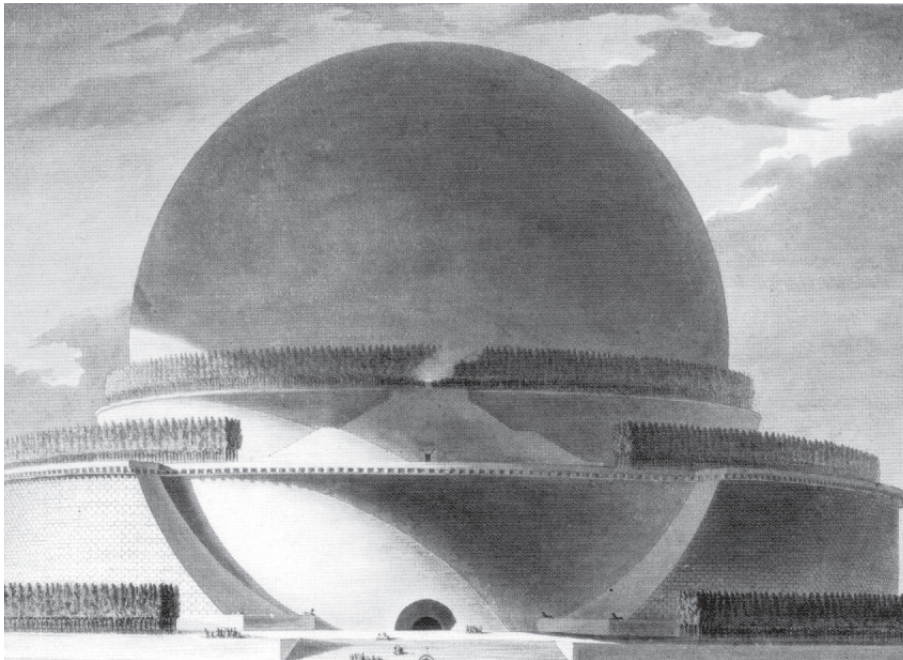
Figure 9
Étienne-Louis Boullée: Design vision for Cénotaphe à Newton (1784). Reproduced from Wikipedia.

Utopian cities and spaces rather often represent the notion of an enlightened-delighted, perfect, superhuman society that has battled nature by design in an attempt to achieve perfect square form-functions and perfect superhuman circles and spheres. But

perfection is not what we get: "In reality, architects and builders have no choice but to proceed in the opposite direction. In the absence of an ideal society, they turn their attention to the shell, the city itself, as an ideal form. And in the twentieth century, this is increasingly replaced by themed entertainment, arcades, mega-malls, and amusement parks" (Herwig and Holzherr 2006:15). And, one might add, by the digital game, either virtual or, increasingly, hybrid.

1.2. Heterotopia
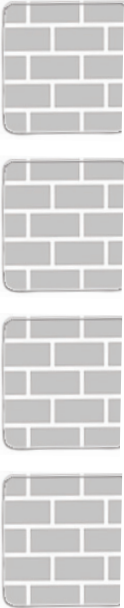
In his 1967 lecture *Of Other Spaces: Utopias and Heterotopias* (Foucault 1997), Michel Foucault investigates how space becomes institutionalized and how structures of power are demarcated. Foucault is, in fact, looking for those places in society that actually lie outside of society, but which can still be localized. Foucault is looking for spatial arrangements of the everyday – cinemas, cafés, beaches – that are simultaneously "represented, challenged, and overturned" (1997:352). Foucault, we could say, is looking for societal play-grounds.

He finds that we cannot localize utopias – they have no real space and are totally perfect, rendering them unreal spaces. But society does have spaces, spanning various ages and contexts, that fit Foucault's profile – realized utopias that "perform the task of creating a space of illusion that reveals how all of real space is more illusory (…) forming another space, another real space, as perfect, meticulous and well-arranged as ours [is] disordered, ill-conceived and in a sketch state" (1997:356). Foucault's examples of these heterotopias – simultaneously demarcations and inscriptions of the everyday – include the museum, the brothel, the cemetery, and the epitome of all heterotopias, the ship.

The ship floats – moves, in fact, in tune with the rhythm of the ocean – from port to port. The ship is a closed program poised in the infinite, dramaturgical space that is the ocean. Along with the ship come dreams of economic growth, treasure, and desire. From the beginning of its existence down to the present day, the ship has always been a reservoir of our imaginations.

There is an enduring heterotopia that Foucault could not and did not identify: the played. In other words, the realized play-ground of play pleasure (see the **Playground** entry above). When not played on or with, a play-ground remains an empty space – it needs a player, and sometimes one or more spectators, to come to life. Although the played play-ground is, formally speaking, demarcated from everyday space, using Foucault, we can read it as a heterotopian other feeding from and mirroring the everyday. We can thus think of playing as a heterotopian practice or, to extend the concept of Lefebvre's *veçu*, as a form of *veçu miroité*, i.e. mirrored lived space (1991).

This much we know: Just as Foucault has identified heterotopian types, we can identify heterotopian forms and programs typical of the computer game. To name a few, we will mention the tennis court, the dungeon, the mansion, the carnival, the castle (see the **Castle** entry), the shadow path, the panzer, the small town, the mushroom kingdom, the noir urbanity, the island, and the planet (see the **World** entry). Heterotopian computer game forms can also be abstract; think of geometrical space, sonic space, and, of course, mirroring Foucault's metaphor of desire, the space ship. All these heterotopian types program but also cater to a particular set of ludic activities. The dungeon programs and caters to role-playing in a system of maze-like tunnels wherein treasure is hidden and monsters such as trolls may be encountered and battled. The space ship programs and caters to six degrees of freedom-floating, trading, and encountering other space ships, species, and specimens of space.

In computer games, any given space can become a heterotopian space of simulation – as long as this heterotopia defers to the game's design and rules and, ideally, simultaneously programs ludic activities set forth by the game's design.

1.3. Dystopia

Utopian thinking and writing has given rise to the creation of anti-utopias as well. If utopias typically manifest counter-everyday spaces that supposedly provide their inhabitants with a happy life, then dystopias are societies characterized by extreme negative qualities such as repression, poverty, hunger, violence, or environmental hazards – challenges, we could say, to be overcome. Early milestone fictional dystopias include Aldous Huxley's *Brave New World* from 1932 and the classic silent film *Metropolis* by Fritz Lang from 1927. The latter is set in a Gothic skyscraper corporate urbanity state, where desperate underground workers (the "hands") sustain the lives of the ruling and privileged class (the "head") that lives high above them in luxury.

Many videogames have embraced similar and explicitly dystopian themes. Consider, for example, the first-person shooter role-playing game *BioShock* (2007). In the brutal and disquieting but highly moralistic game, the player roams through the beautifully inscenated, Art Déco-inspired underwater city of Rapture. Rapture was originally intended as a Garden of Eden by its builder and overseer Andrew Ryan, but then became populated by aggressive, genetically modified mutants and robotic drones. In other words, it transformed into a flawed utopia in which ordered society collapsed. By the way of the decaying narrative architecture, the player is led to believe that is is Ryan he must eliminate. Yet, "as the story unfolds, it becomes clear that, although you [the player, spw] will inevitably kill Ryan, his architecture tells you nothing about the nature of the enemy you face. Indeed, the true enemy has nothing to do with the stylized nature of this lair at all" (Rossignol 2009).

Dystopias, whether stylized as in the case of Rapture or as lairs in themselves, are play-grounds that feature inherent conflicts and thus inherent goals for player-heroes to achieve in that they exhibit word-flaws or imbalances that the player must overcome in order to turn the dystopia at least into a regular, if not a heterotopian world. The dystopian play-ground that encourages the player to sustain the dystopian condition and to prevent other players from taking control provides an exciting reversal on this conflictive topos of overcoming given circumstances.

In consideration of dystopian worlds as a basic form of ludic architecture, we draw your attention to the following interview excerpt, in which ubiquitous computing theorist Adam Greenfield, now Head of Design Direction at Nokia, argues:

> *Cities are all about difficulty. They're about waiting: for the bus, for the light to change, for your order of Chinese take-out to be ready. They're about frustration: about parking tickets, dogshit, potholes and noisy neighbors. They're about the unavoidable physical and psychic proximity of other human beings competing for the same limited pool of resources...the fear of crime, and its actuality. These challenges have conditioned the experience of place for as long as we've gathered together in settlements large and dense enough to be called cities.*
>
> *And as it happens, with our networked, ambient, pervasive informatic technology, we now have (or think we have) the means to address some of these frustrations. In economic terms, these technologies both lower the information costs people face in trying to make the right decisions, and lower the opportunity cost of having made them.*
>
> *So you don't head out to the bus stop until the bus stop tells you a bus is a minute away, and you don't walk down the street where more than some threshold number of muggings happen - in fact, by default it doesn't even show up on your maps - and you don't eat at the restaurant whose*

forty-eight recent health code violations cause its name to flash red in your address book. And all these decisions are made possible because networked informatics have effectively rendered the obscure and the hidden transparent to inquiry. And there's no doubt that life is thusly made just that little bit better.

But there's a cost - there's always a cost. Serendipity, solitude, anonymity, most of what we now recognize as the makings of urban savoir faire: it all goes by the wayside. And yes, we're richer and safer and maybe even happier with the advent of the services and systems I'm so interested in, but by the same token we're that much poorer for the loss of these intangibles. It's a complicated trade-off, and I believe in most places it's one we're making without really examining what's at stake (Greenfield 2008).

In contrast to the all too perfect utopia (that which pervasive computing may bring upon us) and the heterotopian space that allows for playing out alternative realities, dystopias provide pleasure by setting up entirely unenjoyable, i.e. frustrating places that must be playfully escaped, saved, destroyed, or equilibrated. Utopias, heterotopias, and dystopias can all be measured by their artificial and conflictive, i.e. problem-solving potential. Whereas utopias are idealized, hyper-artificial spaces that we may never reach (a problem in and of itself), heterotopias temporarily realize our imaginations. Dystopias, eventually, encourage us to be involved in their systems in order to partially or fully dissolve them. The interview excerpt discusses the way that, ludically speaking, the quasi-dystopia of the city can become a utopia that may turn out to be a dystopia.

In the following section, we will examine play-ground topoi that resemble qualities described in the above section, thus further problematizing the dialectics of ludic architecture between control and agency.

2. Possible Worlds

Hegelian philosophy suggests that everything starts with an idea, with a possibility, and that all that is real is just a realization of an idea. We can imagine playing. That is, with our minds, we can make ourselves believe; and this pretense is a signature feature of our very being. In fact, the basis of games is our capability to imagine a possible situation and to construct a new and secondary kind of reality, according to both Oerter (1999:9ff.) and Piaget (1951). Game designer Noah Falstein describes this practice as "mental fun": "We practice and improve our mental abilities in our leisure time just as we exercise our muscles and build social relationships" (Falstein 2004). We can compare Falstein's concept of mental fun to Jesse Schell's concept of games that take place in zero dimensions, i.e. without a board or a manifest site. As an example, Schell points to the conversational game *Twenty Questions*, in which Player One imagines an object, and Player Two asks "yes" or "no" questions in an effort to guess the object (Schell 2008:134f.).

What is the coordinate system of the imaginary modality? What is its locale, its program? Are possible worlds always subject to mental realms? In an investigation of immersion (induced by virtual reality) and the affinity of the immersion concept to theories of fiction based on the notion of possible worlds and ludic make-believe, Marie-Laure Ryan observes that all these theories share:

> *A reliance on the semantic model of a set of possible worlds in which a privileged member is opposed to all others as the one and only actual world. The distinction actual/non-actual can be characterized absolutely, in terms of origin, or relatively, in terms of point of view. In the absolute characterization, the actual world is the only one that exists independently of the human mind; merely possible worlds are products*

of mental activities such as dreaming, wishing, forming hypotheses, imagining, and writing down the products of the imagination in the form of fictions. VR [Virtual Reality] adds to this catalog of "accessibility relations" a mode of apprehension that involves not only the mind, but also the body. For the first time in history, the possible worlds created by the mind become palpable entities, despite their lack of materiality (Ryan 1999:117f.).

We have to disagree with Ryan. This "bodily mode of being in the world" (1999:137) is a phenomenon that, well before the invention of virtual reality and interactive media, was achieved by many architectural spaces that, form-functionally, aim at make-believe or serve as a stage for make-believe. Some of these play-grounds have been collected in the non-exhaustive inventory presented here.

From our perspective, computer simulation (which enables virtual reality) makes possible the development of different, new, and more complex types of games. Furthermore, computerization serves as a strong reminder that for thousands of years, we spatially and culturally demarcated play and games from everyday life, designated them as our "little feasts in the quotidian" (Bausinger 1999). With computerization, this dichotomy between The Game and The Quotidian ceases to exist; heterotopias can become pervasive, and, eventually, maybe even quotidianized. Let us briefly meditate on the Calvin & Hobbes comic strip "There's treasure everywhere!" to illustrate this hypothesis.

The cartoon – written and illustrated by Bill Watterson (1996) – shows the six-year old, imaginative boy Calvin and his stuffed and energetic pet animal, Hobbes, who has come alive. Hobbes is Calvin's partner in crime, not only anthropomorphing into a best friend, but also into a sardonic commentator – a play-other. In this strip's particular flight of fantasy, Calvin digs for buried treasure. In the first panel, Hobbes asks "Why are
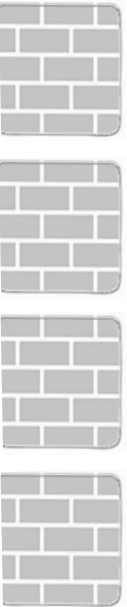
you digging a hole?" Answers Calvin, streaked with dirt and wearing a tropical hardhat: "I'm looking for buried treasure". In the second panel, Hobbes continues to ask: "What have you found?". Calvin lists, "A few dirty rocks, a weird root, and some disgusting grubs," handing Hobbes a sample. Taken with the rock he looks at, Hobbes smiles in the last panel, again asking "On your first try?". Beaming, Calvin responds: "There's treasure everywhere!"

Hobbes is interested not only in the activity – hole-digging – but also in the objects Calvin encounters, which may not seem appealing to most readers. To Calvin, though, the items are treasurable; they possess high affordance. What for, we don't know, and Calvin and Hobbes may not know either. That is because as objects, the treasures come alive only in the moment in which they are instantiated in a certain context. It is interesting to note that in this strip, Hobbes does not represent Calvin's potential maturity and externalized conscience as he normally does. Instead, both characters are immersed in the fascination of pantopian play. "There's treasure everywhere" then, is also a motto that is, at its heart, Situationist (see the **Society** entry of the inventory). It also implicitly reads: "Everything can be treasure!" – and, by extension, enjoyable. Calvin and Hobbes are participating in a situation of indeterminate possibilities, of an infinite amount of possible kinesis with magical rocks, roots, grubs, pets, holes, treasures, and games. The excitement that is at play here is the in-the-moment excitement of possibility – or, as Jorge Luis Borges describes it in his short story, *The Garden of Forking Paths*: "At that moment I felt within me and around me something invisible and intangible pullulating" (1962:99).

Whereas the permeating of computing technologies allows "possible world every-whereness," we can also understand the comic strip as a call to understand any given space as a possible play-ground. Think of all those risk-taking **City** exploration activities involving, for example, forgotten utility tunnels, abandoned subway stations, or inaccessible urban network structures such as pneumatic mail or pneumatic

transportation[22]. In a clarion call to "acute exploration" of the metropolitan landscape, Stilgoe (1998) suggests that one go for a walk or bicycle ride in order to critically probe how certain places and processes, such as main streets and the postal service, are taken for granted, and to thereby become aware of "the mundanity of social interaction, of the built environment, and the technologies that bridge both" (1998).

Eventually, you, the player, negotiate where, with whom, and with what you draw the magic circle to play-move within a possible world of possible worlds. Note, however, that in the comic strip, we only see the play-ground in which Calvin and Hobbes are immersed, not the context and culture in which that play-ground is situated and not the parties who may be repelled by the imaginary modality. So in the spirit of Rosa Luxemburg, let us design possible worlds in which freedom is always the freedom of dissenters, and lived imagination is always and exclusively imagination for the one who imagines differently. Enforcing possible worlds onto non-players may liberate the latter from social conventions and help them see their environment in a new light; but a Kantian improvement of the world by way of gameplay must reflect that universal and particularistic interests must be brought together. It would be wrong to believe that political, social, economic, communication, or game systems in place of everyday release our selves per se. These systems simply win over users, replace the conquered systems, and introduce new rules, which other possible programs then attempt to break.

The game *REXplorer*, which helps tourists explore the history of Regensburg, Germany, can serve as prime and temporary example of a groundbreaking game system and gameworld. In *REXplorer*, as described in the introduction, historical spirits are stationed at points of interest throughout the physical city of Regensburg, and

22 Note that some of these activities are illegal and inherently dangerous. Organizations such as the Berliner Unterwelten e.V., society for the exploration and documentation of subterranean architecture, offer guided Berlin-from-below tours, for example, and in the mid 19th century, the Pneumatic Despatch Company built a short-lived transportation system in London with tubes large enough to fit passenger carriages (Samuda 1841).

players use a special "paranormal activity detector" (i.e. a device composed of a mobile phone and GPS receiver encased in a protective shell) to interact with location-based and site-specific spirits. A novel mobile interaction mechanism of "casting a spell" (i.e. making a gesture by waving the wand-like detector through the air) allows players to awaken and communicate with the spirits in order to receive and resolve quests. The game is designed to make learning history fun for tourists and to influence their path through the city.

REXplorer is a part of the Regensburg Experience (REX) museum, which is full of interactive exhibits that allow visitors to experience different aspects of the city's cultural heritage, such as medieval music and poetry. *REXplorer* is designed to extend the visitor experience beyond the museum walls and to showcase the most significant attraction of Regensburg, its mostly Gothic and Romanesque urban silhouette and architecture. Regensburg is a UNESCO World Heritage site and the best-preserved medieval city in Germany, mostly untouched by the widespread bombing campaigns of WWII. *REXplorer* changes visitors' perceptions of their destination by enabling players to narratively and physically link city sites, thus creating an interconnected mental map.

The target audience of *REXplorer* mainly consists of younger visitors with German language proficiency. The theme of the game is techno-magical: Visitors are asked, as scientific assistants, to examine paranormal activity recently discovered in the Regensburg medieval city center over the course of an hour. Fictional scientists, the players are told, have discovered that the phenomena are somehow linked to a child's
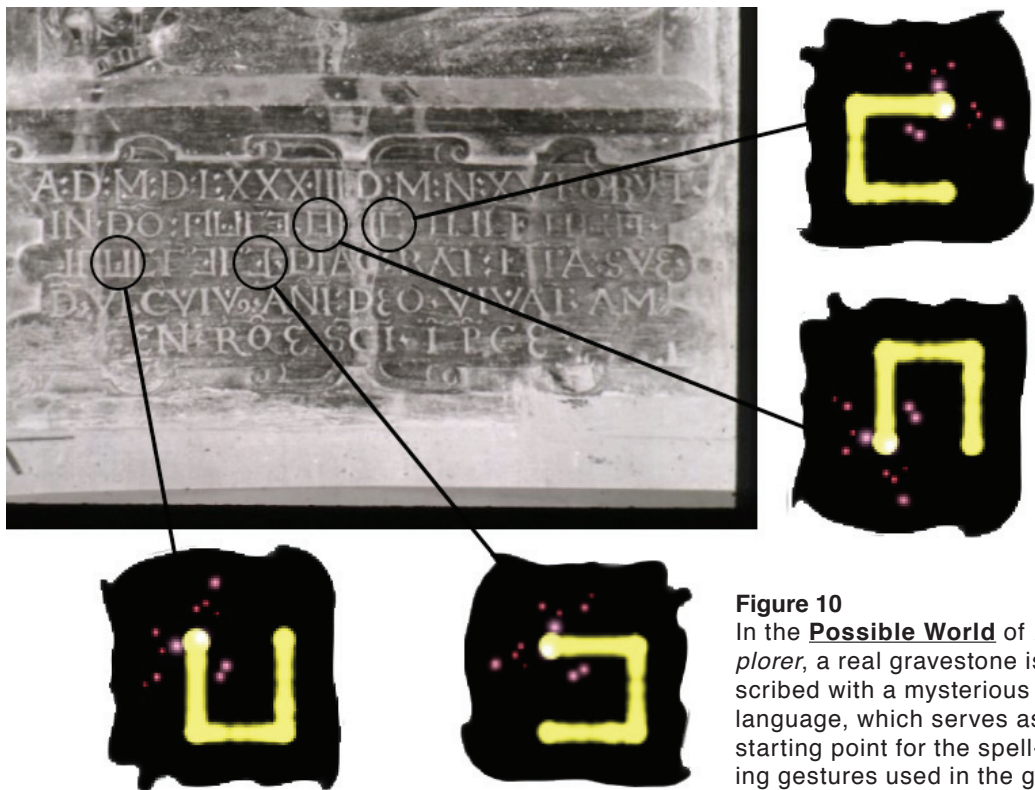
Figure 10
In the **Possible World** of *REX-plorer*, a real gravestone is inscribed with a mysterious secret language, which serves as the starting point for the spell-casting gestures used in the game.

gravestone inscribed with a mysterious secret language shown in Figure 10. The gravestone is a real artifact in the Regensburg Cathedral, and real historians have determined that the symbols, used instead of letters, were meant to cover up the identity of the buried child, who is thought to have been the illegal offspring of a Regensburg cleric – a scandal in the 16th century!

For field research, the scientists have developed a special detector device that is able to measure paranormal activity at specific sites in the city center. The detector has artificial intelligence capabilities and is able to talk directly to the players. This makes

the device a character in the game, anthropomorphically encouraging players to relate to it as a team member trying to help them achieve their goals. The detector reacts to a variety of gameplay situations including, for example, when the player idles for a longer period of time. Most importantly, the detector notifies players when they are in the vicinity of paranormal activity (and points of historical interest) through its own excited heartbeat, which serves to further emphasize its human qualities. The detector character is made even more accessible and entertaining by the voice actor who plays it in so highly expressive, excited, and often self-ironic a manner.

When near a historically significant site, players draw one of the gravestone symbols through the air as though they were casting a spell with a magic wand. Each symbol draws power from one of four medieval elements (earth, water, fire, or wind) and establishes a communication channel to the spiritual world, allowing the either historical or mythological spirits to tell their cliff-hanger stories through the device's loudspeaker. Each story challenges the players to fulfill a quest by going to a different point of interest in the city. Players need to listen carefully to the spirits in order to capture the verbal clues that indicate which gesture to use to accept a quest. When the quest is completed at another site by interacting with another spirit, the original cliff-hanger narrative is resolved, and a new quest is offered. For each completed quest, players receive points, which allow them to level up from a rookie research assistant to a master research assistant during the course of their game session.

The player's progress during a game session is tracked and used to create a personalized player blog through which the possible world of the game lives on. In short, *REXplorer* superimposes an informational, ludic layer upon the physical city of Regensburg.

3. Impossible Worlds

Possibility implies impossibility and vice versa. In the history of architecture, impossible worlds have fired the imagination of many designers. Impossible spaces are also representational spaces that can be found in digital games and that need not comply with the laws of the physical world. Dungeons, for example, can be located at sites where they simply could not exist if the normal rules of physics were followed. Impossible worlds are worlds that play with programmatic illusion, created, for example, perspectively.

The Sony PSP game *Echochrome* (2008) serves as one example of a game whose creators delighted in impossible environments. *Echochrome*, from the Japanese 無限回廊, meaning infinite corridor, takes advantage of the Object Locative Environment Coordinate System[23] (OLE Coordinate System), a virtual environment engine created by Jun Fujiki. In OLE, movement constraints in virtual environments are not only defined by the 3D coordinates of objects, but also by the camera's position in the gameworld. The result is that an object such as a stairway has a different meaning depending on the angle at which it is viewed. In *Echochrome*, the player must safely guide a lemming figure through 56 impossible world constructions that take full advantage of the possibilities of the OLE engine. The ultimate goal is to touch the shadowy figures spread out all across the level. See Figure 11.

Echochrome is clearly inspired by the works of the artist M. C. Escher. Escher's famous *Waterfall* lithograph, first printed in 1961, for example, is an instance of another impossible object, a Penrose triangle, or so-called tribar. The tribar's property of

---

23 A simple Java based level editor can be found at http://www.nhk.or.jp/digista/blog/works/20070517_fujiki/index.html.
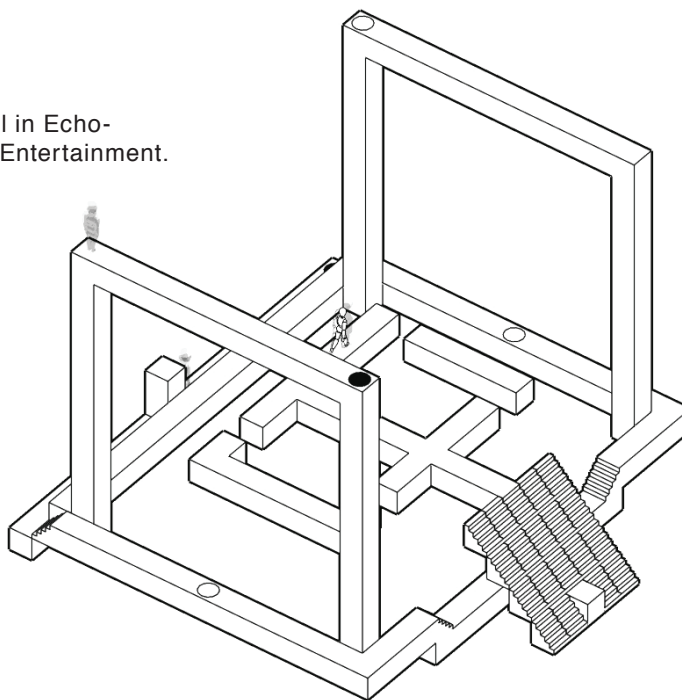
irregular, conflicting perspectives allows Escher to construct a waterfall that splashes into a basin, from which an aqueduct leads downhill in sharp turns, only to end up back at the top of that same waterfall and thereby create a paradox loop (Ernst 2007). *Waterfall* plays with our visual sense, creating uncertainty and defying the laws of geometry. The result is that we seek to problem-solve the impossible and the vertigo it entails; an impossible world, you see, is a play-ground of illusion. To better understand this type of **Playground** – the illusion with which we crave to dance in our everydayness – see **Casino**.

In an impossible world, the world itself is the puzzle; together with the player, it co-creates illusionary movement and play rhythm.

4. Body

Let us investigate examples of how the body – biologically, culturally, and as an element of an interactive system – can be viewed as a play-ground. Note that for the purposes of this book, the investigation rests on the assumption that kinesis is integral to the way we relate to the world and to others. Today, physical and computational worlds are being increasingly integrated. In light of this fact, human-computer interaction design researchers hold that the physical body plays "a central role in shaping human experience in the world, understanding the world, and interactions in the world" (Klemmer/Hartmann/Takayama (2006:1).

In cosplay, short for costume–play, people dress in costume and then dramatize and re-enact their favorite Manga comic or videogame characters. The videogames are thereby spatialized and brought to the streets (see Figure 12, which shows two cosplayers at the Tokyo Game Show 2005). Cosplay as a form of re-enactment thus belongs in the tradition of live action role-playing, which typically relies on pen and paper media for its rule base and costume as the main medium through which it is conveyed. Cosplay is particularly popular in Japan and other Asian countries, where the activity is socially acceptable. Architecturally speaking, the body in cosplay is a space covered by a costume façade, which creates a superficial fantasy similar to the **Trompe l'œil**. This represents one of many possible representational functions of the body as play-ground.

Figure 12
Cosplayers impersonating their favorite video game characters at the Tokyo Game Show
2005. (Left) Wario. (Right) Donkey Kong.

Our bodies and bodily functions can create enjoyment as a result of play activity that
involves the body on many different levels. These levels can be roughly divided into:

- physical play-grounds (see also Buytendijk 1933): Figure 13 shows how
  participants in a pervasive game workshop led by the author use the
  physical body to create games;

- emotional play-grounds (Lazzaro 2004);

- mental play-grounds (see the **Possible Worlds** entry in the inventory);

- sensual play-grounds.

Figure 13
Participants from Shih Chien University in Taipei present body-based game mechanics during a game design workshop co-taught by the author in January 2007.

Let us look at examples of how body enjoyment is achieved. Traditional Chinese foot massages – in western countries, a branch of so-called alternative medicine – belong to the last category, i.e. sensual, player-centered play-grounds. These massages can be quite painful for a first-timer, but may turn out to be a first step down the path towards better health. Many medical doctors criticize reflexology for a lack of scientific evaluation and proof of efficacy. In Switzerland, for example, only licensed medical practitioners are permitted to perform reflexology; this, it is believed, will raise and guarantee therapeutic
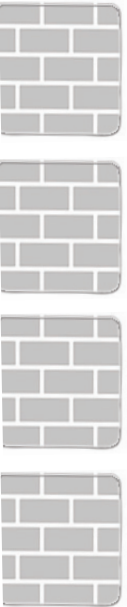
quality on the basis of accepted medical knowledge. This is not the proper place for a thorough discussion of the medical accuracy of foot massages, however. Rather, let us look at reflexology from a game and interaction design perspective as a sensual play-ground.

In Chinese reflexology, the foot, like a **Board** (see Figure 14), is divided into acupuncture points and areas. By pressing the right spot, at the right angle, with the right amount of pressure, with the right finger posture, reflexologists claim that they can stimulate and unblock flows in the patient's body – because acupuncture points are **Mapped** to specific parts of the body – and thereby improve blood circulation or alleviate ailments like indigestion, diarrhea, or menstrual pain. Whether relief is achieved because nerve circuits are stimulated or because endorphins are released is unclear. Scientific evidence, however, suggests that reflexological techniques can reduce stress and be useful for relaxation (Natural Standard and Harvard Medical School 2005). Thus if an actuator skillfully presses the right spot, a feeling of relaxation can result. The body, in other words, has been treated like a sensual and zoned play-ground.

Figure 14
A kind of **Board**: Taiwanese reflexology depiction of foot massage zones.

Similarly, in the technological project *Massage Me* (2007), buttons sewn into a massage jacket interpret back movements and pass these on to a videogame console as control signals: "Otherwise wasted button-pushing energy is transformed into a massage and the addicted game player becomes an inexhaustible masseur" (Perner-Wilson and Satomi 2007).

Buytendijk (1933:121ff.) describes the *Liebesspiel* – in English, flirtation – as the purest of all games. We would go one step further and say that flirtation involves all aspects of the body-as-play-ground. Note that the German term describes not only playful flirtation, but also the acts of mating and love-making – that is, the act of, literally, love-playing itself.

The play-ground of "loveplay" is created at the confluence of physical, emotional, mental, and sensual enjoyment, which, in western societies, often takes place in bed. The architecture of the bed is particularly fit not only for mating, but also for horizontal body programs such sleeping, dreaming, waking up, recovering, resting, giving birth, and dying. The construction of a bedroom, however, to separate the bed architecture from other spaces (and thus separate the related bed programs from other programs, such as cooking and eating) is a relatively novel housing concept that only became commonplace in the 19th and 20th centuries[24] (Dibie 1993).

The play-ground of the body and the architecture it inspires are subject to the way culture frames space. This relationship is taken to a new level when body functions such as heart rate or skin conductivity are connected to a physical space. The design technique of coupling player and environmental play-other was executed by a group of students supervised by the author, who created the biofeedback game prototype *Bioplay5000*, whose biofeedback hardware couples the player with computer-integrated building functionalities such as light control as well as with a camera based motion recognition

---

24 Its roots, however, can be traced to the ancient Roman cubiculum.

system, (see http://www.building-ip.ethz.ch/education/Biofeedback as well as Walz et al. (2005)). In *Bioplay5000*, body and space achieve a new and intimate programmatic entity achieved via play and enabled by **Technology**.

In the case of the *REXplorer* game, the player's body and the game's play-other (i.e. the game controller) form a new kind of interactive unit in that the game uses a novel, ubiquitous mobile interaction technique of casting a spell by way of gesturing. Hummel (2000) has found that the physical movement of gesturing with the arm is more likely to create an engaging play experience than merely staying still.

In *REXplorer*, as has been mentioned earlier, players gesture while holding the game controller, an aluminum shell wrapped with a protective, soft, and stretchable textile that houses a Nokia N70 smartphone and a GPS receiver. The textile overlay transforms the standard phone keypad into an eight-key game interface. Players must hold down one of these buttons while performing a gesture and release it to indicate the end of the gesture. Gesture recognition is accomplished using camera-based motion estimation, as in Ballagas et al. (2005). As motion samples are collected, they are rendered on screen so that players can see their gesture progress in real time. Once the gesture is complete, the motion trail is normalized, and the data is passed through a gesture recognition algorithm. A legend of gestures is provided in a souvenir brochure that players receive at the beginning of the game. The spell vocabulary consists of symbols inspired by a mysterious secret language from a historical artifact, a gravestone located in the Regensurg cathedral. In designing the game, we carefully selected a few relatively simple symbols whose motion vectors were as orthogonal as possible to simplify the gesture recognition process, for which we developed a specific gesture recognition algorithm.

Once we had devised the spell-casting concept, we used an iterative player-centered design process to ensure that the spell-casting input would be intuitive, enjoyable, and
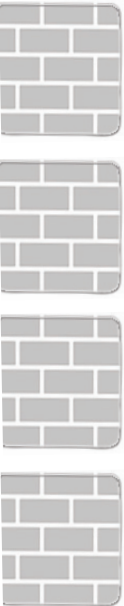
appropriate to the game's concept targeting tourists as well as to the game's narrative. At several stages in the design process, we conducted and video taped playability testing with several integrated prototype iterations both off and on site. These tests were followed by focus group interviews, which we used to identify patterns of behavior. Our main findings regarding the acceptance of gesture input follow:

- Players were surprised by the high level of gesture tolerance. Aaron: "What I thought worked really well was even when you made a round 'C', the device still would recognize it – in any case, it has a really high tolerance."[25]

- In noisy environments, the smoothness of the gesture trace visualization from the motion data was very important to the spell-casting experience because players had preconceptions about the robustness of the recognition system. Smoothness was improved over time by, for example, employing a momentum heuristic.

- Because some players experienced repeated recognition failures at locations with a lot of motion noise, we introduced an alternative spell selection mechanism with a one-button interface.

- Older players in particular found the publicness of the gestures socially awkward. The vast majority in the target group, however, mentioned that the gestures were an important part of the experience, adding, as they did, to the sense of magic and mystery. In a focus group interview, Maria said, "We had fun with the fact that it was hard to trace out the gestures. When it works every time, then it's boring. It shouldn't be too easy."[26]

25 Original German, translated by author: "Was ich ganz gut finde ist, dass selbst wenn man ein rundes ‚C' macht, das Gerät selbst das noch erkennen würde – recht grosse Toleranz auf jeden Fall." Note that playtester names have been changed.

26 Original German, translated by author: "Wir hatten Spass daran, dass es schwierig war, es hinzumalen. Wenn

> – Emotional reactions were also common when players successfully performed a gesture. During a game session, Irene commented, "Bravo... yeah!" after performing a gesture correctly.

Ballagas/Kuntze/Walz (2008) as well as Ballagas and Walz (2007) discuss results from playability testing *REXplorer* in detail. The coupling of bodily gesture and game interaction, so much is clear, instantiates the play-ground that is the body.

5. "Nature"

Orienteering originated in 19th century Scandinavia as a military exercise and developed into a competitive sport around 1900. We can think of it as a predecessor to all standardized scavenger hunts and an influencer of pervasive games involving point-to-point quest solving. We can think of it, in other words, as a mix of contesting, adventuring, and problem-solving, as pure terrain kinesis.

Swedish Major and Scout leader Ernst Killander, the "father of orienteering," organized the first large-scale event in Stockholm in 1918 and continued to develop the rules of foot orienteering thereafter (Palmer 1997). Today, all Scandinavian countries host national orienteering championships, and many national and international competitions and events offer courses that vary in difficulty from beginner to advanced.

Orienteering is a physical, running-intensive game in which players read and interpret a specialized topographical **Map** (see Figure 15, which shows a representative map used by acquaintances of the author during a Bay Area orienteering run in 2005), use a compass to orient themselves, and choose routes in physical space

es auf Anhieb klappt, dann ist es ja langweilig. Es darf nicht zu einfach sein."
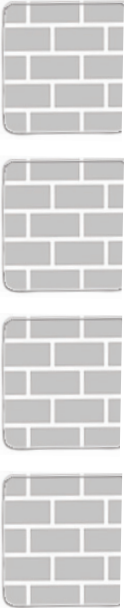
in order to locate and visit a series of control points shown on their map. Whoever reaches the finish line in the shortest amount of time, checking in at the control punch stations, wins. Because the shortest path from one point to another is not necessarily the fastest, players not only compete over respective fitness levels, but also over mental skills such as navigation and map reading. In fact, the main challenge in orienteering is to navigate while running, i.e. to coordinate oneself.
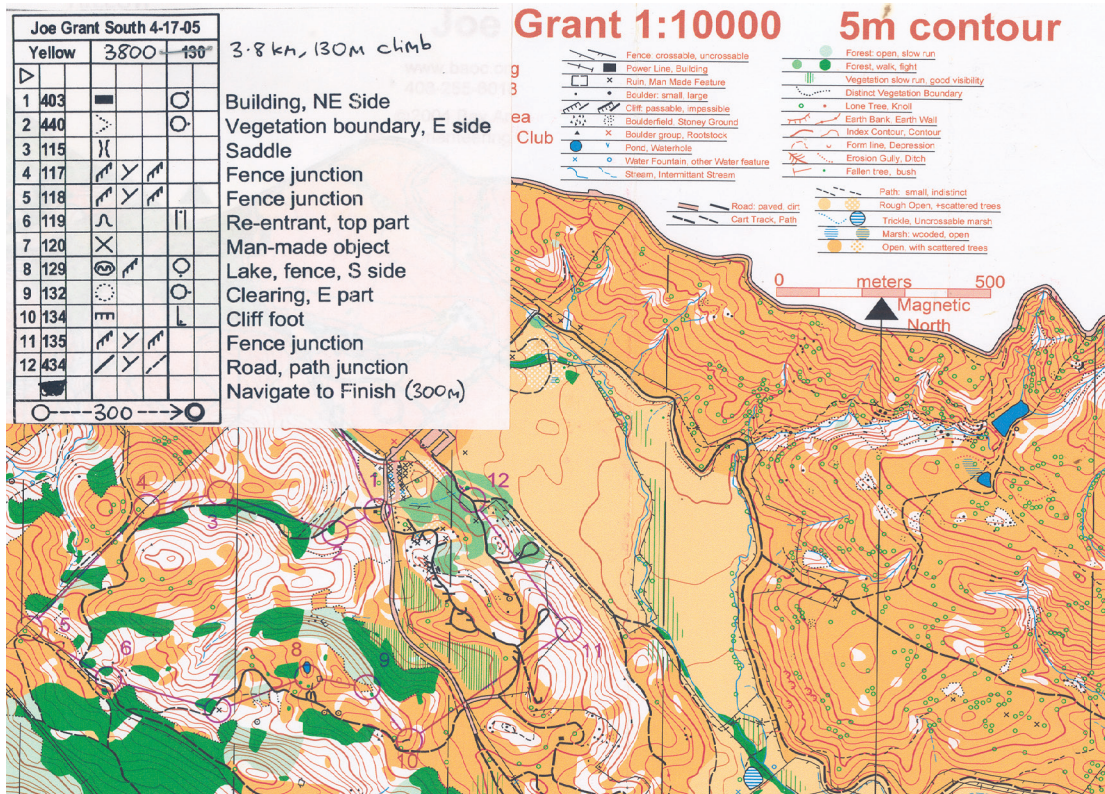
Figure 15
Exemplary orienteering map - difficulty level "yellow", for the Joe Grant south run April 17, 2005, with map legend. Map reproduced by permission from Lea Widdice.

Unsurprisingly, a 1997 member survey of the Bay Area Orienteering Club (BAOC) – the 4th largest organization of its kind in the US –found that among the almost 200 members who completed the questionnaire, "members' personal goals for orienteering center primarily around recreation and self-improvement, specifically (1) Become a better navigator; (2) Improve fitness; (3) Compete with self; (4) Have a nice walk in the woods" (BAOC 1997).

In orienteering, the rules of nature (or the rules of a naturalized environment) must be mastered by a player who is simultaneously rapidly moving and collecting stamps. The relationship between game and architecture in orienteering is thus a curious one because orienteering really comprises three games: one of introspection, in which the player competes against himself; a second in which the athletic contest between player and play-others is central; and, finally, a third in which the contest between player and play-ground is central – the play-ground being a dangerous natural landscape.

Even if we assume that many "natural" spaces used for orienteering have, in fact, been manually naturalized to appear as though they were untouched by man – have, in other words, become designed landscapes – we can still conclude that in orienteering, the player plays against himself and against nature's architecture. The ultimate challenge in orienteering is the annual wayfinding meeting and competition in Venice (also mentioned in the **City** entry). Ironically, then, the equivalent to the videogame incarnation of the bad guy, the boss-monster, in orienteering is a city, the least natural, but also the most designed of all play-grounds; even more ironically, that city is Venice, possibly the most jungle-like of all urban play-grounds.

6. Tessellation

The tessellated play-ground is pieced together by or for the player, using, for example, a collection of plane tiles of a regular shape. The use of equilateral triangles, squares, or hexagons of identical size produces a regular tessellation with the utmost symmetry, while the use of two or more different regular polygons results in a semi-regular tessellation. In both types of tessellation, every vertex must have the exact same configuration. A jigsaw puzzle, then, creates tessellation too, as it creates neither gaps nor overlaps. It is not, however, necessarily regular in strict geometrical terms, although it features recurring regular shape types. Tessellation embodies the form-function of form-functions.

Patel (2006) analyzes and compares the coordinate systems of square, regular triangle, and hexagon grids (i.e. tessellations) by considering the position of grid parts. Patel suggests an integrated coordinate (i.e. positioning) system for these simple shapes by defining nine (3*3) possible relationships between grid parts. These relationships can be expressed as algorithms from A to a list of Bs, i.e.

$$A \rightarrow B1 \; B2 \; B3$$

for each grid subdividing shape, describing a total of 27 algorithms. For example, the simplified form for the relationship "neighbors" is

$$(u,v) \rightarrow (u,v+1)(u+1,v)(u,v-1)(u-1,v).$$

Using Patel's algorithms, it is possible to quickly compute tessellations useful for gamespaces. Piecing together *Lego* bricks can be considered a form of three-dimensional tessellating-play, in which each *Lego* brick is equal to a so-called honeycomb ("Polyhedra which can be packed together periodically, to fill space exactly with no
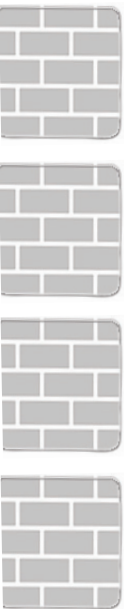
gaps, may be thought of as cells in a space-filling honeycomb" (Inchbald 1997:213)). The three-dimensional human face puzzle toy *Ole Million Face*, created in the 1920s by Carey Orr, an editorial cartoonist from Chicago, and later popularized in the US as *Changeable Charlie* (Gaston Manufacturing), is another example of three-dimensional tessellating-play.

Another more recent and exciting example of a honeycomb-like play-ground is Reinhold Wittig's dice pyramid board game *Das Spiel* (Edition Perlhuhn), in English, *The Game* (see Figure 16). *Das Spiel* comes with a triangular base plate and 281 four-colored dice. *Das Spiel* is actually a game framework, for it can be used to play many different types of building or un-building pyramid games using the dice. Whereas *Das Spiel* is, spatially, a limited honeycomb volume (because there is one final die on top of the pyramid), building with *Lego* can provide, at least theoretically, endless play.

Figure 16
A honeycomb-like play-ground:
The pyramidal game framework
Das Spiel (Edition Perlhuhn 1979).

In **Board** games, tile shapes are used as play pieces that are moved around on a game board. In games of chance, for example, the pieces may be used as chips, in which case the formal role the tile plays in the game (e.g. as a stand-in for money) is more important than its shape. Tile-laying can also be used to create the board of the game. In this case, the tiles have a combined functionality, serving not only as shapes or volumes used for layout and/or geometrical purposes, but also as fundamental vehicles of value (for example, as instruments of scoring or fulfilling the game objective) that can be used to dynamize the game. Three examples of tile-laying games include the board game *Carcassonne*, the letter-tile game *Scrabble*, and the board-tile-laying game *THE aMAZEing LABYRINTH*.

Carcassonne (Hans im Glück 2000) is a tile-laying game designed by Klaus-Jürgen Wrede; note that the very act of tile-laying is a kinesis act. In it, players start with one terrain tile and then take turns drawing a facedown terrain tile, which is then placed adjacent to the tiles already facing up. The drawn tile can only be used to extend a feature (such as a street) on an up-facing tile.
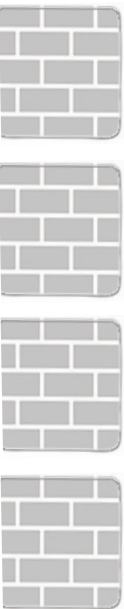
In the tile-laying word game *Scrabble* (Hasbro / Mattel) – originally conceived in 1931 by architect Alfred Mosher Butts as *Lexico* and later refined in cooperation with James Brunot, who had Scrabble trademarked in 1948 (National Scrabble Association 2008) – players draw lettered tiles to score points by forming words on a game board divided into a 15-by-15 grid.

In *THE aMAZEing LABYRINTH* (Ravensburger 1986), created by Max Kobbert and designed by Herbert Lentz, the player must reach treasures by traversing a board made up of movable tiles. In each turn, the player must move a row of tiles either horizontally or vertically before moving her token, thereby changing the maze of tiles to her advantage and her opponent's disadvantage.

Tessellations can be of a semantical nature as well. The OULIPO group – short for "Ouvroir de Littérature Potentielle," which translates roughly as "workshop for potential literature" – was founded in 1960 by novelist and poet Raymond Queneau together with François Le Lionnais and ten of their friends, who were committed to researching the possibilities of incorporating mathematical structures into literary works, cf. Mathews and Brotchie (1998). In Queneau's *Cent Mille Milliards de Poèmes* (Queneau 1961), the reader is asked to cut ten 14-line sonnets into strips; that way, he converts one poem into 1014 possible poems that he can create by combining the strips in different ways in a type of "design your own sonnet" game. Aarseth calls Queneau's experiment a "sonnet machine" (Aarseth 1997:10) and cites it as an example of ergodic literature – a work of art "that in a material sense includes the rules for its own use, a work that has certain requirements built in that automatically distinguish between successful and unsuccessful users" (1997:179). "In ergodic literature," Aarseth continues, "nontrivial effort is required to allow the reader to traverse the text" (1997:1). Queneau's sonnet machine is, to be more exact, a tessellatable text, a paper-based play-ground of narrative creation. This "low" **Technology** allows the narrative to unfold spatially so that it somewhat resembles the Surrealist folding paper game *Cadavre Exquis* (in English, *Exquisite Corpse*), in which a sentence or drawing is created in sequence by a number of participants who cannot see what their predecessors have contributed.

Variation can serve as a twist on this type of turn-based, sequential, chance tessellation. In his early book *Exercises de style*, first published in 1947 by Editions Gallimard, Queneau tells an inconsequential story in 99 different ways and 99 different styles – once as a sonnet, for example, once telegraphically, once in phonetic spelling, and so on. Inspired by Queneau, Madden (2005) adopted the notion of using one starting point to create 99 variations of a similar thing and applied it to his own medium, the comic strip. Another incarnation of tesselation, then, is the emergent meaning of tesselation.

It should by now be clear that the tessellated play-ground is dimensional, that it can have geometric, constructive, symbolic, kinetic, or combined functions, and that it can present itself in various mediums. At its core, tessellation lets us experience pattern recognition and puzzling by forming mosaic play-grounds that serve as demonstrations of perfected, i.e. utopian architectures. Consider the possibilities of such perfected architectures for urban planning, keeping in mind the wise caution of Swiss urban planner Carl Fingerhuth to interpret cities not as jigsaw puzzle tessellations with clear end-states, but as open-ended domino game tessellations instead (Fingerhuth 2004).

7. Board

The board game is the play-ground that abstracts all other physical spaces but is still a physical space in itself. The board, then, is the pan-allegorical play-ground.

Play boards come in all different shapes and sizes and are made of many different types of materials. Geometrically speaking, boards are often four-sided polygons. The most common possible board shape is the square, which has four equal side and four equal (right) angles.

Typically, a board is also subdivided into smaller and repetitive spaces, which together constitute a formal grid structure for the game, as described in **Tessellation**. These spaces are called tiles (Patel calls them "faces"), and each tile is enclosed by edges, or line segments, and vertices. See Figure 17.
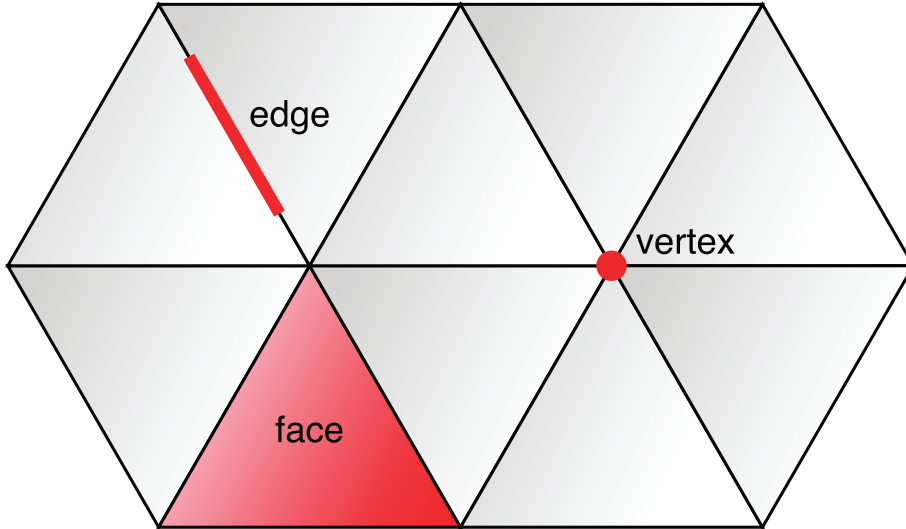
Figure 17
Grid elements of a triangular grid. Reproduced by permission from Patel (2006).

The grid of a game represents the game's playing terrain. Patel (2006), who gives equal attention to digital games, board games, and physical sports games in his discussion, divides grids into the following categories: maps (example: the computer game *Civilization*); playing surfaces (example: *soccer*), boards (example: *chess*), and abstract spaces (example: *Tetris*).

Beyond quadrilaterals that serve as framing structures, other important and recurring board-internal grid structures, i.e. form-functions, include:

> ● **the node grid:** a 19x19 line grid with 361 nodes used, for example, in the game *Go*, in which game tokens are placed on grid nodes and vertices connect the nodes;

- **the spiral:** symbolizes the cycle of life (as in the *Gänsespiel*, in English, *The Game of the Goose* (Glonnegger 1988/1999:44ff.));

- **the square grid:** axes are orthogonal, and cells can be located using Cartesian coordinates (x, y); see also the **Tessellation** entry for further discussion;

- **the triangle grid:** used in 3D graphics for mappings; relatively unfamiliar in games, due, perhaps, to its large perimeter and small area;

- **the hex grid:** like other Euclidean plane uniform tilings – i.e. square and triangle – the hex grid allows for seamless structuration and full modularity. *The Settlers of Catan* (Kosmos 1995), created by Klaus Teuber, lets players freely construct the game world before playing. Hex grids are often used in war board games, as they allow for easier approximate distance measuring of shortest paths by way of hex cell counting (since hexes feature a small perimeter, but a large area). And because hexes have only edge-bordering neighbors, none that are connected solely via vertices, movement rules in a hex grid need not be overly complex. Of course, the hex grid features a coordinate system with two axes, but a less intuitive one than the square grid.

Regular tiles make it possible to locate and address areas on the board and to monitor the movement and trajectories of materials from area to area. Grid taxonomies like Patel's (2006), which relate square, triangle, and hex grids to create algorithms, allow for the rapid computation of rules for the creation-board spaces. This has interesting implications for various facets of **Technology**, including geographic information systems (GIS), satellite-based positioning systems (such as GPS or the planned Galileo system), and positioning systems based on, for example, WLAN access point fingerprinting or GSM cell of origin or signal strength measurements (Meyer 2008).

These technologies – whose accuracy depends on factors like project budget, locale invasiveness, and sustainable signal sources – render the physical world subject to mathematical and metrical analysis (Thrift 2004:588f.). With perfected physical world tessellating and positioning, the physical world can then become a game-board-like play-ground.

During the design process of *REXplorer*, our board game prototypes served both as demonstration tools and as a worlds-in-miniature that made easy gameplay testing possible. In fact, this form of prototype is very useful for content testing during early development stages because it allows content to be read aloud as the players progress through the game. It helps express spatiality, allows players to get a feel for travel times, oversees proximities of sights, promotes narrative consistency, and helps to ensure that the underlying game is fun. Dice and event cards can be used to regulate players'

Figure 18
Early board game prototype of *REXplorer*, used for playtesting. The board displays a top view of Regensburg's city center. Landmark buildings have been carved from wood and placed onto the board, heightening the designer's sense of "being there" and imagining the actual architectural situation.

theoretical progress through the city streets, providing a more realistic simulation of the way people actually move in the city. Figure 18 shows such a board game prototype of *REXplorer*.

Boards and, if they exist, board zones, imply other elements for a game to take place. Additional physical game elements – and thus, typological elements – include game pieces. These game pieces come in various forms, like, for example, pawn, peg, token, bit, mark, counter, stone, and, of course, man. They are controlled by and represent the player on the play-ground of the board, and, as such, imbue the board game with further dimensionality. In the physical world considered as a game-board, the game piece is no longer represented by a physical object, but by the player herself.

Boards themselves, of course, do not need to be flat. In the two-player board game *Abalone* (Abalone Games 1989) – designed by Michel Lalet and Laurent Lévi and endowed with great geometric and algorithmic appeal – a hexagonal board features 61 circular pockets in which marbles can rest. Players may push up to three marbles at a time from nest to nest, either inline – i.e. parallel to the marble – or broadside – i.e. not parallel to the marble line. Balls pushed off the nest area are out of the game, and the goal is to be the first player to eject six of the other player's balls.

In board games, then, the board, which comprises gestalt and internal spatial organization, expresses the program of the game in the following ways:

- in terms of the **magic circle**, in that it clearly marks off the game from other spaces and constrains the game in this enclosed space;

- **allegorically**, in that it represents another space;

- **contestually**, in that it defines the circumstances in which the conflict is carried out;

- **narratively**, in that it provides a theme, e.g. a shape, a (graphical) premise, a figural depiction, etc.;

- **typologically**, in that it has a distinct look and feel and is made of specific materials;

- **perspectively**, in that its core components are both gestalt and imagery;

- **functionally**, in that it serves as boundary and constraint, acts as a symbol, and evokes a certain spatially induced emotion or association;

- **technologically**, in that it is constructed in a specific way with specific materials;

- **phenomenologically**, in that it expresses and assists the game site-specifically;

- and overall, **kinetically**, in the way that it allows, enforces, and restricts movement.

To conclude this analysis, we can state that typically, a board is a necessary and sufficient condition for playing a game.

8. Cave

Both although and because it is not man-made, the cave is the ultimate and, architecturally speaking, original locale. A real cave (as opposed to its allegories – i.e. our houses and apartment blocks) is designed by elegant natural mechanisms that men cannot (yet) easily reproduce. The cave is the starting point of architecture

because it is both demarcated and demarcating; in other words, because it shelters the **Body**. A cave demonstrates how time carves space. As architectural philosopher Otto Friedrich Bollnow puts it, "still today, the apartment is a cave in a mountain (and all the more so, as modern metropolises develop into artificial cement mountains)"[27] (Bollnow 1963:193).

In such a natural time-carved space as the cave complex in Lascaux, France, the walls tell stories. For media philosopher Vilém Flusser, the Lascaux wall paintings are decipherable, two-dimensional codes that not only reduce actual space, time, and circumstances into scenes, but also serve as maps and substitutes for circumstances both past and future. They are, in this double sense, "imaginations" (Flusser 1997:23f.); see **Possible Worlds**. Flusser argues that these code imaginations programmed our ancestors into "a form of magical being" (1997:24), a being made up of a set of scenes that create an imaginary world – a world of images, of allegories. With the invention of scripture, a revolution took place in this imaginary world: the image-scene was de-framed and unfurled, and its contents restructured into lines. Texts, then, derive from images, and single text symbols (i.e. letters) signify images or ideas. Because they are read in lines, texts program linear thinking (ibid.). Based on Flusser's observations, we can think of the imaginary world not only as a world void of texts, but also as a world of scenic storytelling whose walls are a spatial medium and in which the kinesis of the scene takes place not linearly, but somewhat panoptically. This, then, is a first function of a cave: to serve as a medium of spatial allegories, thereby anticipating frescos, tapestries, hangings, church windows, Baroque as well as interactive façades, and, finally, screen-based games (see the **Trompe l'œil** entry).

---

27 Translated by the author from the original German: "(...) heute noch [ist, spw] die Wohnung eine Höhle im Berg (und ist es vielleicht umso mehr, je mehr die modernen Großstädte sich zu künstlichen Zementgebirgen entwickeln)." One example of the inverse – a naturally carved cave that mutates into a building – is the Predjama cave castle in Slovenia, built within a Karst cave mouth in a limestone cliff and featuring a Gothic façade.

In his work *The Republic*[28], Plato used the cave itself as an allegory; and Plato, we know, disesteemed image-making. In his cave allegory, prisoners are chained deep inside a cave with their gazes fixed to a wall. A fire is erected behind the prisoners, and between their backs and the fire, there is a walkway along which puppet figures and objects are carried, casting shadows onto the wall at which the prisoners stare. The prisoners see only shadows, and because they attribute the sounds of the outside world to those shadows, they assume that they are watching reality unfold. One day, however, a prisoner escapes and heads out of the cave. Though blinded at first, the prisoner slowly grows accustomed to the sun and realizes that everything in the cave is an illusion; in short, he becomes enlightened. But upon returning to the cave and reporting the truth to the other prisoners, he is dismissed as having ruined eyesight. Thus according to Plato (with whom Flusser seems to agree), the cave represents an illusionary, i.e. imaginary, and cinematic space, yet in quite a negative sense:

> *Now the cave or den is the world of sight, the fire is the sun, the way upwards is the way to knowledge, and in the world of knowledge the idea of good is last seen and with difficulty, but when seen is inferred to be the author of good and right--parent of the lord of light in this world, and of truth and understanding in the other (Plato, The Republic, transl. B. Jowett)[29].*

Images, then, immerse us "prisoners" in an illusion, blocking true understanding. The cave is the magical play-ground for this illusionary storytelling and, by extension, mechanism of control (for those who present the prisoners with the puppet shadows are, after all, designing the prisoners' experience). No wonder that in modern theater, the audience is seated in the *cavea*, or audience space (see also the **Theater** entry). Wark (2007:002ff.) describes videogame players as the contemporary inmates of a

28 Find *The Republic* as a free ebook at http://www.gutenberg.org/ebooks/1497.
29 Ibid.

Platonic cave, holed up in gamespace, hunched over screens, working-playing, hands compulsively jerking controllers. Yet Wark also permits the possibility of release, suggesting that we can decide if we want to be a player who is a "prisoner of work" or a gamer who enjoys the game regardless of what is at stake, but has no other choice but to play through to the end.

After their function as archetypical and contemporary[30] play-grounds of pictorial storytelling, the second function of caves is their capacity to be play-grounds of spatial adventuring and vertigo thanks to the fact that they feature a minimum of navigational complexity, eventually becoming mazes with twisty little passages, all alike (see also the inventory's **Labyrinth (and Maze)** entry). This is the conceptual framework through which cave and labyrinth unite.

The Mammoth Cave in southwestern Kentucky, for example, is the vantage locale and spatial base for the first computer adventure game, *Colossal Cave Adventure* (Crowther & Woods 1976/1977), mentioned earlier in this work. Will Crowther, an avid caver and ARPAnet developer responsible for routing protocols, put together a vector map of a section of the Mammoth Cave system, of which Colossal Cave is a part, from which he later created the game, which was then expanded by Stanford University graduate student Don Woods. In a detailed comparison of physical source cave architecture and the game architecture created by Crowther's source code, Jerz (2007) sums up his findings:

> *The research expedition to the real Colossal Cave in Mammoth Cave National Park confirms that the map of Will Crowther's original*

30 The Cave Automatic Virtual Environment (known by the acronym CAVE) is an immersive virtual reality environment first developed at the Electronic Visualization Laboratory at the University of Illinois in Chicago back in 1992. The name CAVE refers to Plato's cave allegory, of course, which is appropriate for a site where perception, physicality, and illusion meet – and, in this modern CAVE, technology too. In this room-sized cube environment, rear-projected wall images, stereoscopic LCD shutter glasses, and the movements of the CAVE visitor convey a three-dimensional image. Today, CAVEs and CAVE-like environments are being used at universities and research facilities worldwide.

> *"Adventure" closely follows the geography of the real cave, but with fantasy and puzzle elements. The original source code shows that Crowther selectively deviated from realism; the tension between the altered geography and the mostly naturalistic text illustrates Crowther's respectful intimacy with the natural wonders of Colossal Cave. Woods added complexity and polish, with a careful eye for improving the user's experience (and, occasionally, proofreading). His contributions more than doubled the size of the original data file (from 728 lines to 1809) and more than quadrupled the size of the code file (from 709 lines to 2949). When expanding the geography, Woods improvised freely, yet his additions form an agreeable tension with Crowther's naturalistic setting (Jerz 2007:85).*

Yet whereas in the original cave, the caver plays a space that encourages exploration, *Adventure* encourages the player to explore a labyrinthine, text-only interactive narrative via spatial adventuring and to discover a gamespace by narrative exploration. Figure 19 shows a mashup of an environmental map of a cartographed section of the actual Mammoth Cave along with a flowcharted game map of the textual space in *Adventure* and an excerpt of Crowther's FORTRAN code, taken from Jerz (2007:59). Note that *Adventure* (and, theoretically, any other computer simulation) contains forms of **Impossible Worlds**, that is, maze passages that would be impossible to build in the physical world. Impossible Worlds thus represent a signature difference between physically and virtually represented labyrinths and mazes.
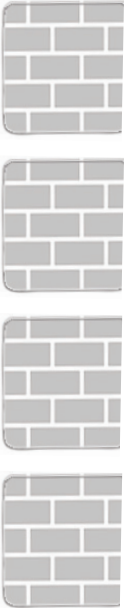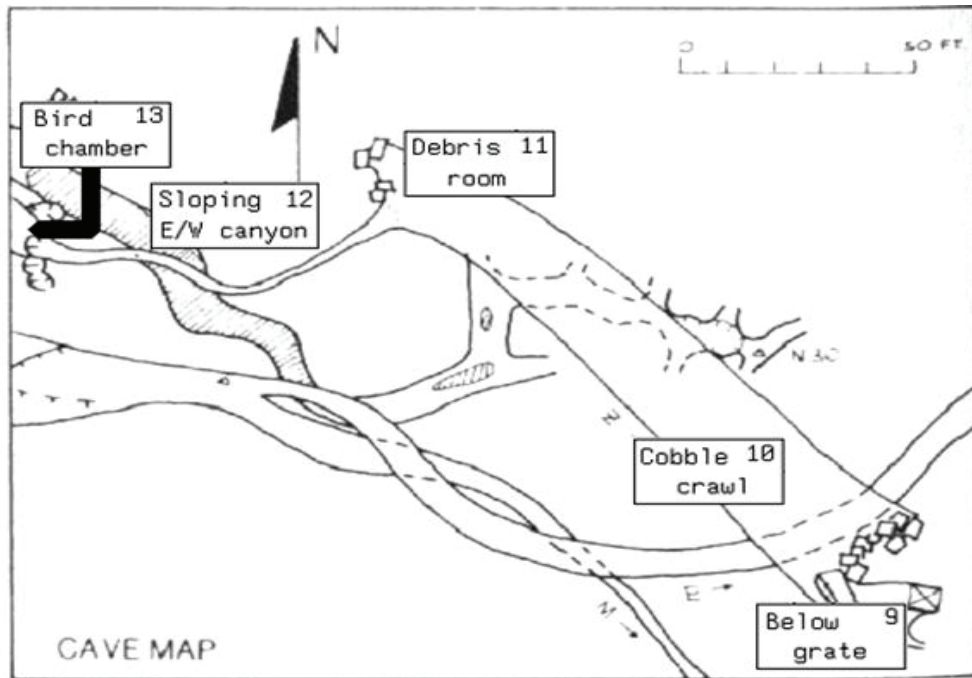
Figure 19
An environmental map of a section of the Mammoth cave in Kentucky mashed up with a flowcharted
game map of the textual space in *Adventure* as well as with an excerpt of Crowther's FORTRAN
code. Note how the following lines map to the numbering in the map:

```
 9 YOU ARE IN A SMALL CHAMBER BENEATH A 3X3 STEEL GRATE LEADING TO THE
 9 SURFACE. A LOW CRAWL OVER COBBLES LEADS INWARD TO THE WEST.
10 YOU ARE CRAWLING OVER COBBLES IN A LOW PASSAGE. THERE IS A
10 DIM LIGHT AT THE EAST END OF THE PASSAGE.
11 YOU ARE IN A DEBRIS ROOM, FILLED WITH STUFF WASHED IN FROM
11 THE SURFACE. A LOW WIDE PASSAGE WITH COBBLES BECOMES
11 PLUGGED WITH MUD AND DEBRIS HERE, BUT AN AWKWARD CANYON
11 LEADS UPWARD AND WEST.
11 A NOTE ON THE WALL SAYS, "MAGIC WORD XYZZY."
12 YOU ARE IN AN AWKWARDLY SLOPING EAST/WEST CANYON.
13 YOU ARE IN A SPLENDID CHAMBER THIRTY FEET HIGH. THE WALLS
13 ARE FROZEN RIVERS OF ORANGE STONE. AN AWKWARD CANYON AND A
13 GOOD PASSAGE EXIT FROM THE EAST AND WEST SIDES OF THE CHAMBER.
```

Image mashup and line matching reproduced by permission from Jerz (2007).

In stark contrast to the Platonic cave, Verner Panton's cave-like architectural explorations sought to fully melt form-functions and spatial elements in order to create a kind of living space both horizontal and vertical. One lasting example of his design philosophy is the *Living Tower* (1968), which looks like a cross-sectional area of a cave and affords playful exploration and adventuring of architectural possibility. Similarly, *Phantasy Landscape Visiona II*, shown at the Cologne fair in 1970, inflates the *Living Tower* into a volumetric and psychedelic playscape wherein cave-dwellers explore a space-adventure (Von Vegesack and Remmele 2000). Figure 20 depicts *Visiona II*.
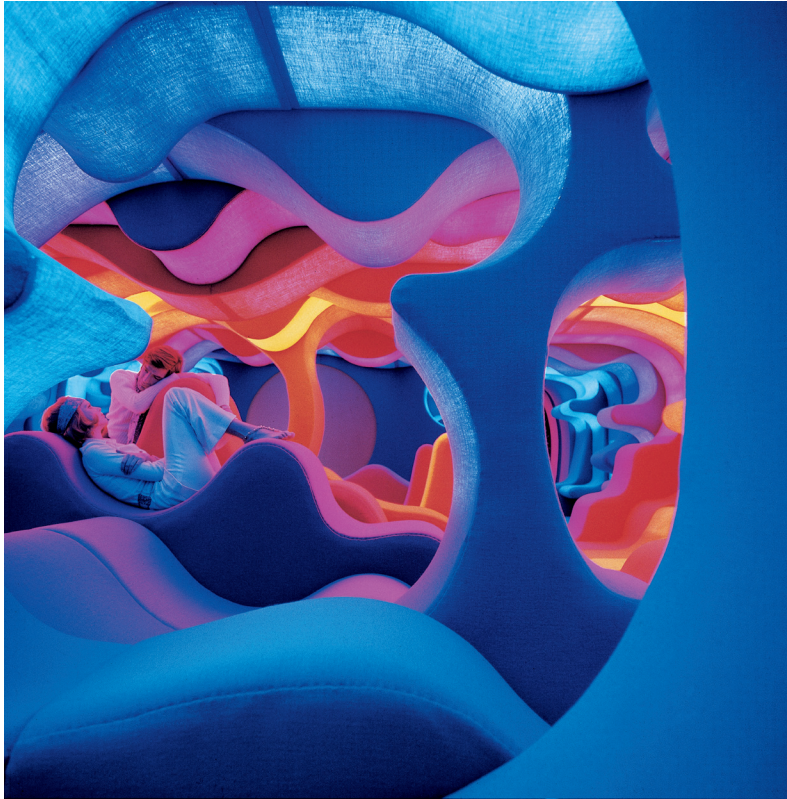
Figure 20
Verner Panton: *Phantasy Landscape Visiona II* (1970), 800 x 600 x 240 cm, commissioned by Bayer AG. Photo reproduced by permission from Verner Panton Design, Basel.

In 2007, it was again a Cologne fair where another cave-like architectural vision was first shown. Perhaps it was intended as a play on the cave allegory, perhaps as a play on Panton's *Visiona II*; or maybe it is simply a recognition of the fact that the cave remains a fundamental sheltering site stored in the collective mind. Whatever the motivation behind it, Zaha Hadid's *Ideal House Cologne* (2007), commissioned by the IMM Cologne Fair, melts walls and furniture seamlessly into a living cave both functionally and emotionally usable[31] for its inhabitants (see Figure 21). For the *Ideal House*, Hadid and her team employed a design technique known as "caving in," i.e. iteratively hollowing out an original starting volume.

Figure 21
Zaha Hadid: *IMM Ideal House Cologne.* Photo imm cologne 2007 - koeln-messe.

31 For more, see the following article about Hadid and her IMM Ideal House: http://www.bauunternehmen.com/artikel_34567_ideal+house+cologne+.htm (German language only).

Both Panton and Hadid attempt to bring cave-emotion to life – Panton through adventuring, Hadid through meditating and savoring. The playfulness inherent to caves consists of more than just a capacity to narrate spatially and to spatialize narrative; through its medial gestalt and time-carvedness, it can become an environmental toy-medium in itself.

By combining storytelling elements with labyrinthine structures and the form language suggested by Panton and Hadid, the cave-toy will eventually re-emerge as a contemporary magical space. The primary design techniques that will be applied to achieve this new cave-living are **theming**, **embedding puzzles**, **concealing**, **deceiving**, **interactivating**, and **coupling**.

An exemplary **play-theming** cave is the loft office of San Francisco game studio Three Rings Design, Inc., developers of *Yohoho! Puzzle Pirates*, a massively multiplayer online puzzle game. Three Rings' interior architecture (see Figure 22) was designed

Figure 22
Jules Vernes-themed loft office of San Francisco, CA game studio Three Rings Design, Inc. Photo reproduced by permission from Because We Can, LLC.

by Oakland-based firm Because We Can, who outfitted the loft to look and feel like The Nautilus from Jules Verne's *20,000 Leagues Under The Sea*. In the office, you can find an attacking octopus couch, a secret lounge area hidden behind a bookcase, fake levers and electric diodes for the "engine room," and many other Victorian and steam punk-inspired elements. Most of the components were CNC cut, and all of them are non-permanent (Wired 2007).

A good example of the **embedded puzzling** technique is architect Eric Clough's renovation of the Fifth Avenue apartment of the Klinsky-Sherry family in New York City. Clough inserted a puzzle-based scavenger hunt into the family's 4,200-square-foot residence, which included, among other things, a clue book hidden behind paneling, ciphers on radiator covers, yielded drawers in custom-built furniture containing clue riddles, decorative door knockers–that can be removed and joined together to create a crank that opens hidden panels, and, finally, concealed puzzles such as a magnetic cube that must be pieced together to open more secret panels (Green 2008). Naturally, when it takes the form of a scavenger hunt, embedded puzzling remains a one-time event that is not repeatable. The author is quite familiar with both this lack of repeatability, and the event character of location- and puzzle-based Alternate Reality Games because in 2002, he himself conceptualized one of the pioneering games of the pervasive game genre: *M.A.D. Countdown*[32] (MC).

MC takes place in both the physical and virtual worlds at the Zurich School for Art and Design. In the game, players are divided into teams of five and assume the role of emergency heroes who must locate and disarm a fake but tangible atomic bomb planted as part of a conspiracy against the arts. During a day-long countdown, the rescue team must find fragments of the bomb deactivation code both in the physical world and on the virtual 6th floor of a school building. The virtual 6th floor is a two-dimensional, point-

---

32 Cf. http://www.madcountdown.com.

and-click, top-view world displayed on the wirelessly networked Pocket PCs with which each player is equipped. *MC*'s treasure hunt incorporates many other media as well, including, for example, puzzle Websites, automated calls to a physical phone booth, messages on answering machines, dislocated books, and poster-sized puzzles, see Figure 23. Walz (2005) describes the game in detail.
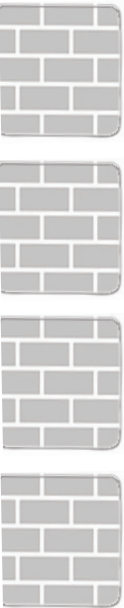
Figure 23
A collage of exemplary *M.A.D. Countdown* interfaces, objects, sites, scenes, and design material.

The **concealment** technique, for its part, is not an architectural novelty; we can also trace it in digital games, in the form, for example, of Easter eggs, bonus stages, and

secret passages. In physical architectures, a multi-purpose palette of concealment architectures would include the following:

- curtained off, recessed alcoves (i.e. caves in a cave wall);

- fortified safe rooms: spaces built into residential buildings in case of threat (break-in), emergency event, or catastrophe (hurricane);

- secret or double (formerly, servant) passageways[33]: allow stealthy entry to and exit from a room or building or, alternatively, connect buildings (e.g. the 800 meter Passetto di Borgo, a hollow wall escape corridor that links Vatican City with the Castle of Sant'Angelo[34]); this category also includes more complex architectures of complication (see also the **Labyrinth (and Maze)** entry);

- booby traps in ancient Egyptian pyramids;

- traboules, passage or stairwell (tower) constructions that connect streets, often through hidden yards or via different levels; traboules can be found in a number of French cities, but mainly in Lyon.

The design technique **deception** is applied in the **Trompe l'œil**; see the corresponding entry.

So far, the design technique interactivation exists only in conceptual form; one day, though, it will be used to enable the building structure itself to playfully interact with the dweller. The 2004/2005 master program of the CAAD group at the ETH Zurich, for example, produced an ironic film in which a protagonist enters an office building

33 Company Creative Home Engineering sells recessable book shelves, rotating fireplaces, bookcases, and custom built furniture, cf. http://www.hiddenpassageway.com.

34 Cf. http://www.saintpetersbasilica.org/Exterior/Passetto/Passetto.htm.

overlaid with a visual game-interface layer. The "eye" of the building then reveals that the building's structural elements are actually "playing" with the protagonist, scoring points by influencing his navigation. An automatic door shuts unexpectedly. Remote controlled furniture falls onto the protagonist's path and thus becomes an obstacle. Lights are turned off a millisecond before the protagonist reaches the switch.

Coupling can be achieved when the living-cave and the player or the player's **Body** become - temporarily or permanently - one system. In the prototype biofeedback game *Bioplay5000*, for example, we have shown how a player can control building and multimedia functionalities with his body functions. When coupled with the system we have conceived, the player can "blow out" the lights - the system recognizes the signal dip caused by heavier breathing, as well as the position of the player (cf. Walz et al. 2005).

It appears, then, that architectures capable of fully immersing the *Homo Ludens Digitalis* in a ludic space are just around the corner. Naturally, this raises certain questions for the future. Will the hypothetical cave-as-game-apartment reward healthy sleeping behavior? What will happen when the cave as a play-ground is combined with other play-grounds, such as **Television** (think the TV show *Big Brother* turned interactive game)? As the author noted in 2006 on his portfolio Website (http://spw.playbe.com):

> *As a designer, I imagine a "game generation:" People who grew playing mostly computer and videogames for all their lives, people whose prime technological and medial references consist of tools, mechanisms, and interaction patterns inherent to both entertainment experiences and the ubiquity of computing technologies. A coming "Homo Ludens Digitalis," writes game and pedagogy theorist Michael Wagner, carries with her and thus initiates a cultural shift towards a "hypermedial reading competence," where the ludofication of society has us experience media not only interactively, but, more importantly, tactically. Like McKenzie*

Wark – who speaks of a "military entertainment complex" – I believe that this shift is deeply political.

With the co-evolutionary advent of pervasive computing, interactive experiences (and entertainment experiences in particular) are no longer bound to sedentary or mostly screen based medial situations such as console or PC gaming. Mobile computing devices such as smartphones, sensor and actuator-rich environments and controllers, positioning services, and computer integrated environments, as well as the pervasiveness of the Internet have already begun to transform the game generation's apartments, buildings, plazas, and cities into technological playgrounds, where "appropriate design sets the stage for human experience. (...) This experience is mediated by this stage, by a place, at best" (McCullough 2004).

The art and craft of make-believe place-making challenges architects, urban planners, and game and interaction designers, and it is likely to (need to) take advantage not only of the game generation's competencies as described above, but also reflect the expectations of the Homo Ludens Digitalis, who has been trained to win not only in gamespace, but in the gamespace of the everyday.

I suspect that in the game generation's world, everyday and everywhere surveillance will become a functional consequence of these expectations. Furthermore, what I refer to as "surveiltainment," will represent a sine qua non condition – that is, a constituting and self-evident precursor of the game generation's ways of living in as well as playing with its world. A number of arguments support this assumption:

(a) ubiquitously computerized, dynamic (make-believe) places are nothing but computer based surveillance systems, even if they permit cheating or are used in ways unexpected by their designers;

(b) *games, by their very nature, are surveillant, dynamic, yet intrinsically motivating learning systems. These systems always know how to reward the player and let the player seem to master the game while in fact assuring that the game masters the player;*

(c) *because games are, at their interactive core, about motivation and learning, and because computers are extremely fit for processing rules (the core of games) – and thus fit for performing games – surveiltainment is the cultural consequence of computerized capitalism.*

In other words: the successful application of games for so-called "serious" purposes other than entertainment by way of omnipresent technologies will entail the emergence of new forms of profit and power execution.

Interaction designer John Thackara warns and reminds us that in the context of experience services, content should be something one does, not something one is given. Pervasive game designer Jane McGonigal, then, may be right in arguing that all gameplay is performance and all performance gameplay and that ultimately, gamers aim at creating a total aesthetic experience – a social utopia, a Wagnerian "Gesamtkunstwerk."

Nonetheless I believe that in the spaces and times of the game generation, we may think that we make experiences, but it could easily be that the experiences make us – our routines, our rituals, our collective memories, our cultural repositories, and our heterotopian societies (cf. Thackara 2006, addendum spw) (Walz 2006b).

9. Labyrinth (and Maze)

Labyrinth and maze are spatial complications of the "detour principle" (Kern 1982:13). They program a rhythmic form of swinging kinesis between player and a kind of building that may have its roots in an ancient dance choreography of the same name (1982:19). These forms have become, both architecturally and metaphorically, prominent spatial configurations in computer-based games that afford players the chance to explore gameworlds and, by adventuring, relieve the initial vertigo they cause. Whether virtual or physical, these kinesthetic configurations are architectural stages with explicitly inscribed kinetic rules, experienceable only thanks to a subject's physical or mental **Mobility**.

From the architectural perspective of a player within, labyrinths and mazes are "bounded spaces to be traversed; their main purpose is to delay the walker as he goes from point A to point B" (Fernández-Vara 2007:74). Upon closer inspection, we find that there exist two fundamental constructive methods to achieve this delay:

- The unicursal method, in which the distance between points A and B is extended by creating a path ordered in a circuitous, winding, meandering fashion. This design method generates the classical labyrinth (Kern 1982:23). Indeed, unicursal bounded spaces are called labyrinths, which, as Moles/Rohmer/Friedrich point out in a discussion of the relationship between labyrinths and graphs, are "nothing more than the expression in simple words of a behavioral graph of movements of being, an application of Graph Theory to real space" (Moles/Rohmer/Friedrich 1977:3).

- The multicursal method, in which (a) paths are forked so that the walker is forced to guess which path will take him to point B in the shortest amount of time, and (b) dead-ends are incorporated into the path structure. This

design method generates a maze, a special type of labyrinth that was originally conceived as a literary setting and only later transformed into a visual reality (Kern 1982:23). Mazes force players to make choices – like, for example, choosing between forking paths, "the simplest figure of nonlinearity" (Aarseth 1997:91), or choosing among functionalities such as linking/jumping, "the hypertext master figure" (ibid.) so masterfully applied by Kolb (1994) in a still groundbreaking non-fiction hypertext that discussed how hypertext alters the way an argument can spatially and non-linearly unfold. In less rhetorical and literary theoretical terms, the maze, then, can be understood as a spatial device with a clear entry point and assumed exit point, featuring ambiguous and consciously disorienting paths. A maze is a building that hinders free navigation, yet like a labyrinth, renders the act of walking through it exciting.

Put another way, "Labyrinths have many meanings. Two of them stand out: the fear of getting lost and the pleasure and challenge of exploration. These opposing meanings, not uncommon in symbols, explain partially our fascination with them" (Passini 1999). On the basis of Passini's observation, we can apply our systematics to investigate the primary functions that both configurations serve. These include: constraint, concealment, obstacle/test of skills, and, above all, exploration. Together, all these functions unite to disorient the player by defying and challenging his or her ability to comprehend a given spatial layout.

Although, as we have seen, the unicursal labyrinth creates a mild form of disorientation, it is a disorientation that often inspires quiet contemplation, if not outright meditation. A main secondary function of the labyrinth is more aesthetic: we enjoy the art and craft of the meander, the twisting of the passages, and the knowledge that we are safe in a "wild" but designed space. Labyrinths and mazes lie at the heart of architectural, urban, and game design: they are architecture's major rhetorical figure in that every

single building, by virtue of its formal nature, includes a kind of labyrinth. The very formal nature of a **City** is labyrinthine too. It is not surprising, then, that architects have always used labyrinths as a kind of unique building signature and **Map**: a building's labyrinth contains an encoded description of the building's geometry as well as site-specific numeric symbolism (Hébert 2004). Perhaps the most famous example of such a labyrinthine building signature is the walkable, eleven-circuit labyrinth embedded in the floor of the Cathédrale Notre-Dame de Chartres, the soaring Gothic cathedral located in Chartres, France.

Labyrinths and mazes can be compared not only in terms their cursality (i.e. how they necessitate player choice for exploration progress), but also by determining the degree to which the functions mentioned above are present in the given labyrinth and maze play-grounds. The relationship between different mazes and labyrinths is summarized in Table 9; emerging play stimuli are cited in parenthesis.

	Unicursal Labyrinth	**Multicursal Maze**
Purposed disorientation function	Weaker	Stronger (vertigo)
Purposed aesthetic function	Stronger (contemplating, storytelling)	Weaker
Role of player choice for progress	Weaker	Stronger (problem-solving)
Overall player requirements	Weaker	Stronger (contesting)

Table 9
Labyrinth versus maze: A summarizing comparison.

By combining both typologies and assuming a purely constructed space (i.e. one lacking, for example, extra obstacles), we can see that the labyrinth is a play-ground best conceived as a spatial device for creating linear experiences that features some degree of disorientation, but doesn't require the player to make numerous choices

in order for the game to progress (as does, for example, a narratively oriented game). A maze, on the other hand, is a play-ground for non-linear play that seeks to disorient the player and requires spatial decision-making as a necessary condition of game progress.

If additional play stimuli or functions are added to the pure labyrinth made of path and walls, active participation and choice-making become more important. Let's look at an example: the motion ride *Abenteuer Atlantis* (AA) – in English, *Adventure Atlantis* – which moves players automatically through a labyrinth. Although highly computerized, the ride will be discussed here in the general context of labyrinths (both physical and virtual) because it is highly revelatory of the prospects for the labyrinth as play-ground.

AA is an advanced interactive shooting darkride designed for families and housed in the Europa Park, one of Europe's largest theme parks. *AA* opened in March 2007 and is a hybrid between a darkride and a shooter game in the spirit of pioneering shooting darkrides such as *Buzz Lightyear's Space Ranger Spin* at Disney's Magic Kingdom theme park in Orlando, Florida.

AA takes place in an enclosed space and consists of 58 connected gondolas, each of which can accommodate two to three passengers. The basic premise is that players are embarking on an expedition to the depths of the ocean in search of the mythical city of Atlantis. The gondolas move on a looped track at a maximum speed of 0.4m/sec, transporting up to 1,800 players/hour. With "laser harpoons," infrared light guns mounted on the gondolas, players can (repeatedly) shoot at more than 80 infrared enabled targets during their ride and thereby score up to ca. 400,000 points. Player scores are presented on the expedition vehicle's panel, as well as on a public display monitor located at the ride's exit (Ertz 2007:28f.).

High scores are recorded on the ride's Website at http://atlantis.europapark.de, where a very simple Java based shooter game lets players virtually pre- or post-experience the ride. Both the *AA* Web game and the *AA* darkride are, to borrow the words of Celia Pearce, "spatial media" (2007:201). But how is the medium of the ride spatial? A looping ride is a curvilinear, volumetric apparatus erected in space. The ride has evolved over time, coming a long way from one of its earliest incarnations, the traditional amusement park ride known as Tunnel of Love, a hideaway for young couples. The ride's historical roots can be traced back to the original meandering, linear indoor experience: the labyrinth, of course. Interpreted as a game, then, the *AA* ride can be viewed as a curvilinear, yet seated first-person shooter action game with limited degrees of freedom; the game is quite literally "on rails," cf. Sellers (2006:14).

In *AA*, the player has some range of motion, and can swirl around in her seat using a joystick mounted to the gondola's panel. She cannot, however, swirl around a full 360° or leave the gondola to explore. The special controller used for this game ride adds to the immersion experience, but the game's core stimuli are contesting stimuli, to which the player responds via the mechanics of shooting and hitting while moving continuously: because during a ride, a target out of sight is a lost target, the central challenge in *AA* is to aim and hit targets while being physically moved by an external engine. We can read *AA* as a game system manifesting itself as a conveyor belt, thereby happily merging the logic of capitalist mass production with the logic of the militaristic moving target. Rides such as *AA* open up a whole new world of possibility for the labyrinth and, at the same time, merge the digital game play-ground with the play-ground of the **Amusement Park** attraction with the help of **Technology**.

Labyrinths and mazes appear in all shapes and sizes across play modalities. Figure 24 shows a door lock labyrinth. Figure 25 shows the architect's signature on the floor of the cathedral in Chartres, and Figure 26 depicts a walkable maze on permanent exhibition

at Stuart Landsborough's Puzzling World in New Zealand, a highly recommended walkthrough museum dedicated to **Impossible Worlds**. Lastly, Figure 27 shows a screenshot of the arcade hit *Pac-Man* (1980), displaying the game's maze that has inspired the pervasive game *PacManhattan* (2004).

Figure 24
Turning door (un-)locking into a playful activity: The Defendius Labyrinth Security Lock made of titanium alloy. Photo reproduced by permission from Art. Lebedev Studio (www.artlebedev.com).

Figure 25
Depiction of the floor labyrinth in the cathedral of Chartres as the architect's signature and a kind of map to the structure of the site.
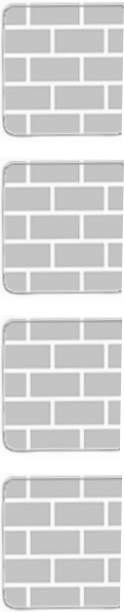
Figure 26
The walkable "Great Maze". Photo reproduced by permission from Stuart Landsborough's
Puzzling World, New Zealand.

Figure 27
Pac-Man © 1980 2009 Namco Bandai
Games Inc. Reproduced by permission.

10. Terrain

Play activity and play-ground can become temporary properties of one another via a terrain. In the summer of 2006, during the FIFA World Cup in Germany, the author was invited to Stuttgart to role-play the master of ceremonies for a soccer related performance installation created by an artist friend. The installation concept was to transform a space not originally intended for soccer gameplay into a semi-permanent soccer gamespace. The idea is reminiscent of the Situationist *détournement* strategy, which was discussed, for example, by Borries (2004) in reference to Nike's guerilla branding and athletic take-over of Berlin's non-sports-related locales.

Figure 28 shows how drawing a mid-sized soccer field onto a garage's concrete courtyard changes our perception of both the architecture of the garage and the game of soccer. This change was visually verified by teams of children who played a soccer

Figure 28
A garage parking lot transformed into ludic terrain: Performance art installation in Stuttgart, Germany, during the Soccer World Championships 2006.
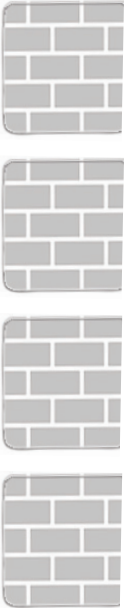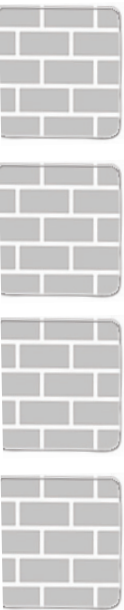
tournament on the concrete "field" as part of the installation. From a window on the second floor, the author served as the performance-game's live commentator.

We, the audience – simultaneously spectators and installation components – quickly realized that any given terrain in the **City** could be tested to see if it was fit for field sports, even without a hired referee (again, see Figure 28). Spread the idea: Temporary magic circles in the shape of soccer fields can be created with the help of nothing more than, for example, some cardboard stencils and spray cans. All sizes – all over town! No need to build miniature wooden goals or goal nets, we can manage without. Players need only negotiate the location of the goals. The installation demonstrated how quickly a neutral terrain could become a play-ground – a lived, i.e. played, space – in the presence of players. Interestingly, the kids had been asked to "perform playing," and quickly ended up just playing without thinking of the performance any longer.

In his materialist history *Skateboarding, Space and the City: Architecture and the Body*, Iain Borden analyzed in great depth how skateboarders perform the city, how they engage with the terrain they choose to use, and how their body-space can only be understood in combination with the architecture they use because both are reconstructed when one encounters the other (Borden 2001:185).

Once skaters move into the city, away from private houses, suburban roads, and skate park architectures, Borden finds that they usually prefer to skate in neglected space – i.e. space characterized by architecture that lacks meaning and symbolism, that has form, but no (longer) function. Using a term coined by Roland Barthes and Henri Lefebvre, Borden refers to these reduced, totally designed spaces as "spatial degree zero" – reduced to totally functional language, totally functional objects, totally functional spaces, totally functional time. These spaces look and feel exactly alike; monotony replicates their steps, banks, handrails, curbs, parking lots, gaps, benches, blocks, streets, roundabouts, and plazas, all of which lack individual

identity. Because they are totally functional, they are ideal play-grounds. Borden argues that "the life of the city should incorporate all manner of spaces where people can gyrate, glide and rotate, mime, perform and declaim, climb, descend and traverse – that is to say, where they can act out their opinions" (Borden 2007:332). This is exactly what skaters do when they skate; by performing, they have fun and implicitly argue that motion play can fill the void of zero degree space. Figure 29 shows a map of skateboarding sites in Berlin.
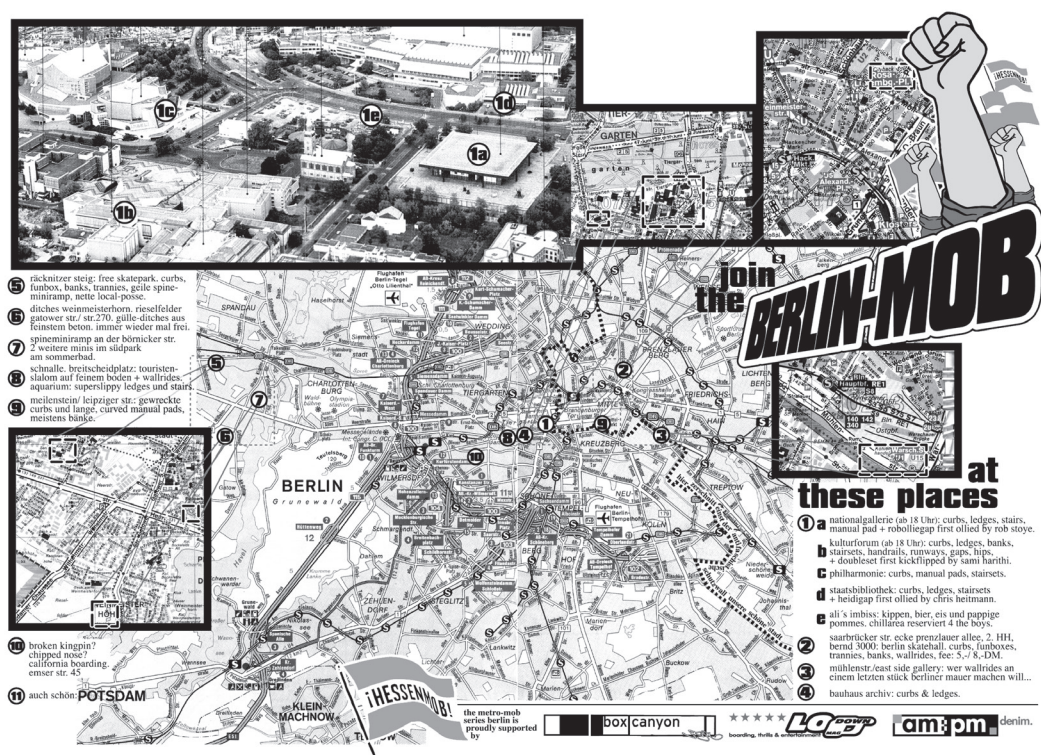
Figure 29
Berlin "MobMap" skateboarding map, mentioning environmental features such as stairs, ledges, walls etc.
Reproduced by permission from MOB Skateboards Roth & Neuss GbR, Giessen.

Similarly, the *Tony Hawk* branded skateboarding videogame series – launched in 1999 with *Tony Hawk's Pro Skater* – lets players experience the way in which urban spaces-as-play-grounds trigger fun. At first, "topography becomes the opponent, a spatial challenge the player must overcome" (Küttler 2007:125). But the more a player learns to master the architectural challenges, the better he understands that just like in a physical skateboarding space, the architecture is not only his enemy, but also his potential ally – without it, he would not be able to perform certain gameplay tricks like grabs, flips, and lips. As Borden explains, "Our urban spaces are not there just for purposes of work, tourism, retail and other supposedly important affairs, but also for having fun, for letting go, for, in fact, being ourselves in our full range of emotions and bodily extensions" (Borden 2007:334). The difference between physical skateboarding and videogame skateboarding is that the game terrain is not designed for zero degree functionalism, but rather intentionally designed to program one hundred percent skateboarding fun. In addition, the videogame playing e-skater does not criticize a space by performing it, but rather performs the space in order to master it and optimize her experience. In videogames, the virtual activity of skateboarding becomes totally functionalized.

We all know that the activity of skateboarding may be easily misunderstood and dismissed as mere child's play. The logical extension of such dismissal, however, is the assertion that architecture must concentrate on the space of designed building-objects. This view unnecessarily limits both architectural theory and practice to a "fetishism that erases social relations and wider meanings" (Borden 2001:7).

Many examples of terrain play-grounds exist, and many more will emerge once given terrains are reinterpreted by players. In the Grand Canyon, for example, the Skywalk attraction is meant to cause delight by inducing vertigo by taking architectural advantage of the terrain. On golf courses, landscapes are sculpted masterfully for the sole purpose of making it harder for the player to sink a small ball into a similarly small

hole and thereby cause delight. *Parkour*, a global terrain play phenomenon invented by childhood friends David Belle and Sébastien Foucan almost 20 years ago in the Paris suburbs, requires players – or so-called *traceurs* – to playfully challenge themselves to overcome obstacles in the built environment as rapidly and fluidly as possible, adapting their movement to the city's topographical constraints, cf. Feireiss (2007:280). Just like the skater, the *traceur* charges the city and its diverse restraints as though it were a physical opponent. Similarly, in several action and action-adventure videogames, the player character can perform free running moves similar to that of the *traceur* (or skater). See, for example, the *Prince of Persia Sands of Time* series (2003-2005), *Free Running* (2007), or the free running-inspired action-adventure game *Mirror's Edge* (2008), set in a seemingly utopian urban environment. The form of spatial awareness characteristic to the above-mentioned examples (e.g. skating, golf, Parkour, free running videogames) is linked to a (often near-esoteric) philosophy of fee paths, fluid movements, and smooth passages – a philosophy, in other words, of play-grounds where player and architecture unite to form a **Playground** of architecture.

11. Map

The term "map" is used by players of first-person shooter games[35] to describe the environment in which they play. All maps scale and virtualize the human **Body** (and first-hand human experience). A concrete top-down map function first appeared in the genre's classic game *Doom* (1993). In *Doom*, the player uses this so-called "automap" by pressing the tab button on the PC's keyboard, thereby switching "between the

---

35 Note: This section stands out from all other sections because its argument is presented from a computer game perspective, as opposed to a physical space perspective. As you will see, this argumentative path is necessary in order to examine the nature of the map-like and mapped play-ground, and is valid because maps are, in themselves, virtual, abstracted, representative spaces, just like computer games.

perceptual and the conceptual modes of space" (Günzel 2007:446). When in automap mode, the player can perform a number of play actions, such as marking the current position, zooming in or out, overlapping the perceptual mode with the map view, or automatically centering the map even if his avatar is moving.

The automap demonstrates two major functions of maps in visual games: orientation and real-time strategic maneuvering in the allegorical gamespace (ibid.). Digital games, and particularly first-person shooters, allow players to act with as well as within maps by, for example, interactively mapping the gamespace by navigating through it.

More fundamentally, games – board games, videogames, pervasive games, etc. – map rules onto space, whereby gamespace is constituted, carved, or used in a certain ludic fashion because it enables a certain type of play (e.g. a flat field enables running, a stage enables role-playing, etc.). Let us look at an example of such mapping.

In the fall of 2004, the author organized a mandatory weekend excursion for his "ArchITectural Game Design" course at the University of Stuttgart, Germany. The class traveled to the St. Norbert conference and lodging center in the small village of Rot an der Rot in southern Germany. St. Norbert is a former Premonstratensian monastery that was given up by the order in 1959. It is a beautiful, Baroque building complex composed of the abbey church St. Verena, which is still in operation, the castle-like main building with picturesque towers, wide hallways, and high, stucco-adorned ceilings, and several additional annexes. Today, as in the 12th century, the remote village of Rot is dominated by the cloister and seems to constitute a sacral landscape of contemplation.

In this atmosphere of cultivated peace, students were asked to use the available classroom furniture – typical seminar space tables and chairs – and whatever other moveable items they could find to reorganize the former cloister's hallway. The goal

was to prototype the space as both play-ground and map fit for a simple shoot-out game involving NERF-type plastic toy weapons. This type of game prototyping allows for physical playtesting beyond the board game, a method that, it is believed, is among the most practical and effective playtesting methods for pervasive games.

After constructing a first level, students played different kinds of shooter game sub-genres in the space, including Capture the Flag and Survivor. Fortunately, the building's layout supported these types of gameplay: the hallway stretched around a 90° corner, with one leg running a length of circa 50 meters and the other leg running circa 30 meters. The opposing teams set up headquarters at opposite ends of the hallway. We elected two referees and agreed that upon being hit with ammo, a player could be removed from her team by one of the referees, who would thus need to observe the scene closely. Play sessions ranged in time from one minute up to an exhausting ten minutes. For each session, we slightly modified the rules of play by, for example, letting players remain in the game until they had been hit three times, or by rewarding hits by letting successful players move a piece of furniture.

In each variation, and across several map iterations, the portable objects in the hallway were always tipped over so that their surfaces could be used as upright shields. In later sessions, players cut out portable Styrofoam shields to supplement the furniture protection. Throughout the course of the session, we noticed re-occurring gameplay tactics, which, as it turns out, were tactics typical of agonal competition and, more to the point, typical of battling games that feature action elements such as hitting, running, and hiding. These gameplay tactics included:

> - **Self-protection and "lying in wait"** (often used in third-person shooter games): The undersides of tables were used as trenches as well as safety and recovery zones. In videogames, however, players tend to dislike "lie in wait" gameplay as it results in unexpected "frags" instead of clear

combatant kills. A game's level design is usually blamed and disdained for requiring "lie in wait" gameplay. In our physical game sessions, however, we found that "lying in wait" was actually an exciting game element not only because of the physical, full body tension that resulted from unexpected attacks, but also because of the back-and-forth tension that resulted from the knowledge that someone was hiding behind a shield.

- **Path obstruction:** Players used the tables in their leg of the hallway to regulate their opponents' movement in gamespace by, for example, placing objects in opponents' trajectories to slow them down or block their vision.

Figures 30A - 30B shows the basic setup of the shorter leg of the hallway and a scene from the game in that leg (note the referee on the very left of the image).

Figure 30A
Playtesting of elimination mechanics with participants in a game design workshop, taking place in the former Premonstratensian monastery St. Norbert in Rot an der Rot, Germany. (30A) Level leg. (30B) Playability session with players and referees standing by the windows.

As a device for generating, formalizing, and testing the spatial aspects of game concepts in their early stages, this play-ground construction method proved to be fast, effectively iterative, and physically engaging. Furthermore, its physical appeal makes this type of game construction method interesting for participative design situations. Though this playtesting method is not suited for re-staging more complex situations, it can be used to scale up a situation that has only been tested in miniature form. That way, real people and physical movement can be incorporated into the testing process, which will thereby better simulate a final product.

You may perhaps be asking yourself why this example was entered into the inventory. The most obvious answer is that it provides a good example of a mapped play-ground. But beyond that, it can also help illustrate the idea of mapping as an intervention. Pre-existing spaces that at first seem unfit for gameplay can always be designated as play-

Figure 30B

grounds; the result of this renaming is impossible to predict. A former monastery, for example, may be considered inappropriate for wild, physical play, especially considering that most monastery visitors seek silence. And yet surprisingly, engaging in wild, physical play in just such a monastery proved quite a positive experience. The same seemingly inappropriate, but actually quite lovely and thought-provoking intervention occurs in the graveyard game *Tombstone Hold 'Em* (2005), in which players play a variation of poker in the – you guessed it – big, open, and enthralling space of a public cemetery.

With the introduction of positioning **Technologies** and location-based pervasive games, the mapping of rules onto spaces and the map-based interactivity described above are merging into a new kind of play-ground: mapped and map-like.

During the design process of *REXplorer*, maps played a number of important roles including, for example, in the prototyping of hotzones, i.e. physical zones in which the player can interact with specific game challenges. Because GPS can have problems in urban spaces due to buildings or even clouds obstructing signals from the satellites, it is very important to test a game's GPS location system thoroughly to ensure proper functionality. Our hotzones are defined iteratively based on GPS measurements and extensive play sessions. We developed a map tool (see Figure 31) that allows us to visually define the hotzones based on the GPS measurements derived during testing. Using this tool, we were able to iteratively define hotzones and to determine that GPS alone is not sufficient for the accuracy that we require. To support location detection, the *REXplorer* system thus also uses Bluetooth beacons, as well as providing players the ability to manually enter their locations when the location detection fails.
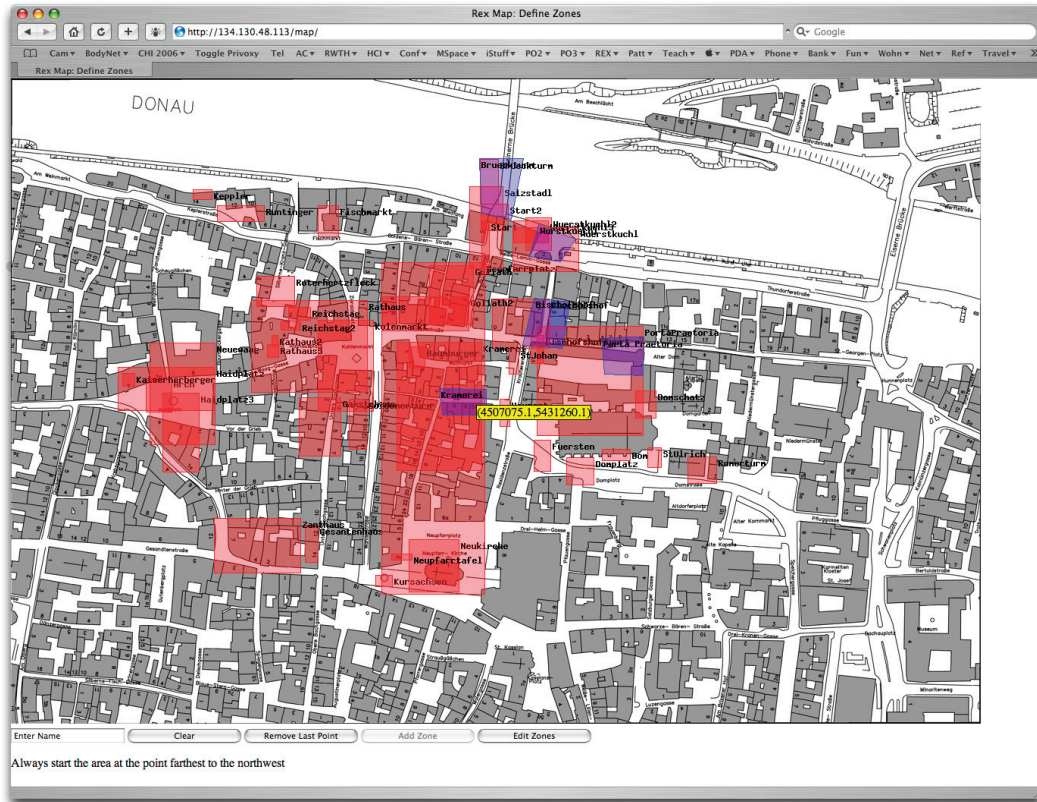
Figure 31
REXplorer map tool that visually defines hotzones based on GPS measurements from playtesting.

Maps are also used in *REXplorer*'s souvenir brochure and blog. During the game, the player's progress is tracked. The resulting information is used to create a personalized souvenir geo-Weblog (blog). The player blog documents the player's route through space by interfacing with Google maps and through time by chronologically listing all sites and characters with which the player interacted during her session (see Figure 32). The blog provides de-briefing Web links concerning the game characters that appeared during gameplay, so that players have the opportunity to learn even more

about the history of the sites they visited. During their game session, players can – and are reminded to – shoot pictures and videos of their field research. This image material (and its corresponding location information) is then automatically added to the blog as part of an interactive map.
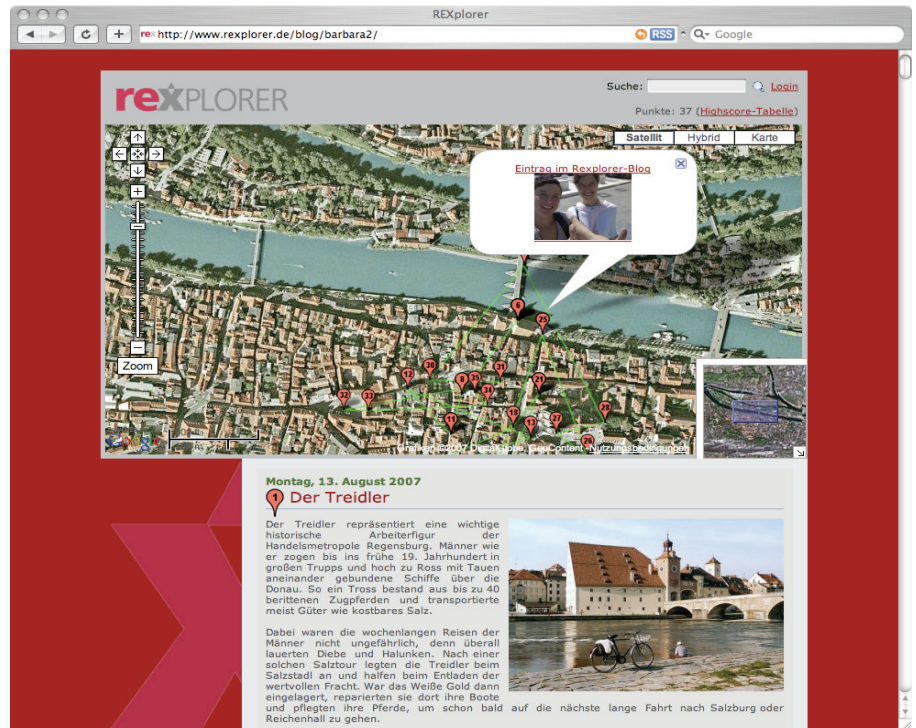
Figure 32
A souvenir blog documents the player route, visited points of interest, and player-generated content (pictures and videos). Clicking on a point of interest on the map links the visitor to in-depth historical information about that point of interest, including external links and a bibliography to encourage further exploration and learning.

REXplorer's game controller provides a simplified keypad interface, one of whose functions is a map button. Since the players are tourists, they generally have difficulties navigating through a foreign city. To compensate for this, we provide a physical German language tourist map in the souvenir brochure, indicating the paranormal activity sites (see Figure 33). By pressing the map button, players can also see their current position on a smaller on-screen map, as well as the destinations of all current open quests. This helps them immensely as they try to navigate through the **City** in order to fulfill the quests.
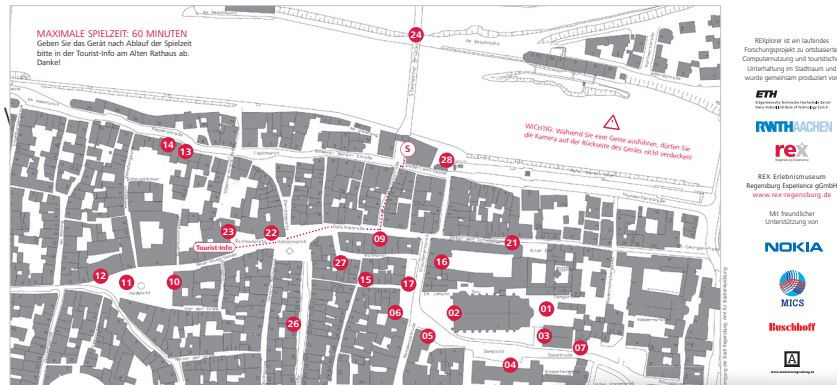
Figure 33

(Right) The outside of the brochure displays a legend for device buttons and gestures. Players receive the brochure when they rent the detector and start playing the game. (Top) The inside of the souvenir brochure features a large map with game action locations marked.

12. Playground

Today, the playground is a highly regulated space built by adults for children up to the age of about twelve years. In the EU, public playground surfacing and playground equipment must comply with the detailed DIN EN 1176 and 1177 standards, which detail issues of construction, safety, and maintenance as well as the liability assumed by the playground premise owner. For example, an apparatus with a height of more than 1.50 meters requires an impact-absorbing layer of sand, fine gravel, or bark mulch[36] — at least 20 centimeters thick; playground equipment not suitable for children younger than three years of age must include an entrance safeguard mechanism; and all see-saws, swings, merry-go-rounds, spring riders, climbing structures[37], chin-up bars, slides, and sandboxes must be checked by janitors every one to three months and by a surveyor every year. In the USA, the National Safety Council has formulated similar rules[38].

---

36 Bark mulch is not recommended by the author, as it contributes to mold build-up.

37 The history of the climbing structure – trademarked in 1920 as the Jungle gym – is interesting, as it feeds back into the history of the playground. Jungle gym inventor Sebastian Hinton was a lawyer and son of mathematician Charles Howard Hinton. Hinton is mentioned in Jorge Luis Borges' short story *The Secret Miracle* and in Alan Moore's graphic novel *From Hell* mostly because he was interested in a fourth dimension and coined the term tesseract to describe a four-dimensional hypercube structure in which four lines spring from each vertex to other vertices. Most likely attempting to build a physical model of the hypercube, Hinton constructed a three-dimensional, multiple-cube bamboo framework in his backyard in Japan while Sebastian Hinton was still a child. Hinton senior theorized that people would never comprehend the fourth dimension while they led their lives in the second, always moving on flat planes. He believed that if people became more comfortable in a real three-dimensional space, the intellectual step to the fourth dimension would be easier. Mimicking a Cartesian-coordinate system in mathematics, Hinton named one set of horizontal poles X1, X2, X3, etc. Those horizontal poles at right angles to the X poles were Y1, Y2, Y3, etc., while the vertical poles were designated as Z1, Z2, Z3, and so on. Hinton senior would then call out coordinates, "X2, Y4, Z3, Go!", and his children – including Sebastian – would scramble for that intersection. Later, Sebastian explained that he and his siblings were happy to humor their father with these drills, but what they really enjoyed was simply climbing, hanging, chasing, and playing like monkeys. And because that type of play was so enjoyable, he eventually decided he wanted to build such a construction for his own children; the jungle gym was the result (Duran 2006).
Sebastian Hinton's wife was Carmelita Chase Hinton, who founded the progressive The Putney boarding school in the 1930s. Shortly before she married Hinton, she had been Jane Addams' secretary at the Hull House, where she took a two-year course on playgrounds (McIntosh Lloyd 1988).

38 Cf. http://www.nsc.org/resources/factsheets/hl/playground_safety.aspx.

In playgrounds, playing almost always takes place under direct (i.e. legal guardian), or indirect (i.e. nanny) control conditions. Essentially, these safety precautions clarify the types of play that the playground and playground apparatus enable: risk-taking, pursuing vertigo, adventuring, and achieving.

Of course, the standards mentioned above provide security and protection for our little ones. But at the same time, standards seek to discipline the **Body**, as Foucault has told us time and time again; this disciplining the playground shares with the original concepts of the **Kindergarten** and the **Campus**, and has embraced the playground concept already, too. The solar powered playground exercise equipment i.play by Playdale Playgrounds Ltd[39] comes with a central LED console and switches at different heights. Children have to follow commands issued by the the console, dictating which switch to activate next; individual or group exercising and performance scores can later be entered into an i.play website. Whilst employing the collecting-based play stimuli within the context of an action competition, i.play is not only a ludic architecture in the age of ubiquitous computing and videogame-like mechanics, but also an advanced instrument of hybrid reality discipline. And yet the origin of the urban playground is not discipline, but rather the opposite.

While roundabouts and swings have existed since the pleasure gardens of the 18th century (Mumford 1961:379), urban growth and industrialization induced by capitalist logic wiped out natural playspaces, meaning play had to be taken from outdoors and relocated to densely crowded houses and apartments or over-populated streets: "Thus this paved desert, adapted primarily to wheeled traffic, became also park, promenade, a dangerous playground" (1961:427). In the face of these rapidly growing, monotonous, industrial, and condensing urbanities, a US reform movement, supported by women's rights activists such as Jane Addams, encouraged the public and

---

39 Cf. http://www.intelligentplay.co.uk.

municipal administrators to provide spaces that would cater to children's "insatiable desire for play" (Addams 1909:Chapter 1). In her seminal book, *The Spirit of Youth and the City Streets*,[40] Addams advocates public recreation, hands-on education, and artistic experience in the form of playgrounds, parks, and sports fields located within the **City** and aimed at healing and overcoming urban alienation and providing direction and focus. Eventually, major cities answered Addams' call, slowly but steadily erecting supervised playspaces.

It was only with the increased building of suburbia in the US that the terrain of suburban greenbelts was won back for outdoor playing. The spatial organization of public "playscapes" mirrors these illusionary naturalizations, offering experiential, modeled
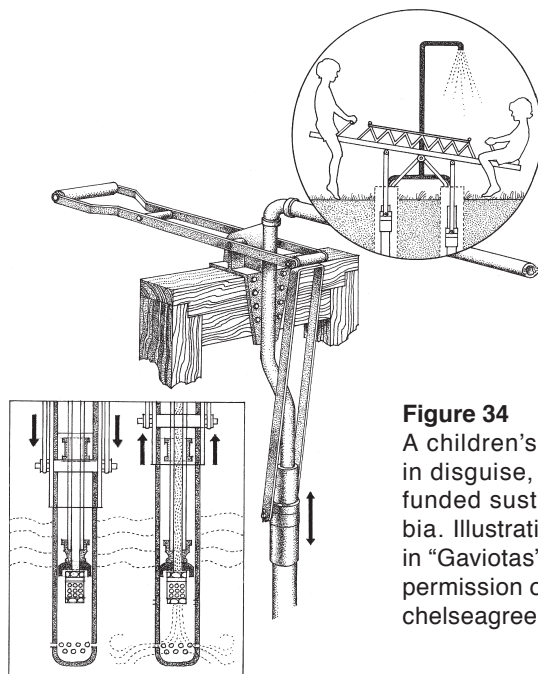
Figure 34
A children's see-saw that drives a water pump in disguise, conceived for the United Nations funded sustainable village of Gaviotas in Colombia. Illustration © 1998 Michael Middleton reprinted in "Gaviotas" © 1998 Alan Weisman, used with permission of Chelsea Green Publishing (www. chelseagreen.com).

40 The full text of the book can be read online at: http://www.gutenberg.org/files/16221/16221-h/16221-h.htm.
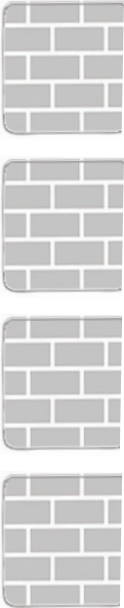
terrains that incorporate vegetation and water into play, as well as, for example, log xylophones, barefoot paths, and human-scale garden chess – the latter, certainly as a means to appeal to older audiences as well. Originally intended as a play-ground of urban liberation, the playground has come to be the play-ground of secured and sealed-off play.

In the ultimate example of disciplining the body, playgrounds can become places of child work, taking advantage of children's insatiable desire for play and exploiting kinesis as kinetic energy. In 1971, in the Columbian war zone of Vichada, a number of idealistic engineers funded by the United Nations co-founded the eco-village of Gaviotas at 4°33'17"N, 70°54'55"W in an attempt to create a community of sustainable living at this very remote site. Over the years, engineers and native Guahibo Indians have come up with many innovations and inventions, among them, a children's see-saw that drives a concealed water pump. With every kinesis cycle of the see-saw– rise and descend – clean water is lifted from below ground (Weisman 1998); see Figure 34. At Gaviotas, the played liquid is a blessing; but at another site, in another context, the innate power of children may be played upon.

The play-ground that is a playground is always a reflection of its wider context. This notion is clearly evident in a novel approach to urban playground design.

At Burling Slip in Lower Manhattan near South Street Seaport – an area that has few playgrounds but is becoming increasingly attractive to residents with children – the City of New York's Department of Parks and Recreation together with "pleasure architect" David Rockwell have developed a figure-eight-shaped landscape for collaborative play. The "imagination playground"[41] (Figure 35) comprises a multi-level space with sloping ramps made out of wood that are intended for running and that connect a sand zone and water zone. Loose play elements are distributed all over the ground: toys and tools

---

41 Cf. http://www.imaginationplayground.org.

such as foam blocks, small boats, and tubes, elbows, and gaskets for constructions, all maintained and overseen by so-called adult "play workers." The goal of this playground space – which resembles the Situationist *New Babylon* concept; see the **Society** entry in this inventory – is to encourage social, sensory, interactive, and individual fantasy play rather than limit ludic engagement to physical activity (Cardwell 2007).
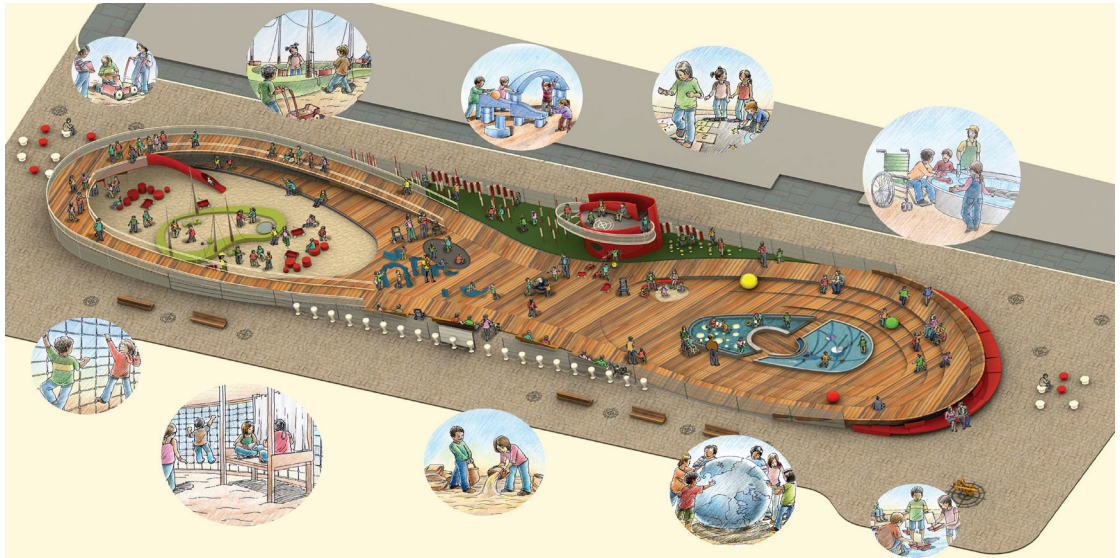
Figure 35
Rockwell Group and the New York City Department of Parks and Recreation: Imagination Playground in Lower Manhattan, which opened in 2009. Drawing reproduced by permission from Rockwell Group.
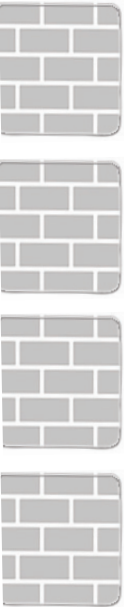
13. Campus

Typically, the campus – from the Latin *campus*, in English, a flat expanse of land, plain, or field – is the ground on which American university buildings are built, comprising research and teaching facilities, administration buildings, student accommodation, and spaces for leisure activities such as gyms or a stadium. The campus concentrates a university's academic facilities on one site meant to embody its overall mission, thereby compacting all aspects of everyday life into an educational play-ground.

After World War II, the idea of the campus hit Europe, with many "greenfield" campuses built in the 1960s and 1970s, including the one where the author worked for some years, ETH Zurich's Hönggerberg campus.

In European urban planning, these introverted and "gated," yet economically viable campuses are currently being criticized for their lack of quality public space and their monoculture (Christiaanse 2007). Their typology, it is argued, runs counter to the efforts of many academic institutions to reintegrate themselves into the urban public realm (Hoeger 2007). One strategy to overcome this alleged remoteness is to make a campus culturally, socially, and thus architecturally attractive so that it can serve as an urban catalyst for surrounding city neighborhoods. This strategy is exemplified by the ongoing ETH Zurich Science City project, which aims to urbanize the remote ETH campus Hönggerberg and transform its buildings into a sustainable model for the university of the 21st century, adding an Information Science Center, a Sport Center, an academic guest house, student housing, as well as a learning and meeting center with an event and exhibition area, career center, and computer-integrated library (Christiaanse 2007).

Another, less construction-oriented strategy based more on computer **Technology** is to increase the attractiveness of campuses and thereby create a sense of connectivism.

This strategy is exemplified by the game prototype *ETHGame*. The game was developed during the winter of 2004/05 in a design class taught by the author and his colleagues at the ETH Zurich in the Department of Architecture. In it, we supervised an interdisciplinary group of architecture and computer science students who worked together on a pervasive game prototype. The class culminated in a two-week intensive workshop and a presentation before school executives involved in strategic e-learning projects.

The *ETHGame* prototype game is a location-based question and answer quiz-like experience in physical space, linking mobile computing and computer-integrated buildings. The game takes place across the city-wide ETH Zurich campus, involving a virtually unlimited number of student and faculty players and about 250 wireless access points.

In the game, these access points represent interactive locations and their locative narratives. The game serves as a vehicle for transmitting and querying knowledge about the individual location's narrative. Thus, each physical location serves as a game locus and interface for the game, and the combination of locations serves as a seamless cross-campus playground. The pervasive environment of the building sites connects players and the game system.

The final game is playable on campus with any mobile or stationary computer and a valid school network account. When a player physically enters a predefined knowledge space with a mobile device, the game locus asks the player location-dependent questions concerning general and technical, discipline- and site-related topics. Figure 36 illustrates a representative application interface for the locus "Baumensa" – in English, the "cafeteria of the architectural department."
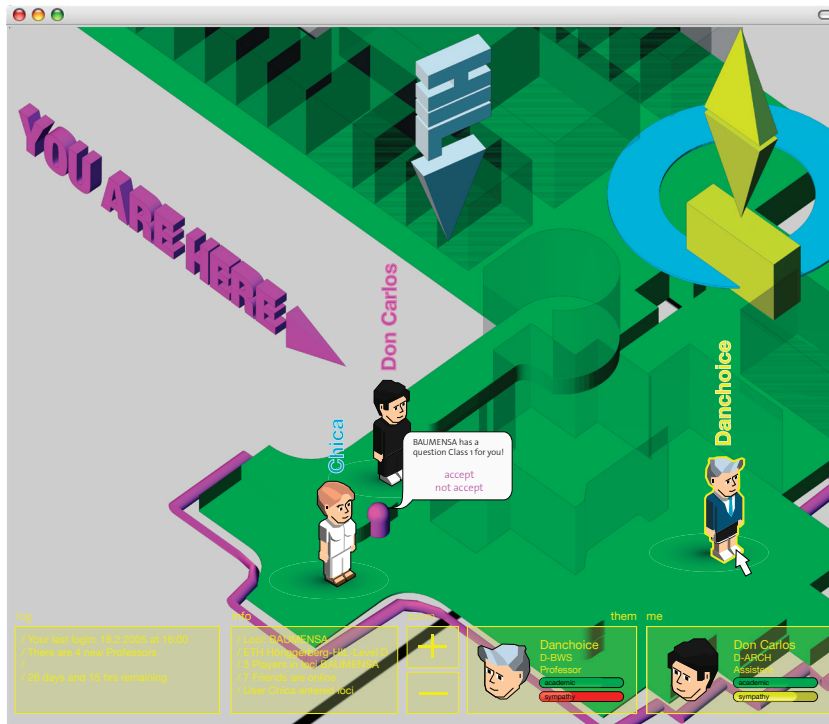
Figure 36
An exemplary application interface of the *ETHGame* prototype, in which
physical locations are superimposed with game rules to foster collab-
orative activity and site and discipline specific learning. Here, the locus
"Baumensa" - the cafeteria of the Department of Architecture inside the
ETH Zurich's HIL building - challenges the player with an architectural
question. Interface sketch by Daniel Wahl.

ETHGame's gameplay involves role-playing an avatar that must collect points by
answering loci questions. Starting out as a "freshman," the player tries to become the
one and only Nobel Prize winner by climbing the virtual hierarchy of the game. Once
a player reaches the level of "professor," she keeps collecting points to ensure her
victory. Only one player can win the *ETHGame* "Nobel Prize" by correctly answering

the last question of the game. If a previous question has not been answered to a locus' satisfaction, a player must consult with another player who is already in close proximity, and together, they must solve the puzzle. Game high scores are displayed on a public high score board. Players may also swap points for coffee discounts in the school's cafeterias.

By ascending game levels through cooperation, answering questions (together with other players), and collecting credit points, a player can win the game and be awarded the *ETHGame*'s Nobel Prize. Once begun, the game – which is supposed to last for six weeks – could impact or at least inspire the way students and faculty work and learn, cf. Walz and Schoch (2006), who detail the design processes of the game as well as design studio didactics.

How did the campus come into being? What culture does it spatialize? Polyzoides (1997) argues that campus-making can be considered a unique contribution to urbanism in that it provides a kind of compressed urbanity, borrowing from precedents in European urbanism, particularly in the arrangement of the central city plaza, the campo (or piazza), which then described the central lawn between groups of university buildings, and later the university itself. Campus-making in the US, however, was originally inspired by and is still carried out according to what Polyzoides calls the Jeffersonian spirit:

> *A liberal education was viewed as a means for young Americans to defend their democratic freedoms over their life-times. In support of that goal, the campus was designed as an idealized setting: a city in the countryside or a countryside in a city. There, students were to be exposed to the civilizing powers of architecture to impart lessons of civic duty and community service. A campus education was intended to convince students of the necessity for tradition and the possibility of cultural evolution (ibid.).*

Since its inception, then, the campus americanensis has served as a certain kind of cultural environment, a **Societal** disciplining environment in which on the one hand, alternative lifestyles can be experimented with, and on the other hand, students can be initiated into the social norms that they will later follow in a microscopic urbanity – in, that is, a **Playground** for young adults.

In the 1970s and 1980s, the tag-like game *Assassin* (also known as the Circle of Death) became widely popular in these special campus environments. In tag-style games (contemporary variants include *Gotcha* and *Paintball*), players stalk and hunt one another at all places at all times in an effort to eliminate competitors with imaginary or mock weapons so that eventually, only one surviving player remains. "Weapons" can range from NERF-type guns (see **Map**) to random acts of kindness, which are used in the outdoor game of benevolent assassination, *Cruel 2 Be Kind*[42] (McGonigal and Bogost 2006).

In 1981, Steve Jackson, a US designer of role-playing games and tactical war games, published a rulebook for these games titled, *Killer*. In the afterword, John William Johnson of Indiana University describes *Killer* as "a 'codification' of an orally transmitted folk game which has been diffusing from one [US] university campus to another for the past fifteen years" (Johnson 1981:75). *Killer* paved the road for live action role-playing and game design in that it standardized rules for hosting one's own game and provided guidelines and scenarios for "human hunt" style, *Assassin*-like live action-role-playing games. It also described a number of historical origins for such games, including **War**gaming; tabletop fantasy role-playing à la *Dungeons & Dragons*, and the re-enactment culture in campus towns such as Berkeley, CA (Tan 2003). *The Society of Creative Anachronism*, founded in 1966 in Berkeley by a group of science fiction and fantasy fans, for example, is a worldwide Middle Ages re-enactment and re-creation

---

42 For game rules, see http://www.cruelgame.com.
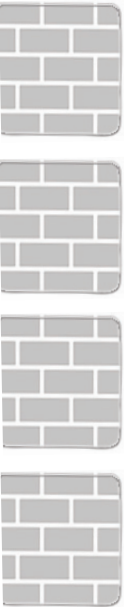
organization whose members study and execute everyday Medieval life in everything from agriculture to cooking, dancing to gaming, leather working to medicine, poetry to pottery, weapon-making to goldsmithing, and weaving to woodworking. Medieval foot combat, however, is the organization's main attraction (SCA 2008). Johnson makes clear the way that this and similar organizations influenced Killer, and then goes on to show how *Killer*, in turn, influenced modern LARP (live action role-playing) culture, see the **Theater** entry in this inventory.

Salen and Zimmerman, investigating the relationship between the artificiality of games and their cultural environments, describe the *Assassin* game of the 1980s as follows: "Game play took place not only in a special, isolated game space, but in and among the activities of daily life" (Salen and Zimmerman 2004:572). Although it is clear that the authors understand "activities of daily life" as everyday campus activities, their description is misleading; it is that special, isolated, 24/7 miniature urbanity of the campus play-ground that enables all the stalking, hunting, and evading over the course of the semester.

Assassin takes the underlying ideas behind wargaming, fantasy table-tops, and combating out of the dorm rooms and onto the wider campus; and campus games are "theatrical in nontraditional but thrilling ways. Players are both actors and audience for one another" (Murray 1997:42). But *Assassin*-type games go even further: they take the spirit of the campus out of the city-in-a-city and into urbanities, pervading the everyday with a prank culture and the concept of joyful "killing." In contrast, the *ETHGame* prototype attempts to create a collaborative campus play-ground which is still agonal enough to be fun.
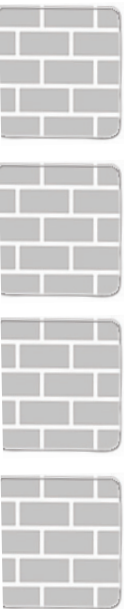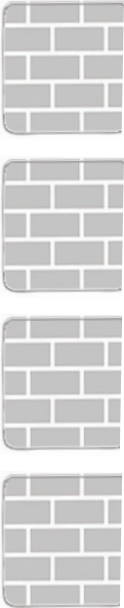
14. Square

In *De Architectura*, ancient Roman architect Vitruvius argues that because the Roman forum was traditionally used for gladiatorial games, a plaza should be built in its place to not only serve as a public communication and trading space, but also as an arena (Vitruvius Pollio 1796/2001a:201). Referencing this designerly advice, early 20th century urban planning theorist Camillo Sitte describes the Roman *forum* – the mother of all plazas and squares, combining Greek *agora* and *acropolis* (Mumford 1961:223) – as a kind of **Theater** (Sitte 1909/2001:8). In Sitte's reading, the forum is the urban equivalent of the country estate's atrium: without these, the city cannot function.

In an aesthetic criticism of 19th century European urbanism, Sitte (1909/2001)[43] proposes a square typology. At its core, Sitte suggests that we perceive a square as a room – that is, as an enclosed area, at best the heart of urban creativity. Sitte strongly opposes early modernist urban planning ideas such as ordering spaces symmetrically or orthogonally and obsessively concentrating on form and shape. Instead, he uses a psychologically informed proportional analysis of the spatial structures of ancient Italian, Austrian, and German cities and squares in relation to their monuments to show how spatial irregularity and ornament can allure us and thereby make public squares more attractive. Modernist architecture – in particular, Le Corbusier's vision of urbanizing the city as exemplified by his conceptual designs, *Ville contemporaine pour trois millions d'habitants* (1922) and *Plan voisin pour Paris* (1925) – rejected Sitte's approach in favor of clear, simple, anti-ornamental geometrical design.

The advent of postmodernist urban planning, however, helped revive Sitte's approach. In the US, Jacobs (1961) initiated a discourse about inhospitable cities, criticizing Le Corbusier's wide, garden city-like grid structures for allegedly promoting crime. Jacobs

---

43 First translated into English and published in the US much later, cf. Sitte (1945).

suggested that the inhospitality of US city cores and streets be overcome by taking a lesson from dense, almost congested city areas – those, that is, that have installed a system of unconscious social control through a direct juxtaposition of street level stores, parlors, and residential living spaces. In her argumentation, Jacobs takes on Sitte's very own reading of agoraphobia – in his opinion, the fear of modernist, geometrically concise squares of emptiness and ennui (Sitte 1909/2001) in which we feel unprotected and insecure. In other words, that which we could call "negative space" (Frederick 2007:6), a kind of space that does not enclose. Still, mind that even Le Corbusier's concept of placemaking attempts to create positive space, though with a different understanding of scale and regularity.

Designers of play-ground experience must first and foremost consider the type of place with which they are confronted. Is it a place that follows a functional layout logic, where, as Mies van der Rohe put it, "less is more?" Or is it a place that is irregular and ornamental, where, as architect Robert Venuri said, "less is a bore?" Just because a space seems suitable for dwelling, doesn't mean it is. Why? Because a place is socially constructed – it only comes alive through the people that inhabit it and the ways they inhabit it. Put another way, "A city's meaning is not just in its bricks and mortar, but also in our understanding and use of the information about it" (Chalmers 2004). This notion can guide the following investigation of a square as a play-ground of public **Theater**.

In the Tuscan city of Siena, the world-famous horse race, La Corsa del Palio – known locally simply as Il Palio – is celebrated twice during the summer. Both the Palio di Provenzano race (in honor of the Madonna di Provenzano) on July 2 and the Palio dell'Assunta race (in honor of the Madonna Assunta) on August 16 are preceded by four days of festivities and a pageant with many costumed participants called *corteo storico*. Both events take place on Siena's central square, the Piazza del Campo, and attract tens of thousands of spectators.

Siena, a former city-republic just like the Tuscan cities of Florence and Lucca, is the most Gothic of the three, and remains an almost flawlessly preserved UNESCO World Heritage medieval city. In fact, the tradition of Il Palio goes back to the Middle Ages, when the *pugna* – that is, public games between city districts, most of them combative – were held on the Piazza del Campo. Starting in the 14th century, the *contrada* – non-governmental city quarter associations that (still) function as urban wards – organized *pugna* in the form of running races that took place publicly across the whole city; this type of pugna was called *palii alla lunga*. After the Tuscan duke banned the bullfighting *pugna* in 1516, the contrada organized the first buffalo-back races on the Piazza del Campo, which later evolved into the modern Il Palio, which first took place around 1650. For more on the fascinating history of the Sienese Palio, see the seminal scholarly work by Dundes and Falassi (2005); virtually every tourist shop in Siena carries copies of this book, now in its second edition.

For our purposes, Il Palio is interesting on three levels, which we will consider in the following order:

- First, Il Palio represents a ludic activity and historical tradition that takes place on a city square, follows certain intrinsic rules, and takes advantage of the urban space where these rules are played out.

- Second, Il Palio is a spatio-symbolic game between city districts.

- Third, Siena is one of the wealthiest cities in Italy, boasting a particularly low crime rate and featuring the highest social capital in any city of its size in western Europe (circa 50,000 inhabitants): "Life in Siena seems ideal, like an arcadia if not even a utopia (...), and the question presents itself of what we can learn from Siena, and that means from the contrade (and, by implication, the Palio) for the organization of urban life in general in the 21st century" (Drechsler 2006:101).

As a ludic activity, Il Palio is best described by its operational rules, which are identical for both *palii*. Below, I have summarized the rules as explained by Dundes and Falassi (2005) and Drechsler (2006), concentrating on the race itself, not the surrounding ludic festivity:

- Il Palio is a bi-annual horse-racing contest thrice around the Piazza del Campo on the Piazza's outermost, steeply canted, 7.5 meter ring. Each lap is circa 300 meters.

- Il Palio is organized by the seventeen *contrada*, each representing one Sienese city quarter.

- Il Palio is, in contrade language, defined as "**War** time."

- In each palio, ten contrada participate, according to a rotational system and a lottery drawing.

- In the race, ten jockeys on ten horses each represent one of the participating contrada, wearing the appropriate *contrade* colors and arms. The hoses are ridden bareback, and jockeys are allowed to use a whip both for their own horse and to disturb their opponents' horses.

- On the starting line, there is only space for nine riders; the tenth has to stand back.

- When the horses are in the correct position, a local authority, called the *mossiere*, starts the race by removing the canapo, the starting cord.

- The first horse to cross the finish line with or without a rider, but with its head ornaments intact wins, and the winning rider and *contrade* is awarded a banner of painted silk, the palio.

The race is ferocious and fast. Jockeys hit one another. Horses are killed or injured. The square is crammed with awe-struck spectators and competing *contradaioli*, ready to fight those wearing opposing colors. Like in any staging of cruelty (see **Theater**) or arena game (see **Stadium**), the public performance of daring horsemanship, mutilation, and "physical re-creation" (Drechsler 2006:115) of the *contrada* is spectacular. Yet, after the second *palio*, as the summer begins to wane, Siena again becomes an outstandingly peaceful city.

The "palio-contrade" complex, as Drechsler thoroughly shows, through *contrada* warding and the palii as a defined time of war, assures that Siena remains a safe city, at least on the surface. Is this the desirable urban model for the 21st century? Are games pacifying the public, and if yes: at what expense?

We can only conclude that the play-ground of the square, a center of urban life in most European cities, reflects some kind of spatial and social structuration and, because of its scale and meaning, is capable of staging and processing central conflicts. Rose (1999) points out that Il Palio is only one of many paramilitary, intramural games of Medieval origin played in Tuscan, Umbrian, and many other cities. These games often reflect the highly zoned architecture of miniature communes in the hilly urbanities where they are played, thereby fostering an intra-urban parochial mentality. Mock combats "offered a non-lethal outlet with, hopefully, a cathartic outcome as a substitute for the vendetta. Such events were preceded by impressive religious-civic processions, formally manifesting the government's jurisdiction. Today, the direct descendants of these paramilitary games come alive each summer" (Role 1999).

Another example of such an intramural game is the Calcio Storico Fiorentino, a Medieval form of mob football revived in the 1930s and played on the Piazza della Novere in Florence. The game serves to illustrate that partisanship in today's soccer **Stadium** to some extent originates in urban or inter-village rivalry. The evolution of

these public games between neighboring areas can also be traced in other soccer-related phenomena such as the Shrove Tuesday, an annual ludic fight between the parishes of All Saints and St. Peter's in Derby, UK (Schulze-Marmeling 2000:12).

The contrada, at least in Role's reading, remain the intracommunal, militaristic, social clubs they have been for centuries. Thus for them, organizing Il Palio also implies controlling the Arcadian life between the fanatically staged games. This, then, is what we can learn from the Palio-contrada complex for the organization of urban life in the 21st century: The institutionalization of an urban game likely entails other urban and social effects in a given **Society**.

15. Theater

Renaissance architect Andrea Palladio's Teatro Olimpico in Vicenza, Italy, inaugurated in 1585, is the first example of a covered, freestanding, and autonomous theatre in Europe since antiquity. Figure 37 depicts a top-view drawing of the building, showing both the audience space, or *cavea*, which seats around 800 people, and the separated stage. In the demarcated *cavea* – see the **Cave** entry of the inventory – the audience's gaze is fixed on the stage so that its members become passive spectators to the role-playing and storytelling action on stage. Later, the audience would also gaze at the painted scenography, which displayed the new Baroque illusionary perspective for the first time, introducing and anticipating the perspectival illusionism which later was designed onto e.g. façades in the city by the same scenographers (Mumford 1961:378). Note the startling analogy between the transferal of Baroque theatrical scenography into the city and the permeation of digital games into everyday life.

Figure 37
Andrea Palladio: Teatro Olimpico (top view). Drawing by Ottavio Bertotti Scamozzi (1776) / public domain. Reproduced from Wikipedia.
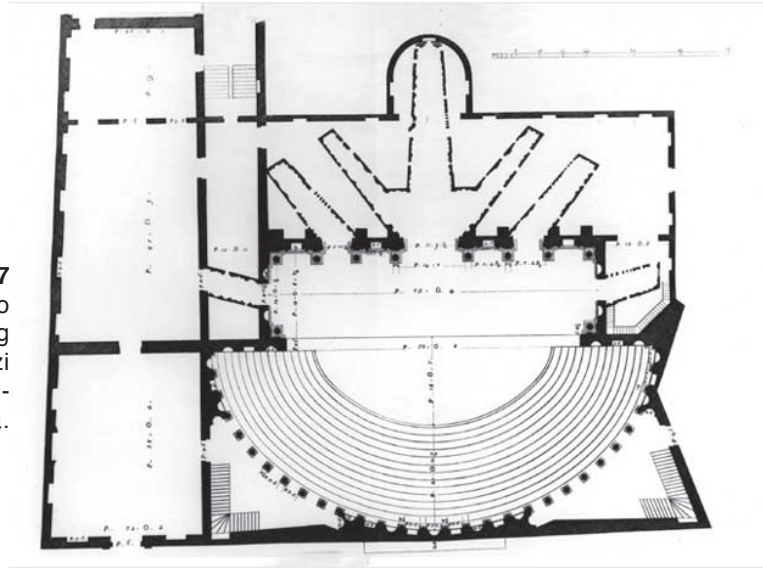
On the one hand, then, modern theater forecloses the intent of Baroque culture to please the masses by way of illusionist spectacle (see also the **Trompe l'œil** entry). On the other hand, and more fundamentally, the elements of the Teatro Olimpico – stage wall, three entrances (which are the platform for the painted scenes), and *proscenium* stage (i.e. stage portal and area between curtain and orchestra crowned by the colonnaded proscenium arch) – reconstruct the theatre of antiquity, in which the circularly seated audience is, according to Vitruvius, "immobilized by entertainment" (Vitruvius Pollio 1796/2001:210). After all, the Greek Θέατρον, théatron, literally means "place for viewing."

The spatial boundary between role-play-ground and savoring-play-ground hampers the to-and-fro between the two parties without preventing it. We can trace practices of overcoming the separation between actor and spectator in Denis Diderot's theoretical treatment of bourgeois tragedy from 1758, *Discours sur la poésie dramatique*. In it,

Diderot (1994), informed by the spirit of Enlightenment, denounces theatrical stylistic devices such as a-part speaking or extempore, i.e. improvised a-part sentences, both of which are intended to break the quasi-programmed demarcation between stage and audience space in order to create kinetic possibility between actor and spectator. Diderot suggests that actors should imagine a wall at the front of the stage, separating first floor and acting area. Ever since, this imaginary but impermeable wall has been known as the fourth wall. An accompanying factor for this central concept of naturalist theatre in the proscenium theatre building can be traced in the concept of "suspension of disbelief".

The suspension of disbelief is an essential ingredient for audience enjoyment of theatrical live play as well as of other forms of entertainment. The term was first coined by poet and philosopher Samuel Taylor Coleridge in 1817[44] to describe the audience's shared willingness to imagine – in other words, accept the validity of a piece of fiction and the space it defines, even if the fiction or certain of its fictional properties are impossible or fantasy-bound (see the **Impossible Worlds** entry) - as long as the fiction delivers entertainment. In games, the suspension of disbelief can take on many forms. In a digital contest of tennis, a player incapable of physically playing tennis suspends disbelief when enacting a tennis player avatar and beating Swiss champion Roger Federer in a simulated tennis match. In fact, the basic allegorical character of digital games presupposes a suspension of disbelief.

The notion of breaking Diderot's fourth wall originated in Bertolt Brecht's theory of the "Epic Theater." Brecht, a German theater director, playwright, and Marxist, envisioned an audience seated in a classical theatre building becoming aware of what it was watching, thereby emotionally distancing itself from the on-stage action and growing into a body of consciously critical observers. In order to achieve this activation effect

---

44 Cf. http://www.english.upenn.edu/~mgamer/Etexts/biographia.html (a Web version of chapter XIV of Coleridge's *Biographia Literaria*, wherein the phrase appears).

– which Brecht called *Verfremdungseffekt*, in English, "estrangement effect" – actors can, for example, directly address the audience, whereby the illusion of play and hence the suspension of disbelief are destroyed for the sake of self-realization (Brecht 1964). Brecht's modernist theater embodies a deeply political and social idea of the relationship between audience and actors, and can be seen as a critique of passively consumed entertainment. This approach not only departs from the work and dramatic theory of Brecht's contemporary Constantin Stanislavski, but also stands in stark contrast to other influential theater theories such as Artaud's affective "Theatre of Cruelty," which uses violence and sexuality to put the audience in the middle of the spectacle of the play and engulf (and expose) it, thereby keeping it in an affective trance. In a certain sense, Artaud was similar to Brecht: he believed that the unprotected, almost surrealist theater experience could become a catalyst for societal transformation – a way to take full advantage of the Aristotelian concept of catharsis by addressing the unconscious chaos of the "great dark myths" (Artaud 1958:31). Brenda Laurel clarifies for us that Brechtian theater, for its part, suggests that catharsis – considered as pleasurable emotional closure in the Aristotelian sense – necessarily takes place beyond the play's ending, that is, when the experience of play becomes embedded in everyday life (Laurel 1993:121).

Brecht's Epic Theater concept suggests other, more far-reaching techniques to break the fourth wall and, by extension, to create an integrated play-ground of role-playing. The most radical technique of the Epic Theatre, the *Lehrstück*, or "teaching-play," was originally intended for children. In it, there is no longer any regulated boundaries between audience and actor:

> *The teaching-play teaches by being played, not by being seen. In principle, no spectator is necessary for a teaching-play, although one can be utilized. The underlying expectation of the teaching-play is that the players can be influenced societally by performing certain courses of*

behaviour, engaging certain actions, rendering certain speeches and so forth (Brecht 1967:Bd. 17:1024).[45]

Brecht's experimental-educational *Lehrstück* attempts to develop a theater without an audience, a theater in which players cooperatively role-play to solve dramatic conflicts. The vision of the *Lehrstück* can be traced in a number of contemporary theatrical modes:

- In German-speaking countries, the field of *Theaterpädagogik* – in English, "theatrical pedagogy" – encompasses a set of different *Lehrstück*-like activities. These activities aim, for example, to bring together professional actors and acting laymen, to stage collaborative performances for corporate and leadership training, to prevent or treat the effects of personal or social conflicts, to teach and train processes, and to let players assess social relationships, learn to cooperate, analyze situations, probe attitudes, and, ultimately, solve problems. The author himself uses Brechtian Lehrstück-like techniques at several stages in his game design classes. Figure 38 shows a group of students from Tsinghua University in Beijing performing and analyzing game system procedures during a workshop taught by the author, with the topic of an Olympic Games pervasive game.

- Much of contemporary theatrical and performance practice plays with the intimate relationship between audience and actors, often extending that relationship beyond the theater building. These practices involve the development play-grounds on the brink of public and private space. Single

---

45 Translated by the author from the original German: "Das Lehrstück lehrt dadurch, daß es gespielt, nicht dadurch, daß es gesehen wird. Prinzipiell ist für das Lehrstück kein Zuschauer nötig, doch kann er natürlich verwertet werden. Es liegt dem Lehrstück die Erwartung zugrunde, daß die Spieler durch die Durchführung bestimmter Handlungsweisen, Einnahme bestimmter Handlungen, Wiedergabe bestimmter Reden und so weiter gesellschaftlich beeinflußt werden" (Brecht 1967, Bd. 17, S. 1024).

audience members, for example, are brought into a direct communicative situation with actors acting solely for them; the theater situation is thus urbanized. In Fiona Templeton's pioneering city-wide theatrical piece *YOU - The City* from 1988 – cf. Templeton (1990) – actors are positioned at various, fixed locations in New York City.[46] One by one, each audience member makes an appointment to go to a small Manhattan office at a designated time, where he is then picked up by an actor, who takes the audience member to the next rendezvous point, where he is then handed over to the next actor. This process is repeated over and over again until the "client"/audience member ends up at a café after visiting various locations throughout New York City. *YOU – The City* is thus clearly reminiscent of Situationism and clearly related to our **Society** entry as well. As one researcher comments, "You - The City can be read in terms of what the Situationists would have called a détournement of the usual networks of communication and exchange. Whereas the Situationists had plans to replace the stairways in Piranesi's etchings with lifts and recast the street dustbins in ivory, Templeton presents a détournement of encounter" (Olsen 2001). In the afterword of her play, Templeton herself refers to this form of one-to-one intimacy as a theater that assumes and creates relationships, while simultaneously evoking privacy (Templeton 1990:139f.). The mobile phone theater piece *Call-Cutta* (2005), created by Berlin theater collective Rimini Protokoll, is another example of theater becoming an urban theatrical play-ground, while at the same time playing with the traditional relationship between actor and audience and making it more personal. *Call-Cutta* is a 60-minute neighborhood walking tour through the urban jungle of Berlin, remotely guided on a cell

46   The author participated in the 2002 Hamburg, Germany version of YOU – The City, called DU / Die Stadt and directed by Judith Wilske, cf. http://www.att-hh.de/archiv/du/.

phone by call center employees based in Calcutta, who were trained to dramatize the experience in that they guide the audience through the telephone etc.[47]
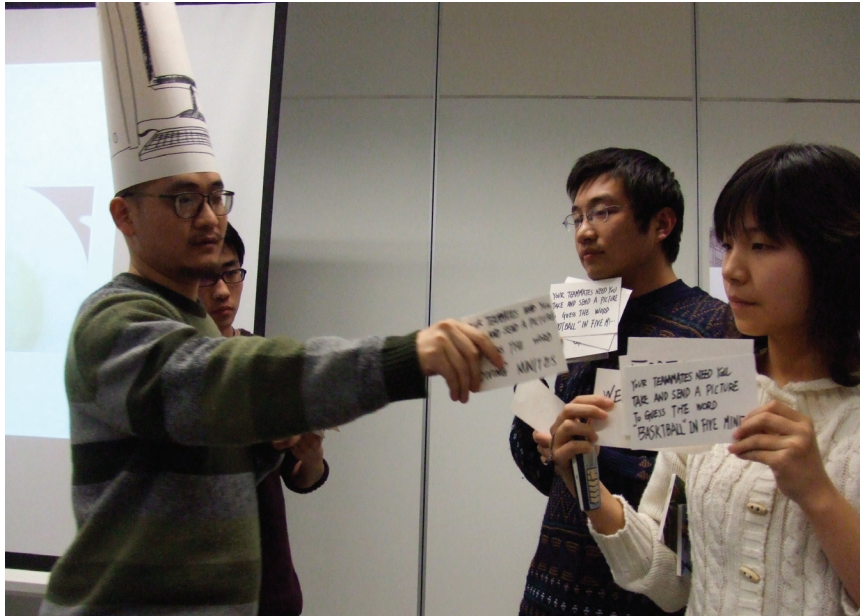
Figure 38
Participants in a game design workshop at Ts-inghua University Beijing theatrically perform a game system process.

In another strain of performance tradition called role-played drama, participating performers are simultaneously spectators and actors. Thus, a performing player is "acting as an author in performing the character, and also acting as audience by watching other players" (Kim 2004:35), jointly realizing a fictional world and story. Still, this kind of acting, like any acting, depends on the actor's ability to consciously differentiate between an ordinary self, a pretended self, and the ensemble.

47 Cf. http://www.rimini-protokoll.de/website/en/project_143.html.

In contemporary times, this dual performer-spectator capacity is the focus of many pioneering games in the fantasy genre, the best of which is the tabletop game *Dungeons & Dragons* (1974). Discussing *Dungeons & Dragons*, Mackay argues that fantasy role-playing is a performance art, "worldly entertainment that manufactures, through a shared social experience, otherworldly playgrounds from the images of American culture" (Mackay 2001:156). Choy (2004), on the other hand, discusses how role-playing games can be interpreted and traced as a form of theater as well as a form of "framing" meaning. As an example of the former, Choy cites Augusto Boal's educational Theatre of the Oppressed (TO), which seeks to free the masses from oppression by involving them in short plays, engaging them in discussion about those plays, and then encouraging them to freely improvise[48] different versions of those plays in order to solve social problems and, in a bottom-up approach, democratize politics (2004:56ff.). TO and Brecht's Epic Theater are similar in that they hand out dramatic patterns to the performers – starting points, so to speak. Note that Choy does not point out the tremendous influence of Brecht's Epic Theatre on Boal's performance theory, though in fact, the main difference between Brecht's Epic Theatre and Boal's TO is only that the latter is supposed to take place wherever people and their conflicts take place, i.e. in schools, streets, prisons, churches, or other public spaces. TO, in other words, is not constrained to the theater building.[49]

---

48 Improvisational theatre in Europe has a long tradition. The Commedia dell'arte (CDA)– or, more to the point, Commedia all'improvviso – originated in Italy in the 16th century, emerging from the tradition of Medieval travel- ing theater troupes. In the CDA, we find typified characters such as the Harlequin, who often invites the audience to participate in the improvisational play, which usually takes place outdoors, using little or no props and some pre-scripted dramaturgy (Richards and Richards 1990).
Whereas in the CDA, improvisation is transformed into a semi-regulated performance technique, the impromptu theatre tradition on which the CDA was based can still be experienced throughout southern Germany and Austria in the so-called "Volkstheaters." These types of theaters are similar to community theatres, but are more tradi- tionally oriented and often stage the same piece year after year.

49 Cf. the Declaration of Principles of the International Theatre of the Oppressed Organization at: http://www. theatreoftheoppressed.org/en/index.php?nodeID=23.

Choy also adduces Goffman's concept of frames of meaning within which subjects perform (2004:58ff.). The "performance frame" differs from the "primary frame" (consider the words "I will kill you," which have different meaning when performed as opposed to when spoken out in a non-theatrical situation), but both are similar in that they afford participants the chance to act along "conventions of etiquette (…) to maintain engrossment of those who are participating and watching" (2004:60), the latter of which is essential to the suspension of disbelief both in the proscenium theater and in dramatic role-playing. In role-playing, this suspension of disbelief is mainly held together by a specially assigned participant role. In the tabletop fantasy role-playing game Dungeons & Dragons, the dungeon master is a selected participant who prepares game sessions, serving as storyteller, moderator, and referee, i.e. game rule interpreter.

Similarly, in live action role-playing games (LARPs), the gamemasters lay out the fictional framework of the LARP to be staged. Although LARPing modes vary widely, the duties of the role-playing gamemaster typically involve preparing and creating a consistent role-playing play-ground for players, determining the game mechanics (i.e. the verisimilitude of player actions), plotting, guiding, possibly providing goals for characters during an adventure, controlling non-playable characters throughout the LARP, and interpreting game rules in order to progress the game.

The main difference between tabletop role-playing and LARP is that in the former, "the creation of meanings is mostly verbal and predominantly symbolic" (Loponen and Montola 2004:40), whereas in the latter, the use of indices – i.e. a real sword, as opposed to, say, a card symbolizing a sword – is preferred (2004:41f.).

Still, LARPs typically use defined spatial "scenes" for role-playing. Montola and Stenros (2008:7) identify three major "design ideals" that currently guide LARP makers: (a) powerful dramas, i.e. LARPs that use scripted events and an act structure; (b) 360°
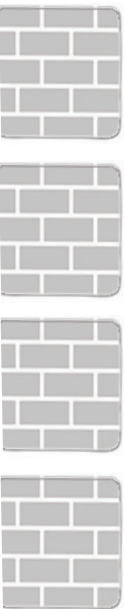
illusions with perfectly crafted theatrical playspaces, which need not be realistic, but must be atmospheric; and (c) pervasive LARPing, i.e. pervasive role-playing in which players and plots actively confront everyday life in urban environments and treat everyday objects and environments as if they belong to the diegetic fiction. As Montola notes: "The selling point of pervasive role-playing is the thrill of non-safe ordinariness combined with game invading the sphere of the ordinary. It's not all about the "this is not a game" illusion (…) allowing the players to pretend that the game is real. The attraction is in the pleasure of doing real things for real" (Montola 2007:184). This type of performative confrontation can and/or even seems to involve involuntary bystanders as well as basically everyone outside of the diegetic framework of the player (group). This last design ideal technique thus resembles Boal's drama technique of the "invisible theatre," i.e. a concealed and confrontational performance in a public space, staging, for example, sexual harassment (Boal 1992).

In Alternate Reality Games (ARGs), the spatial setting of the game becomes ambiguated (as in: "the game could be anywhere"), and puppetmasters assume roles similar to the gamemaster. Christy Dena (2007) differentiates among several design duties: setting the scene by creating game elements, making sure that players can "find" the game and access it, manually adjusting the game subsequent to player input, monitoring the game in real time, and facilitating player collaboration through storytelling and other play elements (2007:238ff.). Design duties do not, however, include making clear to the players that they are staging an unfolding play, which would represent the ultimate breaking of the fourth wall.

This breaking, which turns the spectator into a player and vice versa, is clearly evident in virtual massively multiplayer role-playing games (MMORPGs) such as *World of Warcraft* (2004). MMORPGs take place on clearly defined, virtual stages, and their designedness can be compared to the proscenium theatre in that it features a set of

clear rules that spatially govern experience. Three-dimensional computer simulation demands a clear demarcation of the quasi-theatrical experience from everyday life. Like MMORPGs, ARGs also incorporate virtual role-playing spaces into gameplay, albeit without immersing the player in a sophisticated 3D world. Rather, typical virtual role-playing activities in ARGs include, for example, sending an e-mail to a game character.

What all these forms of dramatic role-playing have in common is the intention of merging, as seamlessly as possible, the roles of actor and audience member. They also have in common a director, who more or less strictly creates and maintains a performance frame for the players, who, in turn, maintain this pre-negotiated imaginary gameworld for themselves and for others. Indeed, Montola finds that "all role-playing is based on a power structure that governs the process of defining" (Montola 2007:178). In virtual environments such as MMORPGs, this power structure is defined and maintained by the game's rule set in combination with the digital environment and certain functional and dramatic game elements.

In certain situations, the rule set is the dominant actor. The rule set of the game prototype for *Spirits of Split* (the product of a 2004 game design summer school workshop supervised by the author in Split, Croatia), for example, supersedes an active puppetmaster during gameplay. In *SoS*, the whole city core of Split becomes the play-ground, with actors acting for, but also interacting with, spectating tourists. In the game, six locals wearing historic dress roam freely through Split's city center, overlooked by the UNESCO World Heritage site, Diocletian's Palace (see also the **Castle** entry). Tourists must locate the "spirits" (see Figure 39, which shows Diocletian himself!) by touring the city and exchanging keys that they have been handed at one of the booths at the palace's gates for cubes, which they receive only when they have located the "correct" spirit. The game is over once the visitors have collected all cubes. The characters (i.e. the spirits) perform little songs or pantomimes typical of the time in

which they supposedly lived. Visitors are free to take the cubes home as a gift from the city. These cubes are similar to the *Ole Million Face* and *Changeable Charlie* cube toys: by turning the cube sides, tourists can puzzle together six perspectively identical images of six of Split's historical periods, including its imagined future as envisioned by its citizens.

Figure 39
The character of "Emperor Diocletian" performed by one of the game design atelier participants in the tourist game prototype *Spirits of Split* (2004). The game takes place on site at Diocletian's Palace, the UNESCO World Heritage protected Roman monument that today makes up the city core of Split, Croatia.

The discussed modes of theatrical performance draw a wide-ranging picture of the theatrical play-ground. This play-ground can be presented to an inactive audience or make the audience its players; it can be organized physically and/or virtually; it can take place in a very defined space or permeate a whole city or combination of playspaces; it can be a verbal activity or involve physical enactment.

For our purposes of outlining the theatrical play-ground, it is most interesting to define it as a continuum of play that, at one extreme, strives to maintain a fourth wall between actor and audience, and at the other extreme, strives to break this wall so that ultimately, an actor-spectator figure can emerge. At the same time, the physical site of the play-ground can also vary. As noted above, it can be the defined space of the proscenium theatre, it can be several pre-defined stations in a city, it can be any given ad-hoc location or combination of locations in a city or rural environment, or it can be any other mediated site. In the latter case, theater permeates space.

Figure 40 depicts how examples from our discussion can be plotted on a two-axis model. The resulting plot shows, for example, that the special role of the proscenium theatre in programming role-playing is similar to the special role of spatial programming in MMORPGs: both offer an enclosed, protected play-ground. This implies that taking the digital gameworld for granted is not a new quality of theatricality. In an earlier and more explicitly theater-related concept offered by Goffman, however, theatrical performance – i.e. dramaturgy – is viewed as a metaphor for everyday social life, in that we all perform "roles" (e.g. student, teacher, husband, son, etc.) on a given "stage" (e.g. kitchen, bedroom) for others (e.g. audience, observers, co-participants) using "impression management." Impression management is a dramatic effect that arises from a subject's task-driven effort to influence the audience's perception about people, objects, and/or spaces by way of social interaction. This includes facets of performative presentation such as muscular control, speech, dress code, manner, etc., becoming, in
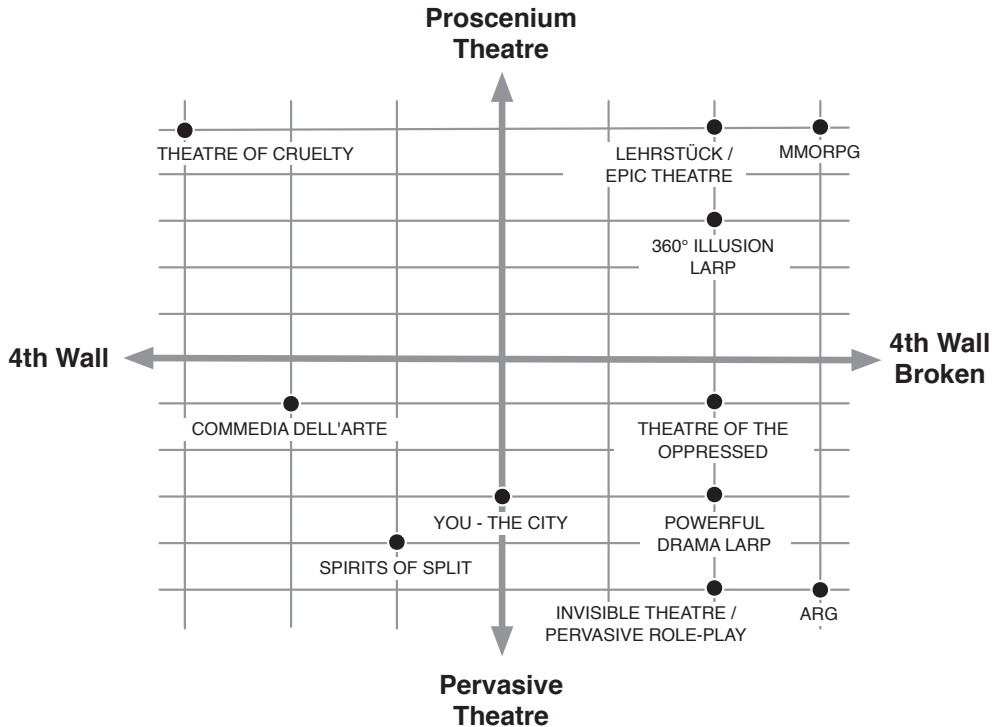
Figure 40
A matrix of performance space and the actor-spectator relationship.

What types of staged confidence games, then, do we play when we play MMORPGs? What games do we play in online social networks, in which we lay open and display our relationships for all to see, in which diaries have become public blogs for everyone to read (see the **Topology** entry), and in which being seen becomes a value, a form of social capital (see the **Panopticon** entry)?[50] What is the relationship between this

50 For an overview of social anthropological research related to social network sites, cf. Boyd and Ellison (2007).

form of socially accepted theatricality and the theatricality of protected, highly encoded performance stages of the digital role-playing game that reach out into the public in the form of LARPs and pervasive games? Will these strains of theatricality complement or confront one another?

16. Stadium

The stadium is an architectural solitaire; and today, stadia stand out as urban – or even national – monuments, architectural icons, or medial architectures. For Koolhaas, a stadium is XL, and the stadium's BIGNESS implies that it does not need a context. A stadium represents and functionalizes mass events. It directs the **Panoptic** gaze of the savoring audience (especially before the advent of **Television**)– towards the center of the giant, usually oval or horseshoe-shaped building.

The soccer stadium can be looked at as a curious combination of a surround theater in which seating and/or grandstands circle around a central stage or enclose this stage (Ching 1995:257). Or it can be viewed as an athletic **Playground**, often in the form of a flat lawn, which, as mentioned earlier, enables running and sports contests. In a more polemic reading, Peter Sloterdijk (2008) notes that in the 20th century, we have faced a double renaissance of ancient spatial forms: that of the Greek stadium and that of the Roman arena. Sloterdijk further notes that the latter prevails over the former. Let us look at both forms to understand what he means.
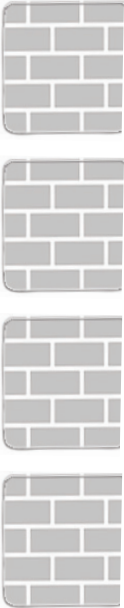
On the outskirts of their polity, in an ancient gymnasium, perfect and perfectly nude athletes prepared to participate in the Pan-Hellenic Olympic Games at Olympia, home of the gods, where well-oiled parties from all over Greece gathered for five days of competition devoted both religiously and culturally to "the body as the active physical

expression, through disciplined play, of the human spirit" (Mumford 1961:136). For many years, the barefoot stadion race was the only discipline of the ancient Olympic Games, and the stadion runners ran towards the Olympic temple *coram deis*, as Sloterdijk (2008) notes. The Olympian stadion site evolved with the growth and meaning of the Olympic Games (Sinn 2004). Originally, the Olympic site consisted merely of start and finish sills, a packed earth track and grass walls for spectators on the sides.

The Olympic Games established an open play-ground of urban rivalry discharged through public athletic competitions. In architectural and appropriative contrast, the Roman arena, and particularly the architectural icon of the elliptical Roman Colosseum (a roofless oval, surrounding, that is, literally: an *amphi*-theatre[51]), inaugurated in 80 AC, squeezed and enclosed space into a "fatalism machine on a grand scale" (Sloterdijk 2008); see Figure 41. Fighting inside the Colosseum meant fighting for life and against death, and, at the same time, for death and against life. Aristocratic politicians sponsored inscenations of fate as a spectacle to pacify the masses and "to win prestige and public office" (Hopkins and Beard 2005:42). Still, bear in mind that the familiar larger-than-life images we conjure of the Colosseum and the performances there are heavily influenced by films and novels, and that "the performances at the Colosseum varied enormously according to the ingenuity of the presenter, the amount of money at his disposal, the practical availability of beasts, criminals or gladiators. After all, a hundred days of spectacles with executions at lunchtime would surely have soon exhausted

---

51 The original Latin name of the Colosseum – or Coliseum – was Amphitheatrum Flavium, as construction took place during the reign of the Flavian emperors Vespasianus and Titus between 70-72 and 80 AD. One myth holds that it was designed by a Christian by the name of Gaudentius, though Virgil, who died many years before the Colosseum was built, held that the identity of the Colosseum's architect was unclear. What is clear is that the construction required an enormous amount of technical and practical architectural and crafting expertise (Hopkins and Beard 2005:144ff.). This expertise must also have been responsible for the designs that are not im-mediately apparent to the on-site observer – namely, the underground **Maze** of preparations and storage rooms, of corridors and hoisting shafts, and of lift wells to the trapdoors above, as well as the intricate network of drains (2005:136ff.). In a way, we can think of these structures and technologies as the game mechanics, pumping beasts to the surface and allowing for surprising opponent spawning.

the supply of condemned men and women, even in a society as brutal and cruel as Rome" (2005:73). The Colosseum was, after all, a "political theatre" (2005:41), where people of the ancient **Society** went to be seen, to watch, to cheer, to re-enforce power, to do business, promote, arrange marriages and alliances, and to hail the emperor and the elite.
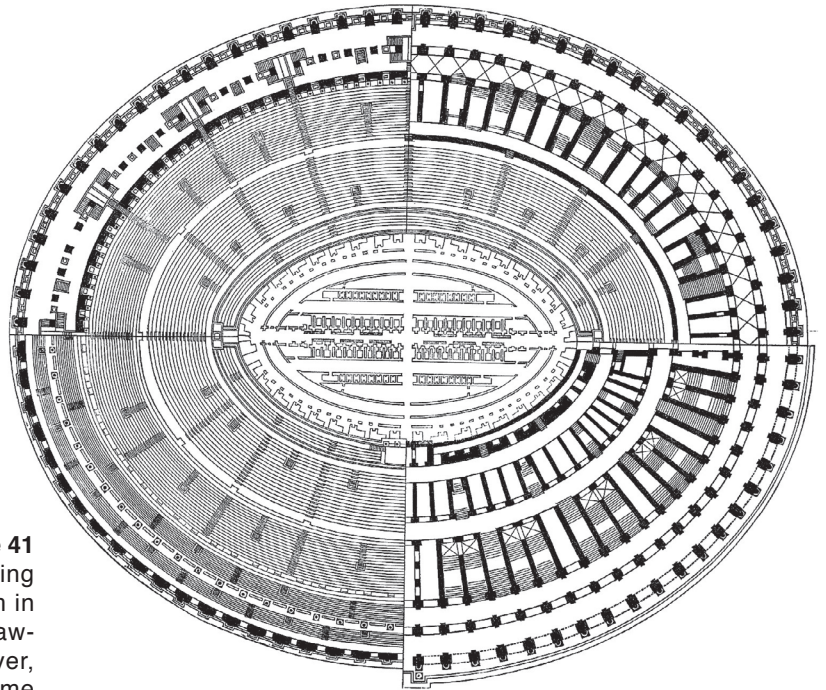
Figure 41
Reconstructed architectural drawing of the Amphitheatrum Flavium in Rome (top view). Note how the drawing peels the building layer by layer, also revealing the technological game mechanics of the space, i.e. preparations and storage rooms, corridors and hoisting shafts, as well as trapdoors. Reproduced from Wikipedia.
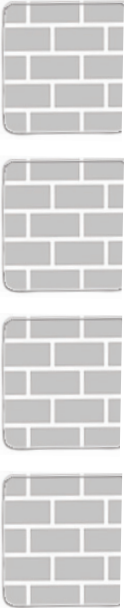
So when Koolhaas argues with the example of Manhattan's culture of congestion that "The Metropolis is an addictive machine, from which there is no escape, unless it offers that, too..." (Koolhaas 1978/1994:293), let us look, with Sloterdijk's words in the back of
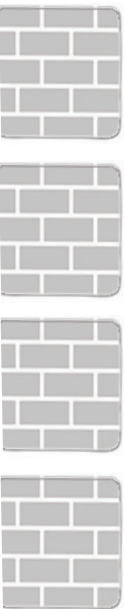
our heads, at the Colosseum as an addictive machine. From this machine, there was, in a definitive sense, no escape for at least one of the gladiatorial opponents who met in the arena. That the ancient Roman idea of (cruel) theatrical entertainment – optimized by **Technological** apparati and constructions – prevails today over the ancient Greek idea of perfect athletic competitions agreeable to the gods, can be traced in a recent essay by stadium architect Volkwin Marg.

Marg, who has built numerous soccer stadia in Europe, suggests that in the media age, soccer stadia are the stage for "commercialized gladiator games" (Marg 2008). In Marg's reading, stadia host and manage mass events, and their purpose is to stimulate vertigo not only through the overwhelming scale of the competitions they host, but also by means of the masses they can hold. In order to be successful, Marg continues, recently built soccer stadia must be cramped and steep and feature a sonic lid, creating a resonance body that amplifies the synchronous, collective, primal scream. Marg appropriately names these new incarnations of ancient Roman arenas, "hysteria bowls" (ibid.).

Other factors also help choreograph the mass experience. The arrival landscape sets a certain mood; security elements steer the stream of visitors and define how the play-ground is perceived; the areal inscenates orientation and, eventually, illuminates the scenery. Yet though the masses may appear homogenous, the logic of sports marketing dictates the programming of segregation between Super VIPs, VIPs, business customers, regular visitors, and fans in the building of professional soccer stadia for the purpose of commercialized entertainment. Taken together, this divided stadium audience then effectively plays the claqueur for the audience in front of home television sets, which demands an authentic atmosphere (ibid.). But Marg misses one important factor, the main factor for those viewers more interested in the ludic activity than anything else: Not only are different audience "ranks" segregated in the stadium, but the audience as a whole is segregated - indeed, sealed off – from the players in

a segregation that resembles the demarcation between audience and actors in the proscenium **Theater**. That means that the audience can gaze and hear, but not play, while the players can play as well as gaze upon and hear the mass and scale of the stadium.

As in the *proscenium* theater, the intended hindrance between players and spectators influences audience affects. But there are other factors, too, that work on the spectator. Not only for the players, but also for the audience, the soccer contest arrogates partisanship, which is amplified by league, cup, or championship games. Furthermore, the play-ground of the stadium emotionalizes and reconditions the relationship between players, fans, and club. In combination with spectator mass and scale, the acting out of aggression can be better comprehended: In a filled arena, it is socially acceptable to at least verbally release aggression (by, for example, screaming, scolding the referee, etc.). But when we are in a stadium, we realize that this catalyst function is normalized, too – that it is part of the ritual in the stadium to behave according to the stadium code, which includes singing or collective playing (as in the *La Ola*-wave movement).

Whether it's a contest stadium[52] – or spectacle arena, the heart of the soccer stadium remains, architecturally and ludically speaking, the soccer game. The literal basis of the soccer game is rules, players, ball, goals, and perhaps most fundamental, a flat green lawn – a field, really. This soccer green enables players to run and kick around a ball[53]. It can be understood as a life-size **Board**, demarcated into smaller spaces in order to visualize and support some rules of the game that takes place on it. The better the game, the better the impression of the stadium – and for the players, playing against the background of 80,000 cheering spectators is an impression not easy to forget.

52 Of course, the stadium can be inscenated as a spectacle, too. Watching the opening of the Olympic Games in Beijing, the author had the distinct impression that he was looking at a red-glowing, almost skeletal Bird's Nest stadium wearing a giant Olympic torch, reminiscent of scenes from *The Lord of the Rings* movies.

53 Of course, a field can be used for throwing discs too, as it is in Frisbee and flying disc, cf. Morrison and Kennedy (2006).
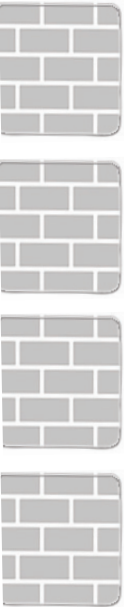
17. Kindergarten

In the 1830s, a pedagogist and crystallographer by the name of Friedrich Fröbel (1782-1852) developed the idea of the kindergarten as a teaching system for younger children, opening the first installation of his revolutionary preschool educational framework in Blankenburg, Germany in 1837.

Fröbel, a highly spiritual and idealistic man, conceived kindergarten as a set of abstract design activities intended to reveal God's universal language of geometric perfection and natural harmony and thereby cultivate children's innate observational, reasoning, expressive, and creative abilities: "Its ultimate aim was to instill in children an understanding of what an earlier generation would have called "the music of the spheres" – the mathematically generated logic underlying the ebb and flow of creation" (Brosterman 1997:12). Many activities were incorporated into the kindergarten concept, such as gymnastics games, gardening, storytelling, singing, and group sociability training. To support these activities, Fröbel invented kindergarten materials, which he called gifts, intended to serve as play things for the children to and program them according to the kindergarten concept.

Gifts 1-6, including ball, sphere, cylinder, cube, and block, were intended to teach the kindergarten children about simple, solid bodies and their kinetic and **Tessellation** properties. Children were meant to "contemplate" the surface of Gift 7, parquetry. The following gifts, e.g. sticks; and drawing with a slate pencil – were dedicated to exploration of linearity, while Gift 11, punching dotted patterns into paper, was dedicated to exploration of visible points (von Mahrenholtz-Bülow 1891:269f.). The 12th Gift – an occupation, really – was sewing, often on gridded paper, and Gifts 13, 14, and 18 entailed cutting, weaving, and folding (which often included making animals and people by folding a single piece of paper, an activity recommended mostly for older children).
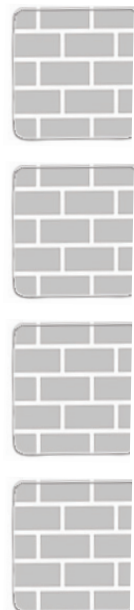
Gifts 15-17 programmed the laying of lines or linear forms by way of slats, jointed slats, and paper strips. Gift 19, peas work, featured softened peas that served as connectors for toothpicks or small sticks that were used to create constructions. And finally, Gift 20 provides children with modeling clay, which, in a way, encompasses all previous gifts (Brosterman 1997:64-88). Figure 42 shows exercises that Fröbel suggests for Gift 1, first published in his *Sonntagsblatt* newspaper. To us, these exercises have the appeal of simple play kinesis, of basic to-and-fro.
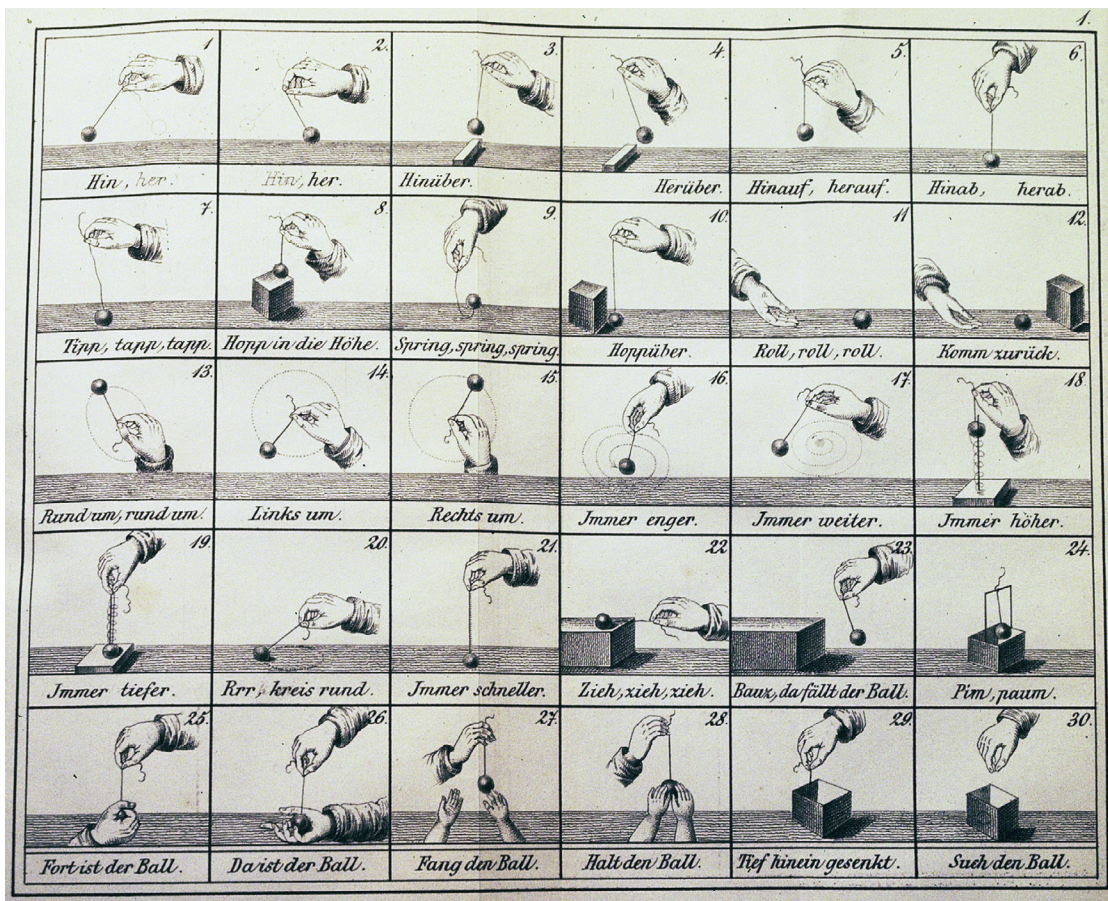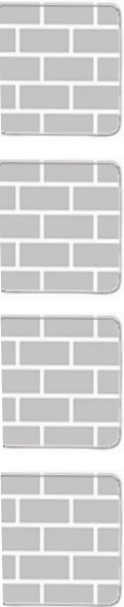
Figure 42
Gift 1 play exercises as suggested by Fröbel. Reproduced from Goldammer (1872). Illustration is public domain.

The twenty gifts progress from volume to plane to line to point to line to plane and back to the beginning: solids (Gifts 19 and 20). Children could not play freely with these gifts; their use was regulated by Fröbel's Unitarianist philosophy: "In short sessions of directed play, the gifts were used to create pictures or structures that fit loosely into three fundamental categories – forms of nature (or life); forms of knowledge (or science); and forms of beauty (or art)" (Brosterman 1997:37). The dimensional wave-form drawn by the twenty gifts and the realms can all be traced in two of Fröbel's major inspirations.

On the one hand, Fröbel's design gifts were inspired by pedagogy revolutionary Johann Heinrich Pestalozzi, who, driven by a belief that the world consists of combinations of basic particles, attempted to break down nature into a language of gridded and geometric elements. He then used this *ABC der Anschauung* (Pestalozzi and Buss 1803) – in English, object observation lessons – to teach orphans and peasants at his school in Yverdon, Switzerland. On the other hand, Fröbel's gifts were inspired by his obsession with crystals and the four-year tenure he spent under Professor Christian Samuel Weiss, the father of modern crystallography, at the Mineralogical Museum of the University of Berlin between 1811 and 1815. At the museum, Fröbel was responsible for researching and categorizing the museum's vast collection, which eventually helped Weiss formulate his groundbreaking, mathematically precise systematics of crystalline geometry, wherein the forms of crystals are external manifestations of regularly arranged particles in three-dimensional grids.

Brosterman, in what can be called an archaeology of modernity and design functionalism, argues that many influential architects and form-givers of modernity have been "indoctrinated, in effect, programmed, by the spiritual geometry of the early kindergarten" (1997:13): Le Corbusier in Switzerland and later France; Walter Gropius and Johannes Itten at the Bauhaus in Germany; Theo van Doesburg, co-founder of De Stijl, in the Netherlands; Frank Lloyd Wright in the US; and, in a turn-of-the-
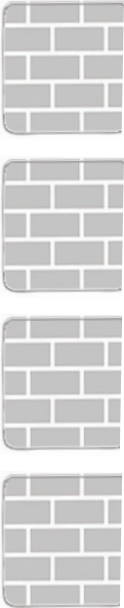
century Milton, Massachusetts kindergarten, R. Buckminster Fuller, who remembers how the 19th Gift led him to the invention of triangular structures from semi-dried peas and toothpicks and, ultimately, the geodesic dome (see Brosterman (1997:84) and **World**).

Fröbel conceived all kindergarten activities, including the gifts, as play activities. This was the novelty of the educational kindergarten: It defined a space for play to teach about life and nature, thereby framing play as essential to childhood development. If we accept only a portion of Brosterman's argument – that modernity and modern design and modern art have their roots in Fröbel's formal language as expressed in the kindergarten gifts – then we can further contend that major components of modernity have their roots in the play of geometrically perfected shapes.

Architecture, then, not only sets the stage for or functionally defers to gameplay; rather, architecture is fundamentally and inherently the result of calculated play with primary forms: a *jeux de volume et de lumière* stretching from *Mass Production Housin*g (Le Corbusier 1928/2008:253-290) to architectural and urban planning rule sets such as those put forth in *A Pattern Language* (Alexander/Ishikawa/Silverstein 1977) and eventually to games such as Will Wright's *SimCity* (1989) or *Spore* (2008) or the *Patterns in Game Design* publication (Björk and Holopainen 2005). To borrow a phrase from game designer Jesse Schell, these are all tools "to play with patterns" (Schell 2007:402).

From this perspective, and in the words of a gamer, we can read the kindergarten as a conceptual play-ground of creation – a God-view of interlinked (cf. **Topology**) creation where children re-create life forms using a God view for tools and where gift exercises trigger play-stimuli and each exercise creates an allegory of the perfection of God's creation, a creation of playful movement.

18. Amusement Park

The amusement park condenses the **City** (or any other theme) and the pleasures of **Technology** into one play-ground. In its attempt to make accessible maximum entertainment on minimal ground, the amusement park always miniaturizes another space, even if that space does not yet exist. The amusement park is like a **Dollhouse** without macroscopic reference – it must entertain with novelty or variation, not with commonplaces. An amusement park can be a play-ground for amusing because like other public sites intended for gazing, adventuring, and contemplating, it is not only a social destination that we seldom, if ever visit by ourselves, it is also a total play-ground. As Caillois notes,

> *the amusement park seem[s] to be the proper domain of vertigo-inducing contraptions – machines for rotation, oscillation, suspension, and falling, constructed for the purpose of provoking visceral panic. However, all the categories of play are concurrently and seductively involved. Shooting guns or arrows are competitive games of skill in the most classic form. (...) Lotteries are everywhere. (...) Mimicry is also present. Jesters, clowns, ballerinas, and mummers parade and cavort in order to lure the public" (2001:133f.).*

Amusement parks are built and attract people all over the world; people – like the author - enjoy "collecting" visits. Existing examples include the Tivoli Gardens in Copenhagen, Denmark, reportedly the world's oldest amusement park; the Prater in Vienna, Austria, with its Riesenrad Ferris wheel familiar from the movie *The Third Man*; Disneyland in Anaheim, CA in the USA, the park with the most franchises; Europapark in Germany, the largest park on mainland Europe; Gorky Park in Moscow, Russia; Jaya Ancol Dreamland in Jakarta, Indonesia; Blackpool Pleasure Beach in Blackpool, England; Tivoli Park in Rio de Janeiro, Brazil; and Durban Miniature Railway Park in
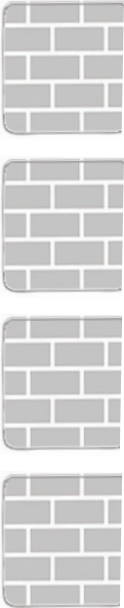
Natal, South Africa. In Dubai, developers are currently constructing the three billion square foot Dubailand[54], a **City**-size urban entertainment center expected to become the world's largest tourist and entertainment destination, combining theme and water parks, gigantic shopping malls, and residential skyscrapers. Upon completion, Dubailand will integrate urbanity with the form of the amusement park, becoming the Arabian spectacle of a *New Babylon* that the Situationist concept of the future ludic city of *New Babylon* never wanted to be (see the **Society** entry).

At least in the USA, where amusement parks are highly commercialized, the park as an architectural form has its roots in several other historical forms, which Judith A. Adams traces in her study *The American Amusement Park Industry. A History of Technology and Thrills* (Adams 1991:1-40). Adams' study serves to highlight how the amusement park, that play-ground and precursor to pervasive games, emerged and was shaped:

- Medieval church-sponsored fairs and trade fairs all across Europe.

- So-called "pleasure gardens" in Europe, which emerged in the late 17th century; unlike the often chaotic and brief fairs, the gardens were available for outdoor activities throughout the warm seasons.

- Parks such as the Prater in Vienna, which opened in 1766 as a naturalized and egalitarianizing respite from urban life.

- Mechanized enjoyment machines such as the carousel and the roller coaster, which constitute the essential and most enduring appeal of amusement parks as distinct from gardens and retreats.

- World Expos, most notably the World's Columbian Exposition held in Chicago in 1893; this expo introduced the essential design elements of

---

54 Cf. http://www.dubailand.ae.

amusement parks – unity, magnitude, and illusion – as well as inaugurating many defining firsts: electricity in buildings, artificial illumination, hamburgers, picture postcards, and organizational elements such as the Midway Plaisance, alongside which amusement attractions were erected, like, for example, the newly invented Ferris Wheel, which rose 264 feet above the Midway. Figure 43 shows an image of the Midway Plaisance.

Figure 43
The Midway Plaisance at the 1883 World's Columbian Exposition in Chicago. Photo is public domain.

Adams' archaeology, however, lacks a few important precursors:

- Masquerade balls and the carnival custom, which take on myriad forms and in which masked and costumed figures play an integral role, asdoes the "cast" for amusement parks. For example, during the Swabian-Allemanic carnival pageants in southwestern Germany, in which the author

has participated for more than ten years[55], the "fools" (i.e. reappearing characters such as the orange-clad Hansel) jump rhythmically to a marching band, slowly moving through town streets wearing wooden masks and traditional costumes with leather straps onto which cupric bells have been sewn.

- Public festivals such as the largest of them all, the Wiesn, or Munich Oktoberfest, which has taken place annually on the Theresienwiese since 1812, conceived as a Catholically sanctioned "time out from order, class, hierarchies, and respectability" (Herwig and Holzherr 2006:68). The Oktoberfest is flavored with extra-strong beer and orchestrated by booths, amusement attractions, and the architecture of giant beer tents wherein people are seated and equalized on wooden benches.

Based on these examples, we can infer that the precursors to amusement parks are, fundamentally, about compaction, and that amusement parks generate a kind of synthetic, if not virtual urbanity catering to those audiences that, in their everyday lives, experience suburbanization and urban sprawl programming as opposed to European models of high density and multiple-use zoning.

In his influential book *Delirious New York* (1978/1994), subtitled a "retroactive manifesto for Manhattan," architect Rem Koolhaas describes how Coney Island, a former resort location and site of legendary amusement parks, grew into a "theater of architectural invention" in the late 19th and early 20th centuries (1978/1994:78) and, as such, into a vis à vis laboratory for modern Manhattan. Koolhaas' term "Manhattanism" – anticipated on Coney Island – outlines an architecture that is theatrical, synthetic, ever-in-progress, ever-illuminated, ambitious, utilitarian, polemic, megalomaniac,

55 Cf. the German language Wikipedia entry on the Narrenzunft Oberndorf at http://de.wikipedia.org/wiki/Narrenzunft_Oberndorf.

vertical, hyper-dense, and subject to gridiron rasterization. It is a "delirious" – we could say, vertiginous – spectacle and testing ground that, urbanistically speaking, has its roots in the competing technologies of pleasures brought forth by an "urbanism of the fantastic" (1978/1994:63) – roots, that is, in the multiple synthetic realities and pleasure zones of Coney Island, including, among others, Steeplechase Park, Dreamland, and Luna Park. In a seconding account of their impact, we read that "the air crackled with electricity. The masses (...) went to amusement parks to try out modern track-systems and novel constructions; the latest in amusement became a test bed for modernity" (Herwig and Holzherr 2006:62). In the guise of entertainment rides and pleasures, the Coney Island pleasure zones and zone visitors together conducted mass experiments in, for example, velocity, automation, horizontal and vertical (elevator) transportation, electrification, and vertical building and experiencing. Experimentation also included simulation – a trip to the moon was offered (see also the **Castle** entry) and a vast indoor model of the canals of Venice was set up (see the **City** entry) – as well as miniaturization – a "midget city" was erected (see the **Dollhouse** entry). In the *Dr. Couney's Infant Incubator* building, premature babies were publicly saved (Koolhaas 1978/1994:46ff.).

Coney Island, we learn, was, at first, a US play-ground. In the beginning, it attracted tens of thousands; then, in the 1920s, one million or more per weekend. This success eventually led to the spawning of Luna Parks all over Europe as well. These parks lost their audiences only in the 1940s due to the advent of **Television** programming and mass tourism (Blume 2001:44). Still, pleasure and architectural concepts from Coney Island live on even today in the **Casino** town of Las Vegas and in **Folly** and symbolizing architecture, which Venturi/Scott Brown/Izenour described so vehemently in their criticism of the symbolistic and zoomorphic building gestalt of the "Duck" (1977:17).

While Koolhaas (1978/1994) encourages us to think of amusement parks as miniature cities, Gingold (2003) encourages us to think of digital games as miniature garden

spaces – an analogy derived from Shigeru Miyamoto, Japanese game designer/ producer of milestone videogames such as *Super Mario Bros.* (1985), and an analogy that points out the affinity between amusement parks (as pleasure gardens) and games:

> *A garden has an inner life of its own; it is a world in flux which grows and changes. A garden's internal behaviors, and how we understand those rules, help us to wrap our heads and hands around the garden. The intricate spaces and living systems of a garden surprise, delight, and invite participation. Gardens, like games, are compact, self-sustained worlds we can immerse ourselves in. Japanese gardens often contain a multiplicity of environments and places, such as mountains, oceans, or forests that we can look at, walk around, or interact with. Gardens are a way to think about the aesthetic, cognitive, and representational aspects of game space (Gingold 2003:7).*
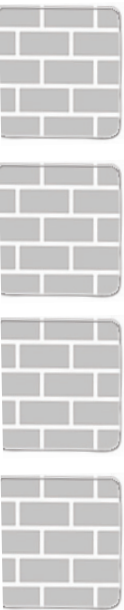
Celia Pearce (2007) merges both models, arguing that digital games resemble theme parks, yet neither references Koolhaas nor points at the garden analogy suggested by Gingold. In Pearce's view, Disneyland in Anaheim, CA came into existence to fill an ahistorical, i.e. narrative and folkloristic vacuum that pervades southern California in contrast to Europe, where inhabitants are immersed in the three-dimensional narrative structures of the European **City**, made up historically of castles and cathedrals (2007:201). In particular, Pearce parallels theme parks and graphically based massively multiplayer online games (MMOGs): both types of locales, she argues, are public places that simultaneously offer entertainment and attract thousands of people. Both are themed, with the vast majority of major MMOGs based, more or less, on the sword and sorcery role-playing game *Dungeons & Dragons* (1974) and motifs from J.R.R. Tolkien's secondary fantasy worlds. Similar to amusement park precursors such as Renaissance fairs, and dissimilar from the Disneyland scheme, MMOGs demand that players role-play and thus fully break the "fourth wall" (see the **Theater** entry for further elaboration).

Whether zoned garden or spatial narrative, the play-ground of the amusement park can be analyzed from a game design perspective as an agglomeration of play pleasures similar to the game design figure of a tournament. In such a space, visitors usually deal with a succession of railed entertainment: "In environments based on the amusement park model, the story and the visit can be tightly meshed" (Murray 1997:109). From an architectural perspective, at least the American amusement park can be taken as an attempt to produce a congested storytelling fantasy by way of **Technology**: "Americans, after all, never had real castles (...)" (Dunlop 1996:104) to program "a place of warmth and nostalgia, of illusion and color and delight" (1994:25). Or so, at least, thought Walt Disney in a romanticized reading of history and present. The amusement park, then, is a sandbox play-ground of imposed, hard-railed configuration - a true spaceplay.

19. Panopticon

Panopticon is a Greek word that means all-seeing and is the name that British philosopher and utilitarian theorist Jeremy Bentham (1748-1832) chose for a completely new, ideal prison meant to be erected in an urban context. Bentham presented this vision to the public in numerous drafts, offering a perfected architectural model in 1791 with his *General Idea of a Penitentiary Panopticon* (Kaschat 2002:114f.). Figure 44 visualizes this late Panopticon structure with six stories, designed to hold circa 460 prisoners, with each windowed cell in the outer circle (A) confining several inmates. (D,O,F) show connecting corridors and wells, followed by a chapel on the inner circle (M,G) and the director's watchtower in the middle (N). As Foucault explains, "The Panopticon is a machine for dissociating the see/being seen dyad: in the peripheral ring, one is totally seen, without ever seeing; in the central tower, one sees everything without ever being seen" (Foucault 1997:362).
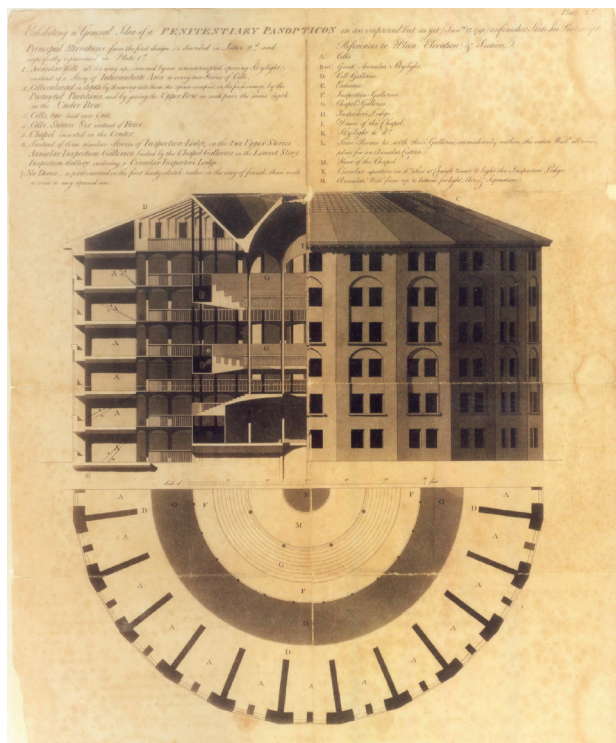
Figure 44
Plan and text for the *Panopticon, or Inspection House*
1791. Bentham Papers, Special Collections, University College London Library Services.

This power of the gaze is institutionalized in the Panopticon. Thanks to the architecture, a single party can conduct absolute surveillance of everything taking place within the building. The Panopticon is an architectural machine that creates and sustains power: prisoners always see the tall and central tower from which they are intermittently observed, but don't know when they are being watched, so must assume that it is always. The result, Foucault explains, is "To induce in the inmate a state of conscious and permanent visibility that assures the automatic functioning of power" (Foucault 1997:361). Bentham's Panopticon has inspired designs for buildings varying from asylum to hospital to, of course, prison, but has never proved sustainable. And yet, the concept itself has sustained thanks to Foucault's in-depth analysis of disciplinary

control (Foucault 1997) as a synonym for a society of surveillance that impacts both public and private life.

The entertainment industry, Peter Weibel briefly notes, does not consider the panoptic principle a threat or a punishment, "but, rather, as amusement, liberation and pleasure" (Weibel 2002:215). And in a mediatized world governed by images, reality **Television** shows such as *Big Brother* (Endemol Entertainment 1999), in which a group of people live together in a "container" TV studio apartment and are recorded 24/7 by cameras, provide "the pleasure of power, the pleasures of sadism, voyeurism, exhibitionism, scopophilia [the love of looking], and narcissism" (ibid.).

The London neighborhood Shoreditch has created a mechanism that caters to those very pleasures. There, residents can tune into a TV channel to watch content from cameras installed in Shoreditch public spaces. The service allows residents "to see what's happening, check out the traffic and keep an eye out for crime" (Digital Bridge 2006). The latter is of particular interest when considering the "crime channel Shoreditch TV" and Shoreditch itself as a play-ground in the form of a panopticon. Shoreditch TV is a public closed circuit television program (CCTV) intended, implicitly, to convince neighborhood inhabitants that public CCTV can assure social control. At its core, however, Shoreditch TV inscenates the power of gaze as entertainment in a true-life version of the movie *The Truman Show*, in which the protagonist eventually escapes the OmniCam Ecosphere, where the reality TV show that he unknowingly inhabits takes place (Paramount Pictures 1998).

Rolf Nohr (2007) considers the movie as though it were a game: "*The Truman Show* anticipates the computer game *The Sims* (2000) and thematizes the closed and fully controlled space of life-simulation on the basis of a normative canon of values and consumerist strategies for success. Like *The Sims*, *The Truman Show* represents the declension of a neoliberal urbanistic space" (Nohr 2007:470).

Michel de Certeau, in *The Practice of Everyday Life* (de Certeau 1984), proposes countering such totalizing tele-views – i.e. perspectives from above and afar that seek to control space – with individual everyday spatial design practices from below intended to break conformity. De Certeau offers some examples of such practices: tactical activities such as the altering of maps or city street objects, the inventing of lost and legendary spaces, and the encouraging of conscious choice and customization of goods so that the consumer becomes a producer. Indeed, in a mediatized age, there are many interesting forms of playful counter-surveillance available:

- New York City based performance activists and Situationist pranksters, The Surveillance Camera Players perform **Theater** plays in front of public surveillance cameras.

- Mann (2003), criticizing an over-surveilled **Society**, describes methods of *sousveillance*, i.e. inverting surveillance, by bringing the power of gaze down below, to a human level – somewhat in the tradition of the Situationist *détournement* performances. An example can be seen on Figure 45, which shows a variety of everyday *sousveillance* infrared and video camera objects.

The panoptic play-ground caters to those who find pleasure in exhibiting and those who desire to show. Those who seek to protect their privacy can overcome surveiltainment by creating sousveiltainment, thereby ironically (re-)creating consumer-created surveiltainment.
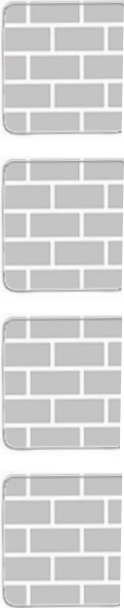
Figure 45
Seriously ironic: "Conspicuously Concealed Cameras as a deterrence against crime" – University of Toronto EXISTech's sousveillance line of products. Reproduced by permission from Steve Mann (www.wearcam.org/domewear).

20. Trompe l'œil

During the Baroque period, which originated in Italy in the early 17th century, artistic methods to deceive the eye were developed with the goal of establishing an aesthetic of the virtual that tended to invade space in every direction (Bal 2001). Combining multiple, shifting points of view and narrative perspectives, the Baroque was different from classical systems in its "refusal to respect the limits of the frame" (Ndalianis 2000). Because of this refusal, the viewer is situated into a spatial relationship to the representation. Consequently, Gilles Deleuze proposes the term "architecture of vision"

(Deleuze 1993:21) as the best way to paraphrase the Baroque approach to building. Similarly, Lewis Mumford describes how the city planners of the Baroque – Servandoni, Inigo, Jones, Bernini – were primarily scenic designers who created theatrical backdrops for the inscenenation of power using designerly means like overscaling, ornamenting, and disguising, and, first and foremost, created a **City** culture of pleasure for the masses by way of monumental façades on grandiose palaces, pleasure gardens with swings and roundabouts, the Bal masqué, and anatomy dissections as public performances conducted in public "theaters" (Mumford 1961:378f.). Here, too, we can identify certain play types: pursuing vertigo, role-playing, savoring, and gazing.

The *trompe l'œil* – French for "trick the eye" – is one artistic technique particularly representative of this Baroque urban pleasure culture based on the architecture of vision. The trompe l'œil was perfected in probably its most immersive form, the quadratura, which virtually extended the existing physical architecture ad infinitum. One good example of a masterpiece of quadratura – and of High Roman Baroque technique in general – is Father Andrea Pozzo's breathtaking nave ceiling of the church Sant'Ignazio in Rome. Painted between 1691 and 1694, the fresco depicts an allegory of the apotheosis of St. Ignatius and the missionary work of the Jesuit order stretched across a circle with a 17 meter diameter. The ceiling is flat, but thanks to Pozzo's use of perspectival projection, a trompe l'œil effect is achieved whereby a viewer, standing at an ideal spot marked by a yellow marble disc in the floor, experiences an illusion of infinite depth. Looking up at the **Theatrical**, lofty cupola [Figure 46], he sees angels floating upward towards the open and bright sky, orchestrating St. Ignatius' entrance into paradise so that "It is almost impossible to tell where the real architecture ends and the faux begins. Here, the subtle techniques of perspective make possible the illusion of a virtual reality which seems to blend seamlessly into the physical space of the church – one has the feeling of really "being there" beneath that angel-filled sky" (Wertheim 2000:111). Also see **Impossible Worlds**.

Figure 46
Fra Andrea Pozzo's trompe l'œil ceiling of Sant'Ignazio di Loyola a Campo Marzi in Rome. Reproduced from Wikipedia.

Not only trompe l'œil frescoes, but the trompe l'œil in general as a **Technology** of visual representation challenge the Albertian fixed-point perspective construction, named after Renaissance architect, humanist, and writer Leon Battista Alberti.

Alberti's 1435/36 work *Della Pittura* can be considered the first modern treatise on the theory of painting. In *Della Pittura*[56], Alberti proposes the mathematical construction and framing of painted space as a way "to control the space which man is to inhabit both as an actor and observer" (Spencer 1970). In contrast, the illusion of infinite spatial

---

56 An English language version of the text can be found online at http://www.noteaccess.com/Texts/Alberti/.

extension into impossible realms as exemplified by Pozzo's piece of art manifests the allegory as the central designerly and spatial trope of the Baroque. It is the allegory as a central spatial feature that ties trompe l'œil to computer games, the latter of which we can analyze as playable illusions (Aarseth 2007).

In fact, it has been argued that like the allegorical spatiality evoked by trompes l'œil, 21st century entertainment forms such as **Amusement Park** attractions are also intended to break down the spatial barriers between the space of the representation and the space of the audience: "One space extends into another, one medium into the next, the spectator into the spectacle, and the spectacle into the spectator. Extending the Baroque spatial dimension of sight, this Baroque attraction employs multi-media technologies to produce virtual trompe l'œil effects that call into play all the senses. Introducing motion, sound, and other sensorial encounters to visual spectacle, the contemporary Baroque articulates the perceptual collapse of the frame more powerfully, and in ways not witnessed before" (Ndalianis 2000). The same holds true of pervasive games such as *REXplorer*.

When we walk, take the subway, or drive through the streets, undergrounds, and squares of Zurich, Berlin, London, New York, Seoul, Beijing, or Tokyo's Ginza, urban trompes l'œil meet our eyes in the form of billboards, large public LCD displays and interactive façades. Many of the interaction possibilities between these new urban forms and the passers-by who see them have not yet been researched. Outstanding projects that redefine this relationship include the Chaos Computer Club's *Blinkenlights* installation in Berlin in 2001. Using 144 building emitters, *Blinkenlights* morphed the windows of the "House of Teachers" high-rise at Alexanderplatz into "pixels," which were then used to display messages and animations on the building with the help of PC software. In addition, *Blinkenlights* enabled observers to play a gigantic version of *PONG* (1972) by using the keypad on their cell phones to control a virtual ball (Willhardt 2007:396f.).

It is not only the entertainment or game spectacle that seeks "to obliterate the frame that demarcates a distance between reality and representation" (Ndalianis 2000). In the future, that will increasingly become the goal of our media-enabled architectures as well of our hunger for illusion. The illusionistic stance of the trompe l'œil and its conceptual successors goes well beyond Le Corbusier's ludically inclined, but nevertheless narrowing assumption that "paintings are made for meditation" (Le Corbusier 1928/2008:170).

21. Television

In 1977, Thomas Gottschalk, today one of Germany's most famous TV hosts, began moderating the new TV show *Telespiele*, which made him famous nationwide. (Note that Telespiele is a German term for early console games, translating quite literally to "tele games.") The show ran for a total of almost 30 episodes until 1981, turning into one of the most popular evening programs. In fact, *Telespiele* was both the defining TV experience and one of the defining game experiences of the early game generation – a first glimpse into the possibility of mediated **Panopticon** games.

Telespiele was a truly unique and groundbreaking TV program not only for its time but also in general. The show consisted of contestants playing videogames against one another in the TV studio, using a large public display and idiosyncratic controllers such as punching balls. The highlight of the show, however, was an entirely different gameplay experience: a call-in candidate would play a game clone of *PONG* against Gottschalk or against a studio candidate, with the players using their voices to control and change the bat's y-axis position by making sounds or remaining silent (which returned the bat to (0,0)). Hence the somewhat confusing, yet amusing game claim: "Eine Telefondiskothek mit Thomas Gottschalk," in English, "A telephone discotheque

with Thomas Gottschalk." The call-in contestant would use her TV set as a display and had the chance of winning a videogame or choosing between a pre-recorded sketch or a live band performance. Although questionable from a design standpoint – players often failed to hit the ball at all, and very few to-and-fros, i.e. ball cycles, took place – the *PONG*-like game in *Telespiele* marked the dawn of pervasive games. Through an interactive game and diverse media, a relational network between a set of rather diverse spaces and actions was established, thereby creating a coherent gamespace that comprised:

- the players (phone-in contestant and show host);

- the other TV studio contestants (now viewing the action) as well as the TV studio audience;

- the physical location of the TV studio;

- the physical location of the call-in candidate;

- the physical and mediated objects used by the players to engage with the game (phone, TV display, interface, controllers, etc.);

- the physical locations of all viewers (including my parent's living room);

- the objects used by all viewers (including my parents and me) to experience the show (TV and, potentially, phone);

- the object-bound mediation of players, candidates, audience, their locations, their objects-in-use and their interactions via the TV.

Quite a complex setup in which the physical and the virtual interrelate, and spaces and objects take on several roles, both virtual and physical, to enable the player as well as the audience experience. The key role in this setup, however, is that of the architecture

of the game, where architecture describes the processes, uses, and performances – in short, the production of space, time, and sociability – that took place during a *Telespiele* show.

In classical tele-games, savoring still is a major mode of experience, in no small part because real-time audience interaction is not easily produced in TV shows. And yet if we assume classical TV delivery (TV set at home with a cable box placed on top), we can think of many interesting models for novel interactive TV games designed according to the following lines of exemplary continua (note that some modes may be mutually exclusive):

- Participants: Cast – TV audience.

- Participation: Savoring – Active participation.

- Commentary: Program created – Audience created (and judged).

- Programming: Live – Preshot.

- Input channel: Remote control – Multiple devices (phone or other).

- Input transmission (i.e. how many players does it take to effect an output): Single player – Accumulated Players.

- Game opponent: Game system – Other player(s).

- Game feedback: Continuous (i.e. real-time) – Discrete (i.e. asynchronous).

- Player location: Televised (TV studio or alternate location) – TV audience.

- Output location: Televised – Personalized (e-mail, IRQ, phone).

- Game progress: Intra-Show – Inter-Show.

- Content fabric: TV show – Cross-media experience.

Television can also extend its reach and interaction possibility when coupled with other media through **Technology**, thereby creating new play-grounds.

22. Folly

The architectural, physiognomic, or zoomorphic – in any case: hyper-real – folly is the play-ground of symbolic savoring and, sometimes, inhabitation. Venturi/Scott Brown/Izenour reject it as brutal: "It is all right to decorate construction but never construct decoration" (1977:163). Figure 47 shows an example of such decorative symbolistic space, a sketch of Charles-François Ribart's *L'Elephant Triomphal, Grande Kiosque à la Gloire du Roi* from 1758.

Ribart suggested the construction of this three-level piece of zoomorphic architecture as an addition to the Champs-Elysée in Paris, where the Arc de Triomphe stands today. The French government turned down the proposal. Over 120 years later, however, on the other side of the Atlantic, the U.S. Patent Office granted James V. Lafferty a patent for the design of animal-shaped buildings in 1882. That same year, Lafferty constructed the Elephant Bazaar, later dubbed "Lucy the Elephant," a six-story elephant that eventually became a National Historic Landmark in the 1970s, after it had already been moved from its original site in Atlantic City. Both Ribart's and Lafferty's elephants are architectural "follies." We can find these often neglected buildings in English parks, at World Expos, or in an **Amusement Park**, usually as (tourist) attractors, landmarks and/or orientation and navigation "pins."

Figure 47
A sketch of Charles-François
Ribart's L'Elephant Triomphal,
Grande Kiosque à la Gloire
du Roi. Reproduced from
Architecture Singulière (1758).
Paris: P. Patte. Public domain.
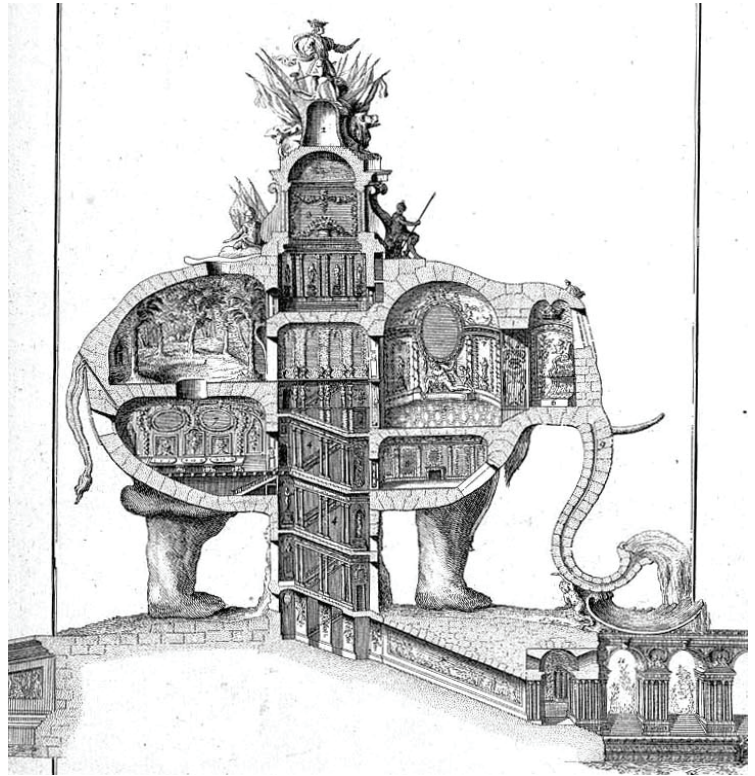
In the strictest sense, though, Lucy the Elephant cannot be called a folly; since its erection, the building has served as a restaurant, a business office, a cottage, and a tavern. The building, in other words, has various practical uses. Even though follies have no building purpose other than pure spatial entertainment, they nonetheless serve spatial functions for the area where they have been erected. As such, follies fall under the category of attractor architecture.

In the landmark study *Learning from Las Vegas. The Forgotten Symbolism of Architectural Form*, Venturi/Brown/Izenour harshly reject the idea of the "sculptural duck" (Venturi/

Brown/Izenour 1977:130) as a self-aggrandizing monument, inappropriate for the scale of environments subject to (auto)mobility, speed, and traveling: "The iconography and mixed media of roadside commercial architecture will point the way, if we will look" (1977:131). In their time, Venturi/Brown/Izenour identified the decorated shed and the "ugly and ordinary" as ways to overcome what they believed were Modern architecture's great mistake – namely, the promotion of space and articulation over symbolism and ornament. The result, Venturi/Brown/Izenour believed, was the "designing [of] dead ducks" (1977:162).

Entertainment **Castles** can feature stylistic tradition or at least raise historical awareness and still clearly serve an aesthetic function. In the spirit of Walt Disney's attempt to create a miniature replica of the world in the form of a park where landmarks from other places could be wondered at, Mickey's Magic Castle clearly resembles the Neuschwanstein folly castle in southern Bavaria, commissioned by Bavarian king Ludwig II in 1868 and still today one of the most popular tourist attractions in Germany. Yet there is a difference between the two castles: namely, tourists can wander the halls of Neuschwanstein. Visiting a non-navigable folly architecture like Mickey's Magic Castle, on the other hand, only serves the savoring play stimulus. And in order for a building environment to become more involved in the play activity it hosts, the building should feature traversability, thereby allowing for player **Mobility.**

Follies are curious, expressive architectures that can add flavor to a game's mise-en-scène.

23. Dollhouse

The dollhouse is an abstracted miniature **Cave** affording directing; it turns domesticity into a spatial toy, and a spatial toy into a home. Long before the invention of the computer generated god view perspective or the digital god game genre, the "director" of the original dollhouse took on a god view of his physical *Sims*-like dolls, which he role-played in order to storytell. Claus Hansmann and Leonie von Wilckens (1959) state – and we agree – that dollhouses are, beyond being play stimuli, scaled down mirrors of the everyday. So if dollhouses became widespread ludic devices during the early 19th century Biedermeier era in Europa, because they were intended to program girls for their later role as a housewife, what does today's ludic device, *The Sims*, program?

Will Wright, main creator of *The Sims*, has called the game "a computerized dollhouse" (Hattori 2000) "for understanding not only our personalities, but also our personal spaces" (Thompson 2003). See also the **Technology** entry. Wright's statement implies, among other things, that *The Sims* allows for simulated and interactable growth of characters and of living situations. The computerized play-ground of the dollhouse allows for the simulation of space and time, but the trade-off for the player is micromanagement under pressure.

Jenkins (2001) praises the game for "the logical culmination of the Girls Game movement and the beginning of the process of developing a more "gender neutral" playspace." Jenkins also mentions that focus group participants told game developer Maxis that they disliked the proposed game title Dollhouse. If Jenkins' praise is well-founded, then the play-ground of *The Sims* dollhouse is a positive example of literally downsizing stereotypes in digital games.

Schell (2007:402) considers *The Sims* a form of pattern-playing (see also the **Kindergarten** entry). This designerly view conforms with that of Celia Pearce (2004), who has dubbed *The Sims* "the IKEA game," finding that there is a subtext of anti-consumerist satire in the game that exists alongside humorously described household items and living enhancements. Pearce also sees a latent Big Brother element (which we would dub a savoring play stimulus; see the **Panopticon** entry).

Paulk (2006) convincingly argues that the game has sped up a sociology of interior design, serving as a testing ground for lifestyle strategies by allowing users to try out different ways of furnishing and organizing a household. In contrast to Pearce, Flanagan (2007) argues that players in *The Sims* "maintain a consumer-driven suburban household" that not only reinforces the logic of the American urban sprawl (bulldoze or develop open space), but also validates and prepares users for a suburban way of life. Rolf F. Nohr calls this the "declension of a neoliberal urbanistic space" (Nohr 2007:470). The satire that Pearce describes likely got lost in the closed and fully controlled space wherein consumerism leads to a **Society** of success.

On the one hand, dollhouses reflect and miniaturize the world outside the play-ground; on the other hand, "miniature scale, clear boundaries, and inner life help players to wrap their heads, hands, and hearts around a world" (Gingold 2003:8). And it is the interplay between macro and micro scale that invites participation and that allows for safe tinkering and world-learning (2003:24f.). The play-ground of the dollhouse lets us oversee a **World** that we experience at close range.

24. War

Television does not really show it, but the space of war is still filled with blood, screams, and tears; and wherever people go, war goes sooner or later as well. Based partly on the war descriptions of Walter Benjamin, we have come to think of war as an all-dimensional spatial permeation – the play-ground of death.

Mumford (1961:42f.) illustrates how war was fundamental to the constituting and cyclic dynamics of the ancient **City**, which thrived and grew by preying on other cities' wealth and thereby itself became a target. Mumford further argues that war shaped the city until the 18th century, as visible European artifacts such as fortification walls, towers, and ditches make clear. Mumford also contends that this shaping brought forth institutional organization in the form of weapon-equipped leadership as well as the superiority of a quasi-standing army within the walls of a given city.

War produces a set of functional **Technologies**. These include technologies of protection (such as the walls cited by Mumford) and technologies of attack (such as the catapult, mobile siege cannon, or Leonardo da Vinci's fascinating war machine drawings), conceived as problem-solving mechanisms designed to conquer and/or kill. This is not to say that war is a game, although war is conflictive and typically has a quantifiable outcome. Rather, games are practicable devices by which to stage and, through rules, discipline war while avoiding its bitter consequences. The origin of games and the origin of the city, you see, are connected by the human practice of war-making.

Wargaming, then, is a mechanism for training people for warfare by simulating it. Between 1780 and 1820, a number of games were invented in Prussia that transformed and redefined chess into a "tactical game based on chess," called War Chess, which eventually became the *Kriegsspiel*, or War Game (Pias 2002:207).

The original game of that name, first demoed by Georg Leopold Baron of Reißwitz in 1811 to Prince Wilhelm of Prussia, used a sandbox within which a **Terrain** was modeled based on the "irrational" scale of 1:2373. Reißwitz, and later his son, Georg Heinrich, continued to iterate the rules and make-up of the game by, for example, adjusting the scale to a more reasonable 1:8000 and table-topping the game using topographical, modular terrain pieces instead of baking sand to puzzle war landscapes and lightweight metal figurines to represent troops (see **Tessellation** and **Board**). The rules of the *Kriegsspiel* board were known as "supplements," and these supplements were fairly complex, detailing movement and battling, and even allowing for the creation of new rules via a random generator device in those "exceptional" game situations in which even the Kriegsspiel's referee could not reach a decision (2002:204ff.).

Coincidentally, this miniaturization of war-making occurred at a time when other devices of miniaturization became tools to train by play (see the **Dollhouse** entry). Peter Perla (1990:4f.) describes how the *Kriegsspiel* eventually became quite popular within the Prussian officer corps and how, in due course, it was introduced to the military in other countries such as the US, the UK, and France. Thenceforth, it shaped the development of wargaming as a tool for planning, strategizing, and de-briefing military action. Traces of the *Kriegsspiel* can be found not only in the US Naval War College's tile-based wargaming room or America's Pacific campaign in World War II, but also in the US Army recruiting videogame *America's Army* (2002) and in the US Army videogame *Future Force Company Commander* (2006), used to familiarize soldiers with the army's *Future Combat Systems*, in itself an extensive program featuring a game-like "warrior machine interface" (Korris 2007:426).

Claus Pias (2004:219ff.), in his archaeology of major computer game genres, points out how *Kriegsspiel* game elements such as the random generator and numerically intricate supplement can be considered a form of mechanical computation **Technology**

(2002:204ff.). Pias also demonstrates how the *Kriegsspiel* has significantly contributed to what much later became the strategy computer game genre.

The *Kriegsspiel* and all war games that came after it attempt to abstract the kinetic extreme of player-player collision. In truth, wargames are allegorical play-grounds for an abstracted contest that will never actually take place precisely the way is has been played. Kriegsspiel is the only way to wage war peacefully; and because of that, pretending to play a game while, in fact, being at war is such a tempting deceptive strategy. This abstracting of war into gaming accompanies the abstracting of war into information-technology processes, including game-like interfaces, computerized weapons, or surveillance systems (De Landa 1991). This evolution leads not only to the synthesis of physical and virtual warfare, but also to the synthesis of warfare and gaming. In an interview conducted by the author in his capacity as co-editor of *Space Time Play*, James H. Korris, founding director of the Institute for Creative Technologies at the University of Southern California, which is mainly funded by the US Department of Defense, points out that "using this kind of synthetic view of the world, people get used to the idea of looking at the world as if it were a videogame" (Korris 2007:429).

25. Casino

When we think of casinos – in fact, when we think of logistically perfected entertainment – we first think of Las Vegas. For some, the city remains a blooming, alluring, ever-changing desert flower, an urban play-ground accommodating illusions, show, and chance, always moving one step closer to becoming the Situationist city of spectacle (Graft 1999). For others, Las Vegas is the manifestation of vice – a Darwinist play-ground of evil. Las Vegas and Venice (see the **City** entry) share more than just this quality of being perceived vastly differently by different people; both are desirable cities

built as islands – one in the desert, the other off-shore – and in Venice, the first legal and public casino ever, a ridotto, was opened in 1638 in San Moise Place to be operated during Carnival. This 17th century ridotto is the original casino blueprint (Schwartz 2006:92ff.).

In comparison to the architectural manifesto of Venice, however, Las Vegas is a young city, and its story can be told in major milestones:

> ● 1905: The city starts out as a speculative land purchase – an empty stage on which the first purely service city in the world would soon be built (Häntzschel 2001:297).
>
> ● 1931: The state of Nevada legalizes gambling.
>
> ● 1941: El Rancho, Las Vegas' first casino hotel, opens.
>
> ● 1970s: Downtown Las Vegas is enthusiastically celebrated as the urban solution for the age of automobile motorization: "The big sign and the little building is the rule" (Venturi/Scott Brown/Izenour 1977:13).

Today: The urban situation has changed significantly. Downtown Las Vegas, then the heart of the city – and, as Hunter S. Thompson wrote, the heart of the American Dream – has become a rundown quarter full of prostitutes, homeless people, and wrecked buildings. The Strip, which used to belong to the Las Vegas suburbs, dominates and illustrates a form of new urbanism, populated as it is with block-sized hotel casinos, huge mock-up architecture such as the Venetian Campanile, and the Eiffel Tower, and a still spectacularly big mini Manhattan, entertainment rides slung around high-rise buildings, staged pirate battles, and a frequently erupting volcano. The city here is a monstrous, well-working amusement complex – a city-sized allegory of allegories. Las Vegas is, if we believe Hal Rothman, the first city of the 21st century; it anticipates the future of a
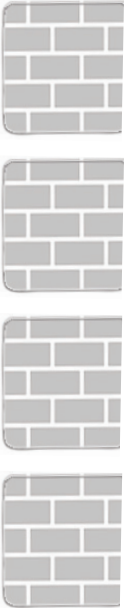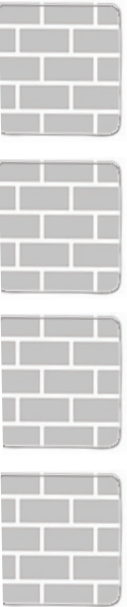
society defined by consumption and entertainment as opposed to industry and farming (Rothman 2002). From a residential perspective, the most popular tourist destination in the USA (Henderson 2003:9) is also a rapidly growing agglomeration of uniformly looking McMansion virtual worlds – endlessly stretching suburban communities with fantasy names such as "Inspirada," "Solista," and "Civita."

In these communities, the buildings all too often have been cheaply put together with wood and polystyrol foam and will last maybe twenty years. Gated communities turn public space into a jail yard; there are no playgrounds and not enough schools, and environmental abuse prevails. In a continuation of its double-edged tradition, the city of the 21st century may well be the "supernova of American Cities" (Davis 2003).

Las Vegas' sole play-ground function is to create maximum profit from entertainment stimuli. Though shopping and wedding tourism have become utterly important, the spatial embodiment of this function is still the casino, which accommodates and enables Las Vegas' major play pleasure: chance gaming.

The Mirage Resort casino opened on The Strip in 1989 and marks the merger of themed gambling and mega-scale accommodation. The Mirage ushered in a new era of entertainment spectacles that aim to fantasize chance; the term to fantasize is used both because in the official language of casino designers, themes are called "fantasy concepts" (Henderson 2003:10), and also because it has been convincingly argued that in Las Vegas, "form follows fantasy" (Hess 1993).

As the first casino fantasy to establish itself as a tourist destination, The Mirage Resort uses spectacular elements such as waterfalls, a lobby rainforest, an erupting volcano, captive animals such as tigers, tropically themed furnishing and finishes, ceilings, carpets, and elements such as an aquarium to set the stage for pre-play, play, and post-play. The casino itself resembles a Polynesian village with canopied

gaming areas (2003:15f.). Robert L. Ward, Senior Vice President of Universal Studios Recreation Group, discussing the Portofino Bay Hotel at Universal Studios Escape in Orlando, FL, explains, "When you experience a hotel as a destination, you don't think, "Oh, a great building – I have to stay there." People don't say that. What they say is, "Let's go somewhere special, perhaps Europe...How about the Italian Riviera? Let's go to Portofino!" It's a more accessible story that reflects how we make our vacation decisions" (Ward 2001:5). Ward points out that entertainment placemaking differs from architectural placemaking in that the former allows for the incorporation of explicit storytelling elements into the built environment such as a premise, location, or cast of characters that enable visitors to make believe.

Figure 48
The silhouette of new urbanism: New York – New York Hotel & Casino in Las Vegas. Photo © 2009 MGM Mirage. Reproduced by permission.
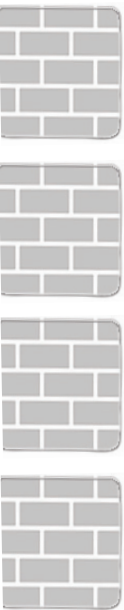
More recent casino resort destinations that reflect Ward's insight include the eight-hectare make-believe-Manhattan New York – New York Hotel and Casino. Located at the corner of Tropicana Boulevard and The Strip, the faux architecture, which cost half a billion dollars to erect, boasts twelve downsized copies of Big Apple high-rise buildings, the Statue of Liberty, Ellis Island and everything else needed to create the fantasy of New York City in the Nevada desert. A rollercoaster ride alongside the buildings adds even more vertical and horizontal excitement to this new urbanism experience. Figure 48 shows (and dramatizes) the silhouette of New York – New York.

Other types of interesting spaces that accommodate gambling also exist. Off-shore riverboat casinos such as Harrah's Shreve Star in Shreveport, Louisiana, combine gambling with the symbolic power of the heterotopian epitome, the ship, thereby creating an über-heterotopian play-ground. The Shreve Star, built in Missouri and later towed to Louisiana, is not an authentic riverboat; rather, it has been designed to resemble one, and thereby adhere to the requirements of a certain Missouri gambling law (2003:82ff.). The Shreve Star is home to three gaming floors that feature expanded heights to accommodate bulky casino equipment. On all floors, a basic, overwhelming, bright, attention-grabbing casino theme prevails. On the Palace of Fun floor, this is accompanied by circus-like colors, forms, and finishes; on the Crystal Palace floor, by a 19th century, botanical glass conservatory look and feel. And yet when playing on the Shreve Star, the author felt that the theming destroys the atmosphere that could have been created by the ship situation itself; or rather, that nautical elements would have amplified the heterotopian situation, which would have been preferable to adding yet another heterotopia.
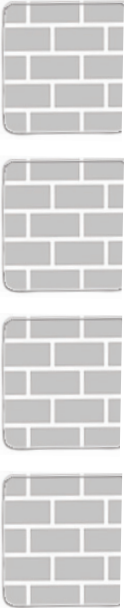
The way that casinos are designed and fantasized as spaces reveals a generalizable pre-assumption: that the fantasy of narrative architectural illusionism in alliance with other spectacles such as live concerts contributes positively to visitor experience. For example, an empirical investigation of visitor satisfaction at atrium-type casino resort

hotels in Las Vegas revealed that these types of quasi-interior public open spaces create a positive feeling of urbanity as long as the atria are humanized, e.g. by use of human scale zoning, inclusion of shopping stores and seating areas, effective connectivity between atria, or promotion of pedestrian circulation, i.e. walkability (Sun 1997). Atria, then, could become the new public plazas of Las Vegas-style urbanism, which would represent a significant departure from the automobile focus of Las Vegas in the 1960s and 1970s (Venturi/Scott Brown/Izenour 1977).

Still, gambling remains the center of attention of all connected plazas in Las Vegas. Whereas on a ship casino, the casino takes up all space on all the floors (i.e. the ship is, spatially speaking, the casino), in resort casinos, the casino is the central area of the property and thereby expresses the fact that gambling is at the heart of all resort activity.

When zooming in on the casino games in the fantasized space, we see women and men gamble casino chips on possible random (combinations of) outcomes, with a quantifiable luck factor involved. There are table games, gaming machines, and random number games such as Bingo. All create certain types of game systems, which we can investigate in terms of, for example, the magic circle, spatial representation, type, or kinesis. Ultimately, though, the goal is to beat chance. In the early 1960s, Edward Thorpe and Claude Shannon carefully studied the anatomy of American Roulette. Over the course of several months, Thorp and Shannon analyzed the motion of the ball in relation to the space of the roulette wheel by, for example, operationalizing how the ball is launched, how it orbits from stator to rotor, how it is affected by the spinning rotor of the roulette wheel, and how their measurements were affected by timing errors. Based on the data gleaned in their experiments, Thorp and Shannon designed the first wearable computer. The size of a pack of cigarettes, the computer was controlled by its wearer's big toe and in the lab, yielded an expected gain of +44% when the wearer bet on the most favored numbers. When secretly testing the device with their spouses on site in

Las Vegas in the summer of 1961, the researchers saw their predictions consistently realized when they played with the 38 numbered and colored roulette pockets. Their device, which combines innovation in both the realm of **Mobility** and **Technology**, was made public many years later, but was eventually banned by the courts in the state of Nevada along with all other outcome prediction devices (Thorp 1998).

When it opened in 1989, The Mirage Resort was not only the first casino to exploit the idea of mass-scale fantasizing, but it was also the first casino to use a closed-circuit television system with cameras on all tables, at all times (Knightly 2007). It is safe to assume that this CCTV system was installed mainly to prevent the illegal use of prediction machines such as the one Thorp and Shannon created. Based on the three elements discussed in this section – i.e. **Panopticon**-like surveillance, themed entertainment, and computing – we derive an impression of Las Vegas as the urbanistic play-ground of pervasive surveiltainment. Is this form of entertainment at least innovative? Quite to the contrary, most of the themed fantasies are either borrowed from successful Hollywood blockbusters or recycle "the arcade, the state fair, the world exposition, and the ambiance of the cosmopolitan, pedestrian **City** [bolding and underlining mine]" (Gottdiener 1997:151). So, is the loss of privacy and the lack of innovation worth the gain in spectacle? Or is the recent foreclosure of the Cosmopolitan Resort & Casino building project a sign that the policy of unlimited entertainment has come to an end in the western world?

As Ian Bogost notes,

> *The casino, tavern, arcade, and pizza theater (e.g. Chuck E. Cheese's)*
> *all share similar properties. They are enclosed spaces without windows*
> *in which participants can easily lose track of time. They are dark and*
> *constricted, with limited space for free movement. The games therein are*
> *provided not for their own sake, but as a means to an end, as a way of*
> *drawing players into spaces, keeping them there and taking their money*

(whether as payment for the games themselves or for other services) (Bogost 2007:305).

The casino, then, is not only a panoptic play-ground for a kind of adult pinball; it is a play-ground that continuously perfects persuasion.

26. Mall

The Monroeville Mall in Monroeville, PA is a roughly 100,000 square meter indoor shopping complex constructed between 1967 and 1969. Figure 49 shows one of the mall's entrances as well as the corridor that leads from that entrance into the mall.

Figure 49
Impressions of Monroeville Mall in Monroeville, PA, setting for the Zombie movie *Dawn of the Dead*: (Left) A mall entrance. (Right) Corridor leading from the entrance into the mall.

Once the United States' biggest mall, the Monroeville Mall served as the main location for George A. Romero's highly influential 1978 horror film, *Dawn of the Dead*. The production of the movie was partially financed by the owners of Oxford Development Company, the firm that had built the mall and was managing it at the time of shooting. The zombie movie, then, served not just to entertain movie-goers, but also to market the mall. This is somewhat surprising considering that both the mall setting and the plot itself made *Dawn of the Dead* a harsh critique of American consumerism. While insatiable zombies hungry for human flesh are barred from entering the mall, the supposed sanctuary character of that mall together with its heterotopian inscenation of supplies soon wears thin on the main protagonists once they realize that their safeguard is, in fact, their prison. In *Dawn of the Dead*, the mega-mall is not only "a substitute **City** [bolding and underlining mine] center and rendezvous point, but even an amusement or theme park" (Borries 2004:43) (see the **Amusement** Park entry), but also a site where players seek to solve the problem how to survive as long as possible in an effort to outsmart their enemies, the zombies, who just as passionately seek to devour them.

In homage to both the Monroeville Mall and *Dawn of the Dead*, the designers of Capcom's Xbox 360 action-adventure game *Dead Rising* set their game at the "Williamette Parkview Mall," for which they designed an environmental **Map** clearly inspired by the film. See Figure 50.

The play-ground of the mall is filled with consumerist collectibles meant to both still and instill hunger, the most profound desire.

Figure 50
Dead Rising: An Xbox 360 and Nintendo Wii based video gamespace filled with zombies and inspired by the Monroeville Mall space and the George A. Romero movie series. In-game screenshot © 2006 2009 Capcom. Reproduced by permission.

27. Castle

The castle as a play-ground has different faces, but it is always an expression of fortification and enclosure and is thus a form of military architecture. When games implicitly or explicitly involve the castle trope (which, in the western world, usually appears in the form of motte and bailey, fortress, citadel, or, more representatively, palace), it can be assumed that some type of contest between competing powers or metaphor for defense or attack pervades the activity. **War** and castle are common, if not cliché, ludic architectural tropes.
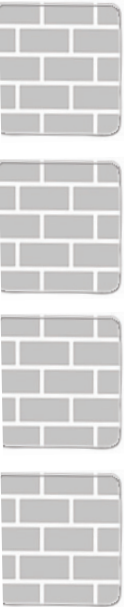
The castle awes and expresses power by virtue of its scale, not only to intruders, but also to the populations who live near it, which it overshadows and commands. It defines a kind of artificial island in the wild. Note that this island-like nature of castles also explains why we are particularly fascinated by urban islands such as Venice, New York, Las Vegas (in the midst of the desert), and, formerly, West Berlin (in the midst of socialism).

This is all the more interesting when one considers the fact that "the proto-city had (...) the beginnings of its institutional life in the fortified camp and the shrine, not necessarily occupying a common site" (Mumford 1961:64). In German, the term Burg – which has always meant "fortification" and today, also means "castle" – was long used to describe the spatial form of the **City**, as evidenced by the names of many cities, like, for example, Hamburg or Regensburg. Likewise, the German term *Bürger* means "citizen", or, more literally, "townsman." Similarly, in colloquial English, "burg" still connotes a city. Neither city nor citadel can be thought of without thinking of the other; and in Europe, neither can be thought of without thinking of the heritage of antiquity and the many Roman fortresses out of which modern cities grew. The play-ground of the castle is an ur-symbol of urbanity.

Functionally, castle gameplay can be achieved in many ways. Castles can be strongholds to be placed or obstacles to be overcome. They can feature a palisade made up of pointed pales, a ditch surrounding a steep motte, a sleek scarp of rampart to climb, with soldiers hiding behind parapets, terreplein that must be hit, scorchers behind loopholes, a postern to seek and secretly enter, a wooden horse body to smuggle men into the polity, and, ultimately, a keep that must be penetrated (see Ching 1995:98f. for castle terminology). Inversely, castles can also be fortifications that must be defended.

Inside the castle keep, other functions are possible. Often, booby traps, secret passageways, and other **Labyrinth (and Maze)** structures are contained in this

extruded **Cave**. Sometimes, they feature nightingale floors, across which we must walk in order to get from one room to another (see Figure 51). In Japanese palaces and temples, these nightingale floors – 鶯張り in Japanese, or *uguisubari* – are floors designed to fabricate chirping, nightingale-like sounds when tread upon, thereby serving as a kind of building embedded alarm system. From a game design perspective, this feature can be considered an interactivation design technique as described in the **Cave** entry.

Figure 51
A castle alarm system: the Nightingale Floor has been designed to fabricate chirping sounds when treading over them. The sign in the image details the construction.

Symbolically, in a game of power, a castle can be a **Folly**, and as a folly, a political "stamp." For example, the Hohkönigsburg castle in Alsace in France lay in ruins for over two hundred years before being refurbished as a "fairytale castle" of the reigning Hohenzollern house by Berlin architect Bodo Ebhardt, commissioned by German emperor Wilhelm II. The refurbished castle combined political and attractor functions (Willaume and Richez 1991), but also sounded a warning, and thus militaristic signal to the French. Today, the castle is one of the most popular tourist destinations in France, serving to remind visitors of the former German presence in the Alsace. Entertainment and military, we see, were co-evolving even before the invention of the computer. Whereas "the digital emerges as military, but achieves acceptance as entertainment" (Wark 2007:95), the analogue Hohkönigsburg emerges as military warning, but achieves acceptance as entertainment.

Finally, let us look at the castle trope when used both as backdrop and interactive playground. The PS2 action-adventure game *ICO* (Sony Computer Entertainment 2001) is designed, explicitly, iconographically and beautifully based on the trope of castle architecture, and it represents "a huge spatial puzzle from which you, the player, must escape" (Davidson 2007:54). In *ICO*, the constructive trope is well-supported and achieved by the way the game camera follows the player context-sensitively (Adams and Rollings 2006:247). The camera, using different positions and angles, intelligently inscenates not only the action, which is, of course, most important for an action-based game, but also the immense architecture and landscape. Through these shifting camera positions, the game both mentally and pictorially maps and almost draws the gamespace panorama for the player. In addition, in *ICO*, the gamespace itself is the puzzle from which the player must escape, "by climbing, jumping, pulling levers, pushing crates and running around" (Davidson 2007:54).

Through kinesis, the player "learns" the embedded game architecture of *ICO*. But this is not where the cleverness of the design with regards to the architectural experience stops. In *ICO*, the player controls a boy, but in order to end the game successfully and traverse gamespace, the boy must take care of a mysterious girl, protect her, and help her overcome numerous spatial challenges. To do so, the player-boy holds the girl's hand throughout the course of the game. This hand-holding is an essential part of the gameplay and is underlined by controller force feedback, affecting the player's **Body**. "This creates an intimacy between the two characters lost in the castle; the virtual/physical act of holding hands is the means by which they work together to get through the ruins" (Davidson 2007:55). In this way, the gamespace in *ICO* is integrated emotionally through a deeply human bond, perceptually with the help of a context-sensitive landscaping camera, and cognitively by virtue of the fact that challenges are created for the boy and on behalf of the girl.

In *ICO*, the castle is the game system, and the game system is the castle. This conversion of a castle into a game system reminds us of the Fun Palace, an improvisational architecture conceptualized by architect Cedric Price in 1964 together with avant-garde theater director/producer Joan Littlewood, who, in 1955, premiered Bertolt Brecht's play *Mother Courage and Her Children* in London, thereby bringing the concept of Brecht's Epic Theater to the UK. (See **Theater**, where Brecht's vision of breaking the fourth wall between actors and audience is discussed.)

The Fun Palace - cf. Figure 52 - is not a conventional building, but rather an ad-hoc construction of leisurely learning and discovery, where a scaffolded structure for pivoting stairs and escalators, moveable (and prefabricated) wall, floor, ceiling, platform, and stair modules, and overhead cranes affords constant constructing, dismantling, and reassembling. The Fun Palace, in other words, is a life-size kit-of-parts **Playground** of performativity and kinesis between players, objects, and the environment, which,
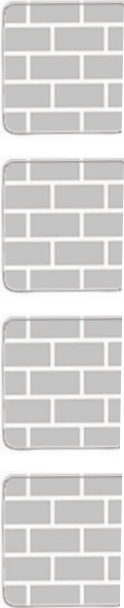
theoretically, aims to eliminate contest and encourage creation and adventuring. Littlewood "envisioned an ideal realization of Brechtian theater as a place of cultural bricolage where people could experience the transcendence and transformation of the theatre, not as audience, but as players and active participants in a drama of self-discovery" (Mathews 2005:76). In the original Fun Palace concept, we can see not only an affinity to Brechtian theater, but also to the Situationist urban ideal of *New Babylon* (see the **Society** entry), in which the symbol of the palace was supposed to be democratized.
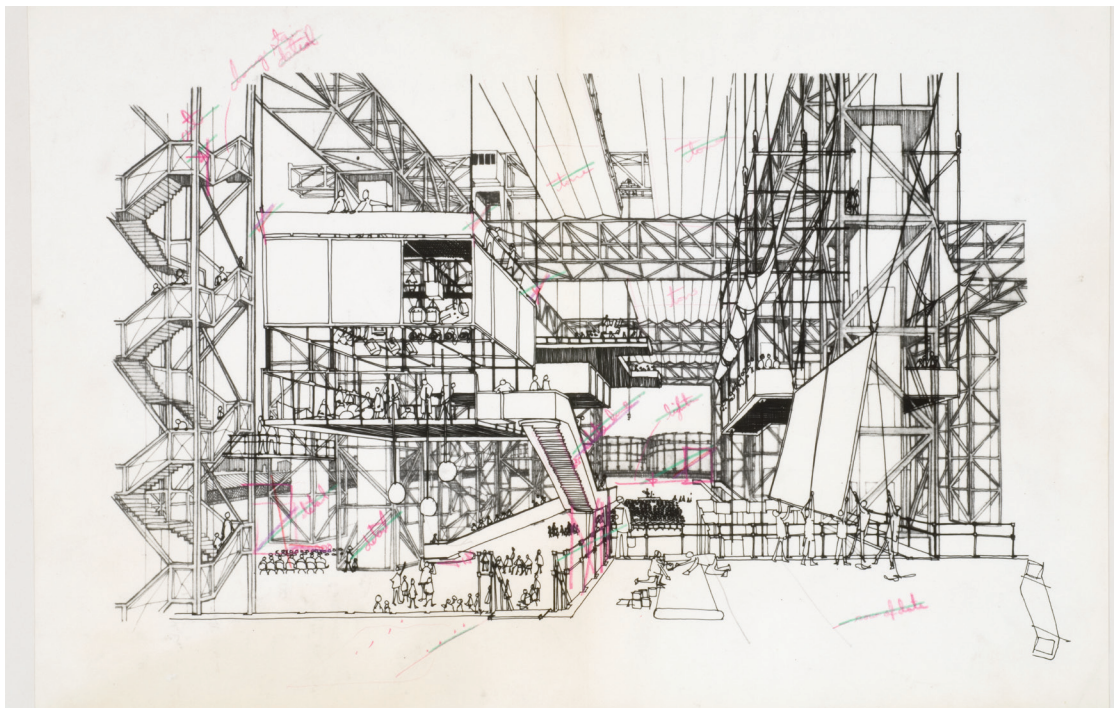
Figure 52
An early pervasive playground: Cedric Price. Interior perspective of Fun Palace. ca. 1960 - 1964.
Reproduced by permission from Fonds Cedric Price, Collection Centre Canadien
d'Architecture / Canadian Centre for Architecture, Montréal.

Price, designing based on Littlewood's theatrical brief, began to plan for the construction to learn, with the help of artificial intelligence and computation, behavioral patterns, and not only adapt to the player's current program, but also to anticipate future activities, thereby gradually shifting the focus from Brechtian theater to cybernetics, control systems, and social engineering. In fact, the inclusion of cybernetics scientists in the conceptual planning of the Fun Palace quickly led to the treatment of Palace players as data whose interests and activities would be monitored by sensors and computers. The Palace system would thereby have helped "modify people" with the help of virtual reality-like simulations such as "a trip around the moon in a space capsule," an "underwater restaurant," a "maze of silence," or a "fantasy generator." "Today, the idea of "unmodified" and "modified" people makes us recoil in horror. Yet, in the 1960s, the prevailing and naïve faith in the endless benefits of science and technology was so strong that the Orwellian implications of "modified people" went largely unnoticed. At the time, the "social control" aspect of the Fun Palace was seen as a constructive contribution to society" (2005:85f.).

Conceptually speaking, the Fun Palace anticipated the virtual realities of digital games as well as the privacy issues of surveilled entertainment and, more generally, pervasive computing (see **Panopticon**). Indeed, the Fun Palace truly would be an interesting role model for a building-based pervasive playhouse. Formally and aesthetically speaking, the unrealized Fun Palace certainly impacted architectural design and the construction of many realized buildings. For example, referencing the design of the Centre Pompidou in Paris, Reyner Banham writes that that "the concept of a stack of clear floors that can be adapted to a variety of cultural and recreational functions seems to recall the (...) Fun Palace of Cedric Price and Joan Littlewood, even if the project was never as radical as the floorless Fun Palace, or as casually innovatory as Price's Inter-Action Centre," a realized, but much smaller Fun Palace-like hands-on leisure center in the UK, demolished in 2003 (Banham 1977:275).

The lesson is: a castle designed for fun can break the symbolic power of the play-ground, but will exert control over any player who chooses to experience it.

28. City

For the oncoming tourist sitting on one of the ferry boats speeding through the saltwater lagoon, Venice's *centro storico* is highly evocative. The cityscape and overall composition of the city center are incredibly moving, featuring, as they do, the Campanile, the combined colors of canals, palaces, and water, buildings that sharply carve an island of islands, and that special Venetian summer smell. All these make the city memorable. Camillo Sitte writes romantically of Venice: "So much beauty is concentrated on this single patch, no painter has ever conceived more beautiful architectural backdrops, no theatre has ever seen anything so sensually captivating than what has been capable of arising here in actuality."[57]

Venice's aesthetic qualities are a fact; wayfinding in Venice, however, is a challenge. No wonder that Venice, the most touristed city in Europe (see **Casino** for the most touristed city in the US) and, claro, the most beautiful city in the world, is the epitome of the urban game: a citywide **Labyrinth (and Maze)**.

In *The Image of the City*, Lynch (1960) empirically explores how city dwellers perceive and envision spatial information while navigating through urban space. Although the study was conducted using only US cities as examples, Lynch identifies a number of systems that render the example cities more legible for the study subjects and allow for what he coined "wayfinding," i.e. "a consistent use and organization of definite sensory
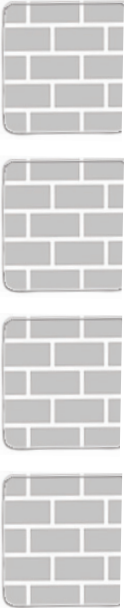
---

57 Translated from the German original by the author: "So viel Schönheit ist auf diesem einen Fleckchen Welt vereinigt, dass kein Maler noch je Schöneres ersonnen hat an architektonischen Hintergründen, kein Theater noch je Sinneberückenderes gesehen hat, als es hier in Wirklichkeit zu erstehen vermochte."

cues from the external environment." (1960:24) Wayfinding devices assist people in constructing a predictable mental map, an environmental image. Lynch organizes the elements of this mental map into five categories, in turn creating a design vocabulary for urban wayfinding that has since served as inspiration to urban planners and architects as well as information and interaction designers. Lynch's elements follow:

- **Paths:** The streets, walkways, transit lines, canals, railroads, and other urban channels through which people travel.

- **Edges:** The walls, shores, fences, barriers, shorelines, and other perceived boundaries that exist in relatively straight lines, thereby demarcating as well as relating distinct areas.

- **Districts:** Larger sections of a city that are distinguished by their unique identities or urban characters (Financial Districts, for example).

- **Nodes:** Focal points such as intersections, enclosed squares, subway stations, and other transportation hubs.

- **Landmarks:** Readily identifiable points of reference (in Europe, for example, the Eiffel Tower in Paris or the Fernsehturm (TV Tower) in Berlin).

Lynch derives two concepts from his study. The first is the imageability of a city: "a quality which gives it a high probability of evoking a strong image in any given observer" (Lynch 1960:9). The second is a city's legibility, that is, "the ease with which [a city's] parts can be recognized and can be organized into a coherent pattern…a legible city would be one whose districts or landmarks or pathways are easily identifiable and are easily grouped into an overall pattern" (Lynch 1960:10).

For the oncomer on the boat, Venice at first appears highly imageable and legible.

But for those traversing the city on foot, the sheer combinatorial possibility of canals, bridges, pieces of art (statues, roundels, coats of arms, crosses, reliefs, logos, plaques, and fragments), **Squares** (*campi*), small squares (*campielli*), and lanes – alternately called *alli*, *salizzade*, *rughe*, *liste*, *rami*, *sottoporteghi*, *rii terrà*, and *fondamenta* – is the underlying truth of the Venetian game.

Venice, navigationally speaking, is simply disorienting. Fabio Carrera (1997) has shown that at least on the level of the Campo Santa Maria Formosa square, for example, Venice can be imageable thanks to the free-standing church landmark. As a navigational network, however, the city remains an exciting maze. No wonder, then, that the annual Orientamento a Venezia – abbreviated as just Orivenezia – is the toughest city orienteering competition in the world.[58] (See also the **"Nature"** entry, which discusses the sport of orienteering). Yet, arguing only in terms of navigation would not do Venice justice. Like so many other European cities, as well as New York and Boston in the USA, Venice immerses pedestrians in a three-dimensional narrative (see Pearce (2007:201)).

As a city experience, the Venetian maze is acceptable (and made possible) to us because, with every other turn and break of visual angle and perspective, there is always some new thing to adore, a compelling urban story to discover, a dead-end to realize. Venice, in short, is a perfect archipelago adventure for disorienting pleasure. Venice, we daresay, is the perfect physical urban play-ground because it combines the kinetic participatory delights of pursuing vertigo, contemplating, savoring, adventuring, amusing (tourists usually visit in groups of two or more), problem-solving, and wayfinding achievement with a unparalleled pedestrian experience of **Mobility**. It is, in short, a play-ground in and of itself.[59] – We can only hope that the game generation will still

---

58 Cf. http://www.orivenezia.it.

59 An entertaining gameplay strategy for the maze that is Venice can be found at http://www.initaly.com/regions/veneto/ovensty.htm.

have the chance to play Venice, which is in constant danger of being flooded by rising waters. Should that happen, gamers may instead decide to see the replica Campanile at the Venetian Resort **Casino** in Las Vegas, proclaimed Entertainment Capital of the World and Venice's New World counterpart. Similar to the perfect, but sadly and slowly sinking play-ground for making one's own urban adventure, the urban archipelago of Casinos within the Clark County desert vegetation offers a gamble on one's future, too.

In the game *REXplorer*, the city of Regensburg is not only used as a backdrop, but as a functional platform and raison d'être for the game. The game design understands the city as a rhetorical landscape that persuades the player to move between urban sites. Players are presented with audio drama based cliffhanger puzzles spoken by site-specific characters. By way of these audio cliffhangers, characters offer quests to the players, which can only be resolved at other sites. Players, then, must keep moving in order to play the game. Through this core mechanic, the audio augmented city becomes a physical game **Board** on which player mobility is influenced with the help of reward structures (players who successfully resolve their quests receive points, and walking itself is credited as well). For a more detailed discussion of this aspect of pervasive gaming, see Walz (2007) as well as Walz and Ballagas (2007).

The cityscape of Venice and the *REXplorer* game teach us important lessons as to how to design exciting mazes and how to think of them architecturally and in terms of urban-like relationships. We can also turn this around and think of the World Wide Web as an urbanistic maze; the pervasively computed city towards which we are heading today is another such maze. See Figure 53, which sets both maze metaphors into relation.

When one considers the urban maze of Beijing, where a labyrinthine, disorienting structure is achieved by demolishing whole city quarters, one may be inclined to think that Venice will spearhead the heterotopian model of the European city-as-museum.

Figure 53
Two mazy city metaphors: (Left) Artist collective eBoy depict the WWW as a city in their FooBar poster (www.eboy.com). (Right) In 2004, the architectural office hybrid space lab envisioned a SubCity - a pervasively computed urban game (www.hybridspacelab.net). Images reproduced by permission.

But, although the Asian model may try to abandon the European **Labyrinth (and Maze)** topos, it inadvertently re-establishes that exact model through constant changes in the cityscape and in building usages.

29. Society

On the evening of December 20, 1960, in a militant presentation at the Stedelijk Museum in Amsterdam, Constant Nieuwenhuys – a Dutch architect whose name is commonly shortened to Constant – accused the modern **Cit**y of being an exploitative, utilitarian machine that demands productivity from its population, that pacifies with pseudo-**"Nature"**, and that destroys life. Constant suggested a solution called *New Babylon*, which he later revised again and again, but which, at its core, constitutes "a vision of a ludic society" (Nieuwenhuys 1974). In this "counter-design to Modernism's functionalization and realization mechanisms for architecture and town planning" (Feireiss 2007:218), inhabitants play a creation game of movable walls, floors, partitions, ramps, stairs, bridges, and infinitely variable qualities of light, color, ventilation, texture, temperature, and moisture, designing their own environment for adventuring against their designed backdrop. Architectural historian Mark Wigley evocatively recounts Constant's concept:

> *Technology has long been the new nature that must now be creatively transformed to support a new culture. The increasingly traumatised inhabitants have to take over the shaping of their own spaces to recover the pleasure of living. This reshaping will soon become their dominant activity when automation handles all forms of production. Leisure time will be only time. Work gives way to an endless collective play in which all fantasies are acted out. The static constructions of architects and town planners are thrown away. Everybody becomes an architect, practising a never-ending, all-embracing "unitary urbanism."" (2001:9).*

New Babylon represents an activist's and activist play-ground, an elevated, jungle gym-like (see the **Playground** entry in this inventory) fluxus labyrinth, covered on a

planetary scale, programming an "unfunctional and fantasy way of living (...); people would constantly be travelling" (Nieuwenhuys 1964/2001:14). At Constant's first presentation at the Stedelijk, however, the debaters raised a fundamental question: would *New Babylon* liberate humanity by affording the pleasures of fluidity and of creative and adventurous play? Or would it be a prison? (Wigley 2001:11)

Constant's vision of an all-consuming hyper-urbanism overwriting the city (Sloterdijk 2006:98) accommodated the revolutionary goal of the Situationist International (SI), of which Constant was a member when he first presented *New Babylon*. This SI goal was to overcome not only modernist architecture, but to conquer consumerism and, ultimately, capitalist society through ludism. A 1957 fusion between radical avant-garde artists and groups (mainly, the *Lettrist International* centered on the artist-theorist Guy Debord and the *Mouvement international pour un Bauhaus imaginiste*, founded by the painter Asger Jorn), the SI experimented with a number of ludic techniques and provocations, among them *New Babylon*, under the umbrella of the concept of *psychogéographie* (Stahlhut et al. 2006). Basically, psychogeography can be described as the playful becoming aware of, reimagining, and exploration of the city; in other words, the affective realization of the city. In the following list, a number of exemplary psychogeographical techniques are presented:

- In the first issue of its magazine Potlatch, the Lettrist International published "The Psychogeographical Game of the Week":

  In accordance with what you are seeking, choose a country, a more or less populated city, a more or less busy street. Build a house. Furnish it. Use decorations and surroundings to the best advantage. Choose the season and the time of day. Bring together the most suitable people, with appropriate records and drinks. The lighting and the conversation should obviously be suited to the occasion, as should be the weather or your memories. If there has

> *been no error in your calculations, the result should satisfy you (Debord 1955/2004).*

- In our terms, we can think of this game as consisting of adventuring and creation play pleasures, with some risk-taking and performing-socializing.

- The Situationist practice of *dérive*, a term coined by Russian LI member Ivan Chtcheglov meaning, literally, "drifting." The dérive is similar to Constant's ever-traveling Homo Ludens, in that it refers to constantly and rapidly vagabond and adventure through different areas in the city (Stahlhut 2006:10). Game rules and gamespace were defined for a *dérive*; this included starting and possible rendezvous points, duration, number of participants, size and kind of urban playground, objective, and activity filters such as, "Look for all taverns serving white rum," or "Take a cab and drive 20 minutes westwards before starting the dérive" (Debord 1958). *The Universal Psychogeographic Computer* (Hou Je Bek 2007) introduced earlier in this section in the discussion of utopian play-grounds can be considered a *dérive* device, while Debord's and Jorn's *The Naked City* map of Paris bears witness to ample, vertiginous adventuring – a nomadic kinesis, leading to a joyful re-discovery of a city by the way of a design that "simultaneously mourned the loss of old Paris, prepared for the city of the future, explored the city's structures and uses, criticized traditional mapping, and investigated the relationship between language, narrative, and cognition" (Sadler 1998:60). See Figure 54.
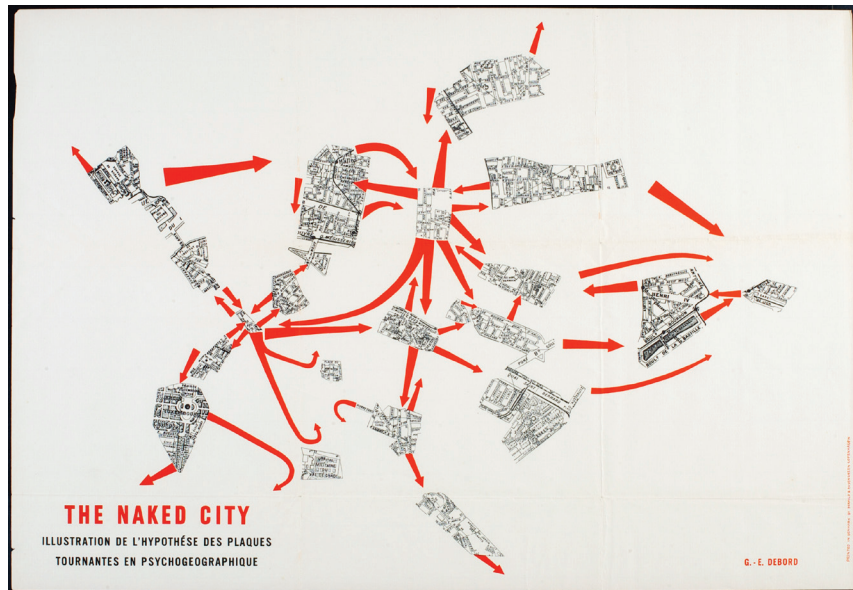
Figure 54
Guy Debord: The Naked City. Illustration de L'Hypothése Des Plaques Tour-
nantes En Psychogéographique (1957), screenprint. Reproduced by permis-
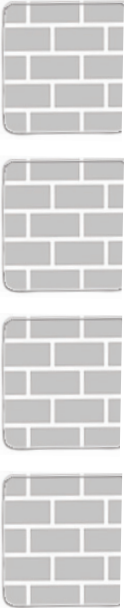sion from RKD, The Hague.

● The Situationist practice of *détournement* is a creative play pleasure
  meant to misappropriate, reorganize, pocket, and de-contextualize
  existing structures such as signs, façades, objects on the streets, etc.
  (Debord and Wolman 1956). It is a combination of adventure-creation
  with components of risk-taking.

Borries (2004) traces how Nike applies subversive practices as marketing tactics in
urban areas in an effort to penetrate sub and counter cultures and thereby establish
a branded city that transcends the logic of everyday. Just do it, so to speak, like
André Agassi and Pete Sampras did in a Nike TV spot in which they played tennis

on New York City's 5th Avenue as an act of liberating the regimenting of the city: the street becomes the tennis court, the sidewalk the bleachers. But whereas the New York City TV spot was merely symbolic, the Nike basketball court surface made of recycled sneaker soles (bearing the Swoosh logo, naturally) located at Berlin's Alexanderplatz, the heart of the city's public sphere, is very real: "The Situationist strategy of fake and détournement can be discovered as an instrument of communication in nearly all of Nike's urban interventions. They serve here the same function they do with the Situationists and media guerillas, namely to gain access to new spaces of interpretation and opportunities for reflection" (Borries 2004:72).

When reading these lines and thinking about recuperating marketing, let us not forget where the Situationist games came from; in its heyday, *dérive* promised a new urbanism with "rooms more conducive to dreams than any drug, and houses where one cannot help but love" (Chtcheglov 1958). Building authentic pantopian dreams, then, can be a tactic stronger than the tactics of those who succeeded in misappropriating by misappropriating their greatest enemies. In a society in which life presents itself as an immense accumulation of commodified spectacles, a fallback Walden tactic is still by far more truthful than radical opportunism.

In our context, street and guerilla artists show us an alternative to life in the woods (which can be seen as an early example of a self-governd alternative to the society of the spectacle). With guerilla art, people express themselves, often playfully, in a public space, in order to affect as well as to reclaim the space, to make a political statement, to decontextualize or to intervene, often with the goal of letting people interact with this environment in a novel, though-provoking way. Basically, this can mean that someone presents someone else with something elsewise than what they might suppose: "Like a random act of kindness, guerilla art has the potential to create a ripple effect. Imagine the postal worker running through his day, stopping for a moment to read a quote you have

chalked onto the sidewalk." (Smith 2007:15) writes Keri Smith in her inspiring book *The Guerilla Art Kit*. This tactic of anonymous artists entering into people's daily routines, then, overlaps with Situationism, but may be more about beautifying, questioning and interacting with space impermanently than about altering space forever.

30. Topology

A topological play-ground maps how nodes in a social network are acquainted, just as in the following example:

> *To prove that nowadays the population of the Earth is in every aspect much more closely interconnected than it has ever been, one member of our gathering proposed a test. "Let us pick at will any given existing person from among the one and one half billion inhabitants of the Earth, at any location." Then our friend bet that he could establish via direct personal links a connection to that person through at most five other persons, one of them being his personal acquaintance. "As people would say, look, you know X.Y., please tell him to tell Z.V., who is his acquaintance....so and so." "OK," said a listener, "then take for example Zelma Lagerlöff" [literature Nobelist, born 1909]. Our friend placing the bet remarked that nothing is easier. He thought only for two seconds. "Right," he said, "so Zelma Lagerlöff, as a Nobelist, obviously knew the Swedish king Gustav, since the king handed her the prize, as required by the ceremony. Gustav, as a passionate tennis player, who also participated at large international contests, evidently played with Kehrling [Béla Kehrling, Hungarian tennis champion and winner at the Göteborg Olympics 1924, 1891-1937], whom he knew well and respected." "Myself," our friend (he was also a strong tennis player) said, "I know Kehrling directly." Here was the chain, and only two links were needed out of the stated maximum of five (Braun 2004:1745).*
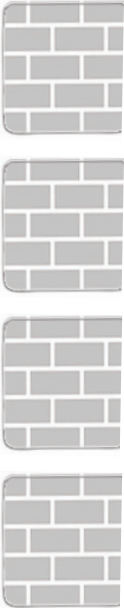
Chemist Tibor Braun, in a letter to *Science* magazine, translated the aforementioned portion of a humorous short story composed by Hungarian writer Frigyes Karinthy in 1929, originally called *Láncszemek* – in English, Chain-Link. As you will note, the activity described – i.e. the test – is really a game, with the objective to prove that the bettor knows, by a maximum of five linking chainmen, any other given person on the planet. The play pleasures implicitly include contesting, problem-solving, (social) storytelling, and the kinetic pleasure of jumping from node to node, and thus, from friend to friend-of-a-friend. Karinthy's short story also anticipates, by many decades, the scientific discourse surrounding the structure of social networks and particularly, their connectedness. The fictional story marks the appearance of a spatial concept we know today as "six degrees of separation."
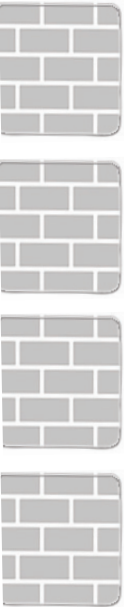
One of the first quantitative studies concerning the structure of social networks was conducted by controversial social psychologist Stanley Milgram in the late 1960s. Milgram (1967), then at Harvard University, sent letters to random subjects in Wichita, KS and Omaha, NE, whom he asked to participate in a scientific experiment by forwarding the letter to a target address through a personal acquaintance who is more likely than the subject to know the target person, either a stock broker in Boston or the wife of a divinity graduate student in Massachusetts. Milgram's goal was to find the "distance" between any two people in the US. Based on the letters that arrived at their destination and the log filing postcards that chain-persons were asked to mail to Harvard, Milgram conjectured that 5.5 was the average number of acquaintances separating – and thus, connecting – any two randomly chosen human beings in the United States.

Milgram's experiment has been harshly criticized for lack of scientific rigor, for little evidence of successfully completed chains[60], and for not reflecting the implications of mail forwarding factors (and hindrances) such as race or class (Kleinfeld 2002). Yet,

---

60 Kleinfeld found, upon re-visiting Milgram's original research notes stored at Yale University, that the claim was not supported by Milgram's experimental results: 95% of the letters sent out had failed to reach their targets.

the concept of a world of socially linked "small-worlds" prevailed, and eventually lead to playwright and screenwriter John Guare's play and movie, *Six Degrees of Separation* (1993), which introduced the idea of a worldwide linkage system. J. J. Abrams, who starred in the movie as the character Doug[61], later became the executive producer for the TV series *Lost* (2004-2010) and *Six Degrees* (2006-2007), both of which implicitly and explicitly use the six degrees of separation concept as a storytelling and character puzzling device. Figure 55 shows a *Lost* character connection map excerpt featuring exemplary characters and series locations.

In *Lost* in particular, but also in general, the concept of six degrees of separation makes us comfortable, because it creates the illusion (and mystery) of intimacy, and it has an utmost alluring explorative play character that spans all of social space. The online social networking sites Friendster and Facebook play on the concept, too. But is the concept scientifically valid? Or maybe the more appropriate question is: In which play-like contexts do we find small-worlds?

---

61 Cf. http://www.imdb.com/name/nm0009190/.
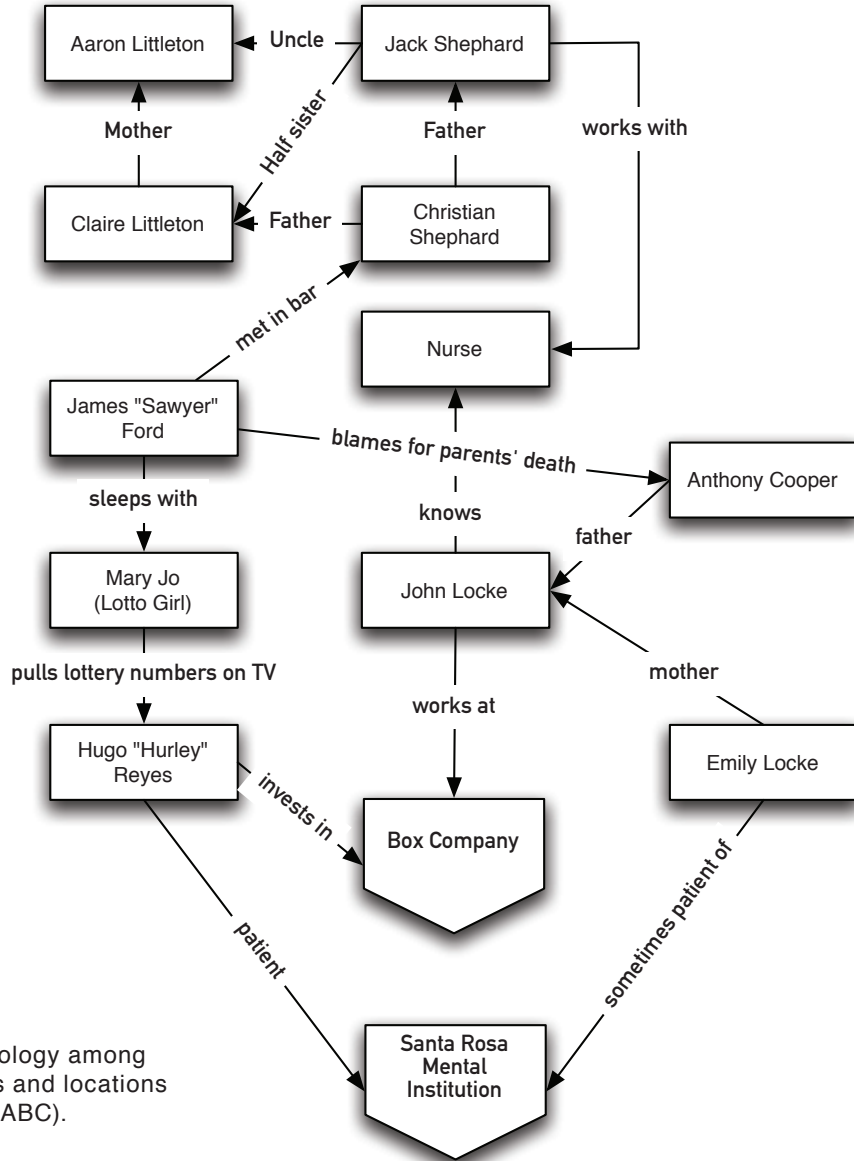
Figure 55
A socio-narrative topology among
exemplary characters and locations
in the TV show *Lost* (ABC).

Duncan Watts and Steven Strogatz (1998) show that many natural as well as designed networks exhibit the small-world property, achieved by adding a small number of random links to a network, which reduce its diameter – i.e. the longest measured direct path between any two vertices in a network – from very long to very short. This finding suggests that infectious diseases spread more easily in small-world networks than in regular networks. The small-world architecture developed by Watts and Strogatz also supports the observations made by sociologist Mark Granovetter (1973) in his milestone paper, *The Strength of Weak Ties*, in which he asserts that our acquaintances – i.e. our weak ties – are less likely to be involved socially with one another than are our strong ties – i.e. close friends. Any individual, therefore, forms a low-density network with weak ties, whereas in comparison, a set consisting of that same individual and her close friends forms a high-density network enabled by the presence of many of possible lines. See also Granovetter's critical recapitulation of his own argument in Granovetter (1983). Both findings let us think of playspaces as sites where something is passed on (or back) in space, allowing for contesting, risk-taking ("Will this prove to be a strong tie?"), chance, collecting, adventuring, or storytelling; think of a *Telephone*-style[62] information corruption activity or an activity in which a story (an image, a video, a song) grows from node to node.

In an effort to reveal the mathematical features of a sexual-contact network using a random sample of individuals, Liljeros et al. (2001) found that the connectivity of an objectively defined non-professional social network linked in the most intimate way possible is scale-free. That means that there is no core group that is separated from other individuals. Scale-free describes the fact that in sexual-contact networks, one can observe connectivities much larger than the sample's mean, in contrast, for example, to a single-scale network. In a single-scale network, each agent would have had the

---

62 Known as Chinese Whispers in the UK and Stille Post in German-speaking countries.

same amount of sexual contacts, creating an exponential and homogenous network, as opposed to a non-homogenous scale-free network.

Using citational and co-authoring data from scientific papers in physics, biomedical research, and computer science, Mark Newman (2001) investigated the "Who is the best connected scientist?" game and came up with the following summary:

> *In all cases, scientific communities seem to constitute a "small world" in which the average distance between scientists via a line of intermediate collaborators varies logarithmically with the size of the relevant community. Typically, we find that only about five or six steps are necessary to get from one randomly chosen scientist in a community to another. It is conjectured that this smallness is a crucial feature of a functional scientific community.*
>
> *We also find that the networks are highly clustered, meaning that two scientists are much more likely to have collaborated if they have a third common collaborator than are two scientists chosen at random from the community. This may indicate that the process of scientists introducing their collaborators to one another is an important one in the development of scientific communities (Newman 2001:408).*

The results from the sexual-contacts research as well as the citation game are consistent with findings suggested by Barabási and Albert (1999) as well as by Albert/Jeong/Barabási (2000) and a categorization popularized in Barabási (2003). Barabási counts small-world networks as exponential networks, in contrast to **Technology**-based networks, which are scale-free and feature self-organizing properties.

These properties are governed by two straightforward rules: (a) expansion (nodes are added one node at a time for a given period of time), and (b) preferential-attachment (new nodes connect to existing nodes and are more likely to connect to the more
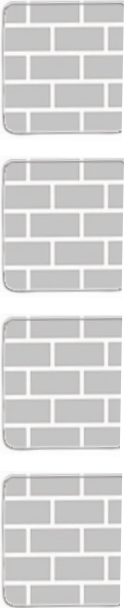
connected nodes). More than a fixed six degrees of separation, these principles are likely responsible for the scale-invariant architecture of the World Wide Web, where Website's nodes seek to link themselves to hubs, i.e. Websites with the most connections. Figure 56 visualizes the diff
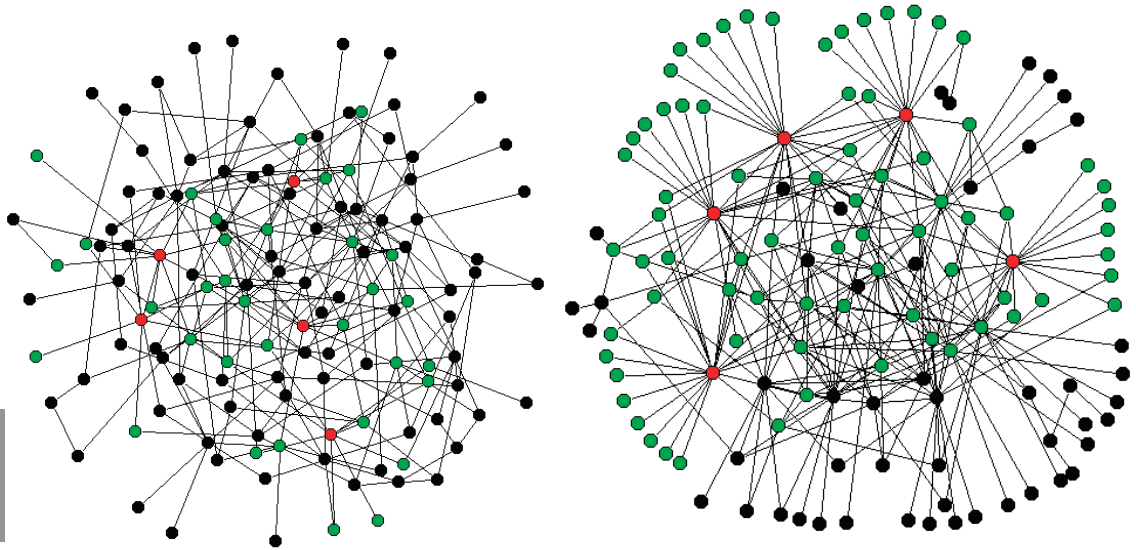
Figure 56
Two types of networks visualized: (left) A homogenous exponential and (right) an inhomogenous scale-free network. Most nodes in the exponential network have about the same number of links, whereas in the scale-free network, most nodes have one or two links and only a few nodes have a large number of links, so that the system becomes interconnected. The five nodes with the highest number of links are colored dark-gray; their first neighbors are colored gray. Figure reprinted by permission from Macmillan Publishers Ltd.: NATURE Albert/Jeong/Barabási (2003).
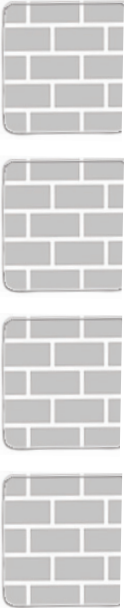
Barabási's principle of preferential-attachment is interesting when viewed from a game design and play pleasure perspective, beyond storytelling and character topologies

such as those found in the TV series *Lost*. The principle indicates that scale-free play architectures can emerge when play-others – players, objects, and spaces – have been found more attractive by previous players than other play-others. When implemented, this could play a role in orienteering-like games (see **"Nature"**) and scavenger hunt situations, as well as in exploration and adventuring play and game types in general. The similarity of this hypothesis to the principle of social navigation, which holds that participants' activities in a (physical or virtual) space are influenced by observing and following other participants' activities (Dourish 1999), is striking.

In the hybrid network space of *REXplorer*, another type of topology has been established, in which physical sites are connected through the fiction and rules of a game (as opposed to, say, a physical topology in which wires or cables connect nodes). In designing the game, which is intended as a playful yet educational touristic offering that goes beyond the classical guided tour, we reviewed the city of Regensburg's overview list of over 1,400 protected historical buildings, which describes each site's erection, make up, and usage over time. We then cross compared a number of city sightseeing guides including the city's tourism Website, finally filtering 29 sites of interest out of the mass of information; these represent typical sights that tourists would want to see during a day-long visit.

In the first design draft, we decided that each building or a building's main function over time should be represented by a site-specific character. To prototype these characters and give them personality depth, we used a character sheet format. This consisted of a one-page description of the different characters that provided an at-a-glance overview to simplify the review process. These character sheets were important in communicating our more detailed content ideas with the local tour guides for content supervision as well as for guiding the voice actors. The character sheets provided a compact and highly browsable format that supported an effective review process. The
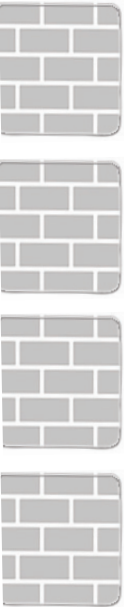
tour guides were able to suggest improvements or changes in character selection very easily using this format. The changes at this stage of the design process were easy to incorporate and they prevented significant rewriting of the full script later on.

The main challenge of narrative production, then, lay in bridging the characters (and **City** sites) so that they would be connected meaningfully, as well as emotionally, through quests. In the design document, we created guidelines as to which general emotional dimensions could bond the characters so that players would want to travel from site A to B to fulfill a quest in order to hear the resolution of a cliffhanger. In the game dialogue script, we applied emotional bridges such as romance, greed, and fear to the Non Playable Characters' (NPCs) quest stories, while planting clues in the NPC's sentences as to which element gesture the players need to cast. For example, at the site of the historical character Barbara Blomberg, we embedded the clue for the expected gesture element "water" by having Barbara, crying, ask the player to take her "tears of her love" to emperor Karl V., who she has only seen once, but with whom she has a son

Once we had created example quests between characters, the script draft was reviewed by stakeholders. Based on the feedback, we eventually created 59 quests with the help of a travel journalist, who acted as a co-writer. The final script was iteratively fine-tuned and was recorded at a professional recording facility. Figure 57 shows *REXplorer's* narrative topology as well as the game's kinesis topology in the relation to the physical site on top of a city core map. As can be seen from this Figure, *REXplorer* provides a connectivist perspective of the city of Regensburg.
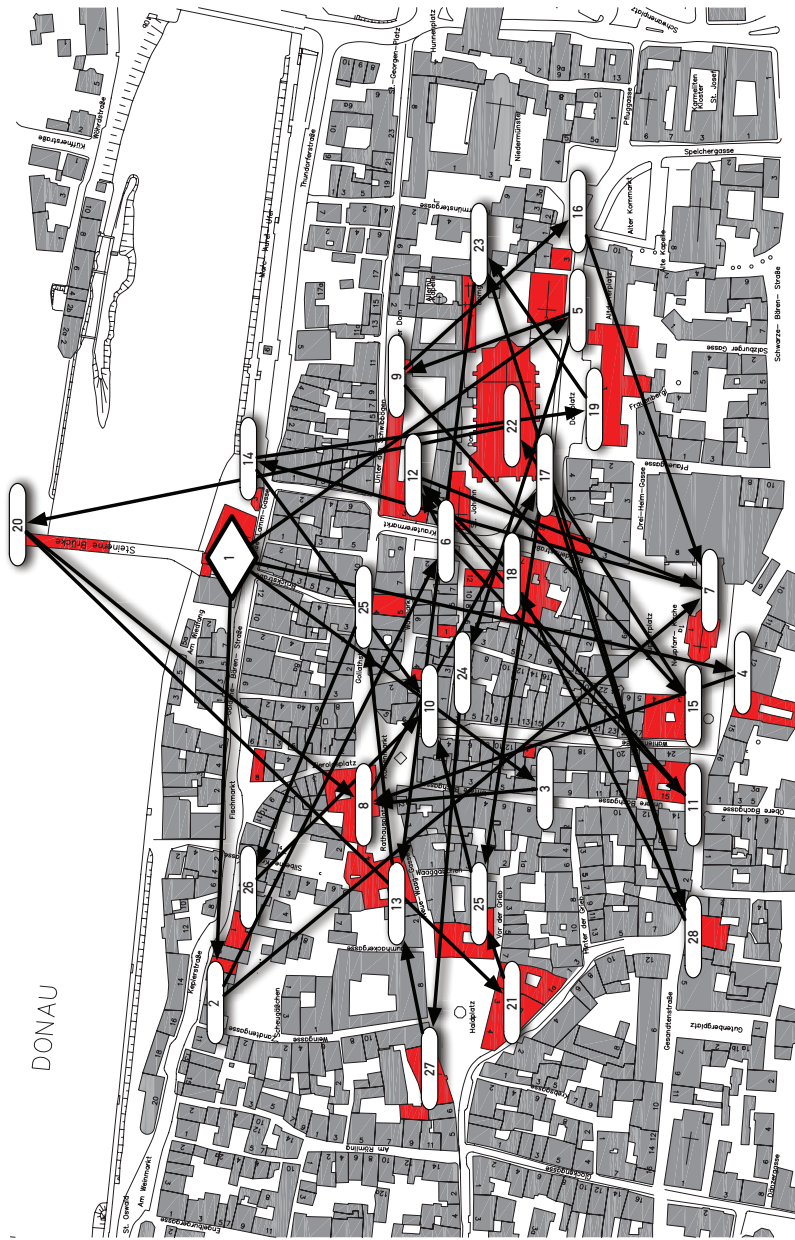
Figure 57
Topologies in *REXplorer*.
Game topology in relation to
the physical site on top of a
city core map as well quest
associations between charac-
ter-sites no. 1 to 27.

Many pervasive games fail to reach the masses because they are depending on specific sites (as *REXplorer* is), social situations or times; or because they are event- or campaign driven and irreproducible; or because they are enforcing socially inappropriate behavior onto players in public space, such as running, costuming (see **Body**) or role-playing.

In comparison, interweaving pre-existing social, spatial and temporal topologies and everyday behavior with pervasive gameplay may serve as a key to commercial success or game attractiveness. A game can pepper, amplify or enhance a given situation or procedure with the help game mechanics, yet without aiming to break given everyday circumstances. For example, *REXplorer* takes advantage of the tourist situation, during which, typically, groups of leisurely-oriented people attempt to visit and learn about a defined set of sites during a limited amount of time. Another example, the location-based social networking game *foursquare* (2008), rewards city exploration and activities as well as meeting new people with points and badges. Thereby, the game capitalizes on present urban networking patterns such as friend finding, going clubbing and discovering as well as sharing places and activities. In fact, both *REXplorer* and *foursquare* quasi "ludify" pre-existing patterns, flavoring them with uncontroversial and playful, but alike behavioral patterns. I call this type of game design technique the *simile principle*, cf. the chemical rule *similia similibus solventur*, or the homeopathic rule *similia similibus curentur*.

31. Mobility

In 2005, on the side of a heavily trafficked federal highway just outside of Regensburg, a man-sized poster courtesy of the Bavarian road safety association warned the *Homo (Ludens) Digitalis* that though driving fast may feel fun and quite game-like, it may have an irrevocable consequence: – "Game Over", see Figure 58. The road sign refers to the meme of a computer-like interf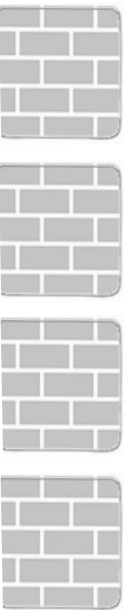ace; it concerns an actual automobile, but acknowledges the illusory similarity of driving that automobile and playing a racing game, a game of contest and risk-taking, where in real life, losers pay the highest price – death.

Figure 58
A man sized poster, courtesy of the Bavarian road safety association, applies a race game look and feel to warn of speeding.

Whereas the game that lures behind the street sign promises vertigo from high-stakes play, in these times of rising petrol prices, a different car-related activity, hypermiling, has become a game-like achieving and contesting activity in which car drivers strive to squeeze as many miles as possible from a tank of gasoline[63].

Mobility, in fact, mobilizes the magic circle, and it can be abstract and concrete. Mobility enables contests, signifies the way a plot progresses, and can have a visual gestalt or an auditive one. Without mobility, perspective would not have a before or an after. Mobility creates play functions related to movement. Mobility is the concrete expression of kinesis on a play-ground: through mobility, we perambulate space and time.

Mobility plays a major role in the way we, playfully, learn the **World**. Jean Piaget (1951) illustrates how the development of motor skills and the development of cognition in children interrelate and cannot be separated from one another; sensomotorical intelligence, and also more general traits of intelligence, fundamentally result from motor function and experiencing the world through movement. Piaget explains that it is during the "sensorimotor stage" (Piaget 1992:49), which spans from birth to the age of two, that this type of intelligence is acquired, when the child rehearses reflexes, develops habits such as thumb-sucking, grabs with the hands, and begins combining prior motor skills to actively experiment and play. Ultimately, the child leaves behind this trial and error phase, once he has become capable of playing games with more complex rules. From an adult's perspective, children's movements are, as mentioned earlier, often unjustified, undue, and repetitive (Buytendijk 1956:294ff.). But from the perspective of a child, it is precisely these factors that make mobility highly enjoyable because through movement, children experience the world.

More rigorously, then, and in agreement with mobility researchers Zoche/Kimpeler/Joepgen (2002:7), we define "mobility" here as follows:

---

63 Cf. http://www.wired.com/cars/energy/news/2008/06/hypermilers09.

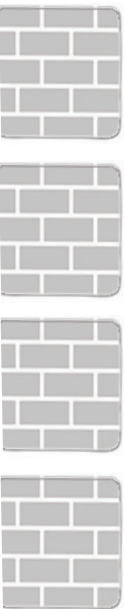| Mobility |
|---|
| The potential for movement and the execution of movement. |

The first aspect of the definition underlines the fact that mobility implies that a person's **Body**, an object, or, alternatively, a space are mobile (and in reverse, that this mobility is the condition of being mobile). The second aspect describes the actual concrete movement of people, objects, or spaces, i.e. the process of change of an entity from one unit of a described system to another unit. The two defining aspects are reciprocal: without the condition of mobility, actual mobility cannot take place, and without actual mobility, the condition of mobility is worthless. Together, the two aspects create what we can call a mobility-space. For a defined system with a set of actors and a set of elements, such a space embodies all possible movements and all actual movements.

But what are the dimensions of mobility? What kinds of mobility can we identify? Below, we've grouped the major kinds:

- **Anthropological:** Michael Gleich (1998) traces mobility as an anthropological constant, claiming a *Homo Mobilis* for whom mobility is an exigency, a capability, and a desideratum (1998:13). This way of looking at mobility certainly resembles Piaget's constructivist stance, and it remains the core of all mobile play-grounds.

- **Physical-geographical:** In geographical space, physical mobility can be a property of people or things, and people's mobility can be caused by migrational, vacational, or leisurely everyday activities (Zängler 2000:20f.). This kind of mobility implies a positional change between spatial units, of which games can take advantage. Physical movement of people, then,
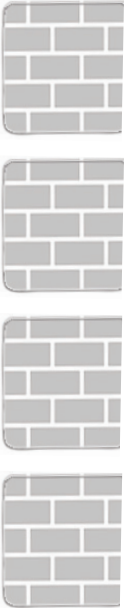
can be interesting particularly for health game purposes – for example, to resolve obesity[64]. Another starting point for designers can be reoccurring route patterns, for example commuting between home and work.

- **Social:** Individual or societal changes between groups, strata, or classes, which take place over time (i.e. intra- or intergenerationally).

- **Formative:** John Urry (2000), somewhat combining several of the approaches cited above, argues that as spatial metaphors and processes, mobilities are at the heart of contemporary social life and should therefore be at the center of 21st century sociological analysis. Travelings are thus constitutive elements of the structures of western Society and cultural identity. They can be corporeal, object-related, imaginative, or de-materialized, i.e. virtual. Nigel Thrift (2004) even envisions that continuous and ubiquitous numerical calculating alters our understanding of how we relate, so that "the nomadologic of movement becomes the natural order of thought" (Thrift 2004:590), which Thrift calls the "qualculative sense" (ibid.). In an earlier study of spatial formation, Thrift shows, for example, how the railway has been exceptionally important in the shaping of modern mobility, remodeling our existing relationships to landscape, space, and time. The railway has familiarized the masses with machinery outside of the workplace, it has democratized longer-range travel, propelling passengers through space, and it has, as a **Technology** of power and quite like a projectile, pierced, bridged, framed, bypassed, amplified, and degraded physical space – in other words, disciplined and dominated it (Thrift 1996:266ff.). Urry, transposing Thrift's railway observations onto
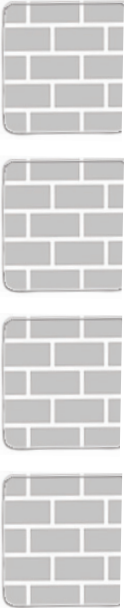
---

64 Martin Knöll, an architect and doctoral student at the University of Stuttgart co-supervised by the author, and the author are currently preparing the production of *YourParkour*, a mobile and pervasive game to fight obesity, targeting 12-13 year olds.

the notion of the flexible and wholly coercive car, which "reconfigures civil society involving distinct ways of dwelling, travelling and socialising in, and through, an automobilised time-space. Civil societies of the west are societies of automobility" (Urry 2000:59). When we were kids sitting in the back seats of cars, we played games like "I spy with my little eye," but tomorrow, our backseat kids will investigate crime mysteries designed to span vast areas along the road network, while they travel at automobile speed and look out of car window. Even today, just such a mystery exists in prototype form: the game prototype *The Journey*, which links a GIS module to a narrative engine (Gustafsson et al. 2006).

In all the ways that we play while driving, riding the train, or talking to others on our mobile phones, mobility is the play-ground of delightful discovery. Maybe it is because of this that Urry realizes, without explicitly mentioning Foucault, that the ship is the most remarkable mechanism (and metaphor) for mobility, travel, and possibly, travel encounters: "Mobilities that pass over the edges of society, through and into the "other"" (2000:48). The nature of mobility, we see, is heterotopian; whereas in the Baroque era, architecture, theater, dance, and music deceived eye and ears by "moving" the senses with the help of illusions (Oechslin 2007) (see the **Trompe l'œil** entry in this inventory), the fluids of the 21st century are made up of "the remarkably uneven and fragmented flows of people, information, objects, money, images, and risks across regions in strikingly faster and unpredictable shapes" (ibid.).

These flows, then, allow for the creation of flow games – games that take advantage of existing flows or create new ones. In a time when physical mobility based on vehicles is becoming more expensive due to rising energy prices (or, seen another way, reduced resources), other mobility vehicles will have to enable intellectual, mental, emotional, communicative, and, naturally, ludic mobility.

32. World

In the 1960s, architect R. Buckminster Fuller proposed the *World Game* (WG), a conceptual design-scientific approach to creating an Integrative Resource Utilization Planning Tool on a grand scale. With it, Fuller eventually hoped to "find the specific means of making five billion humans a total economic and physical success at the earliest possible moment without anyone being advantaged at the expense of another" (Fuller 1971:2). Fuller called his vision a game in order to underline the fact that it would be accessible to everyone because it would be unburdened by the political ideology and economic interests of an elite class. His ultimate goal was to achieve world peace by providing the highest standard of living to everyone on the planet, continually and sustainably (1971:89).

Fuller suggested that the WG be the focus of the US pavilion at the EXPO 1967 fair, where it would be housed in a Fuller-typical geodesic dome with a diameter of almost 80 meters. As in many military gaming systems, which Fuller had experienced personally (1971:4), a giant **Map** of the world located inside the dome would be connected to a computing system with a comprehensive database storing and processing knowledge about abundant and scarce world resources, needs, and problems gathered from satellites and other sources. Possible WG objectives included:

- **Communication:** "Availability to all mankind of means to communicate with anyone wishing to be communicated with at the highest rate of economy and efficiency" (1971:112).

- **Education:** "Make available the best comprehensive education in all spheres of life for all mankind; and to anyone who wishes to learn anything, everything pertaining to his special interest" (1971:113).

- **Energy:** "Make available enough energy for the healthful internal and external metabolic functionings and satisfaction of Spaceship Earth and all mankind living and to be living at the highest rate of economy and efficiency" (1971:113f.).

Neither the EXPO version of the WG nor any other facility-related version of the WG was ever realized, but many World Game workshops have been conducted ever since to help set Fuller's Spaceship Earth metaphor on course. Indeed, Fuller never intended the WG to be just a temporarily employed problem-solving tool in the style of planning or strategy games. Rather, he envisioned realizing a permanent real-time computing system based on noble and, in his time, not-yet-feasible goals. To some extent, the Internet today has grown into what Fuller envisioned many decades ago: a worldwide, real-time **Technology** network that "makes the world work, making mankind a success, in the most efficient and expeditious ways possible" (1971:95). Fuller's WG may have inspired cybernetics experts Stafford Beer and Fernando Flores, who in 1972 in Santiago, Chile, designed a computer-rich control room to assist president Salvador Allende in determining and steering the socialist economy of his country (Himmelsbach 2007:412).

The ludic space of the WG, we see, is not just *Spaceship Earth* (the title of a book Fuller authored) or its computer simulation. It is both. Therefore, it is legitimate to think of the WG as the ultimate, largest possible play-ground in the age of pervasive computing – a play-ground of **Possible Worlds** where all play types are legitimate, even if subordinated to the great systemic goal, and where the pleasure consists of collective and constant problem-solving and achieving.
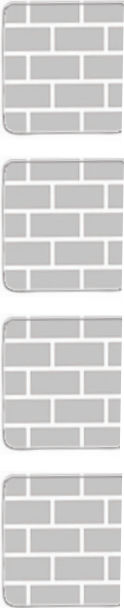
33. Outer Space

In *Spacewar!*, one of the first digital games, developed in 1961 by MIT students on a DEC PDP-1 computer, a circular, dark Type 30 Precision cathode ray tube with a dotted, yet accurately modeled night sky serves as the setting for an outer space battle and as a major inspiration for many digital games to follow.

Outer space is the play-ground of many infinites:

- It is the location of infinity and its allegory (in itself allegorized when compressed into a game); outer space programs six degrees of freedom.

- Typologically, this space does not need many visual elements to be universally understood.

- Potentially, zero gravity and the sheer size of outer space allow for infinite **Mobility**.

- The core function of outer space in games is to provide an open space with some hindrances that must be overcome, such as meteoroids and an infinity of potential enemy or benign species – an infinite dystopia.

- The movement enabled by the heterotopian space ship that goes to places where no one has ever been before.
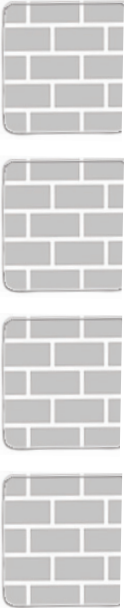
The play-ground of outer space embraces and embodies all other play-grounds, possible and impossible worlds that we are not yet capable of comprehending. It also implies an inner space and as a result, is implicitly connected to all other **Play-grounds**.
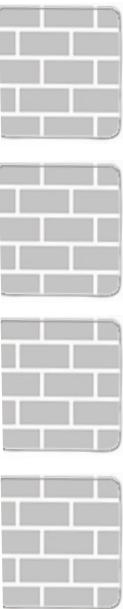
34. Technology

We know that there is a particular affinity between games and computing technology that has led us to state that all gamespaces represent, at least conceptually, rule-bound digital spaces in which conflictive, goal-oriented player interaction takes place. We have briefly discussed the enjoyable qualities of technology, finding that play interrelates with the technology through which it is expressed, and we have regarded game technology as a vehicle of architectural experimentation. The latter view is obviously accompanied by the finding that "entertainment is a key driver for development of technology" (Cheok et al. 2007:128). But what is the play-ground of technology? How is technology ludically spatialized? Let us look at three exemplary perspectives, which also help to clarify notions of technology and how they affect the way a ludic architecture unfolds.

In the previously mentioned tourist game prototype *Spirits of Split* (SoS), supervised by the author and co-developed during a 2004 game design summer school class conducted on site in Split, Croatia (cf. Walz 2006a), "low" technology was used to create a gamespace for the player. In the game, the tourist player only stays an average of two hours in Split's ancient city center, a former Roman palace. Because temperatures easily reach 40°C during the high season, the site is crowded and narrow. In *SoS*, actors wearing historical dresses are therefore distributed in the play area at easy-to-reach plazas, where they hand out cubes that represent their historical eras. Tourists can collect six different cubes, which they then place in a box that they can keep as a souvenir. City center, cubes, and costumed actors (singing or performing historically accurate songs) all provide lightweight and technologically unobtrusive entertainment appropriate for a laid-back Mediterranean environment.

The "high" technology – i.e. technology-centered – perspective represented by Benford/Magerkurth/Ljungstrand (2007:248) cites pervasive games such as *Can You*

See Me Now? (2001) as examples of hybrid environments built upon a blend of recent technologies, combining the location-based and, typically, public nature of gameplay. In the example game, *CYSMN?,* up to 20 online players are chased through a virtual 3D city by up to four players who move on the actual streets of that city, running to capture the online players in the virtual representation of the city. The physical runners are equipped with GPS and GPRS enabled handheld computers that show all player positions on a digital map application. Online players (who move at a fixed maximum speed) can send text messages to other online players as well as to the runners; runners communicate with each other over a walkie-talkie channel, verbally and contextually transmitting their current urban status, which is then broadcast online. This audio stream "defines the game; because they are privy to the runners' talk, online players are quite adept at avoiding their pursuers, effortlessly leading them up and down hills or through crowded public spaces" (Benford 2007:258). The gameplace – i.e. the area where the game is physically played, where it takes place – of *CYSMN?* is both the actual city and the places where online players play; in other words, it is distributed across a network. The gamespace of the game – i.e. the space wherein the game takes place – is primarily virtual for the online players and physical for the runners. Yet each group is provided with information from the other realm, making the experience for the chasers physical-virtual and that of the online players virtual-physical. Together, the game group experience – and the gamespace it creates – is hybrid, and only made possible because of technology. Similarly, noted game designer and theorist Jane McGonigal, argues that *CYSMN?*'s gameplay renders the role of games in society as a form of "colonization" (McGonigal 2007:233) of players, objects, and environments in the name of ubiquitous computing.

An appropriative, game-centric perspective on the spatialization of technology can be traced with the help of game designer Gregory Trefry, who asserts that the core challenge for ubiquitous game designers is "to find the right technology to fit the game" (Trefry

2007). Trefry leads us to understand that it is not necessarily a certain technology that makes a good, i.e. well-designed and playable game, but that a certain type of game affords an appropriate technological solution.

We can call the aforementioned technology affordance the *technological decorum* of the technological play-ground. In the case of pervasive games, this affordance shifts away from the application domain of pervasive games looking to superimpose physicality with aforementioned "computing functionality" (Magerkurth and Röcker 2007:6). Instead, this affordance implicitly considers all technology – old, new, or experimental – as a means to create a certain kind of gameplay experience: "Many games find interesting ways to repurpose existing technology and infrastructure" (Trefry 2007).

In *Payphone Warriors* for example (a game co-designed by Trefry in 2006 for the New York City based Come Out and Play Festival of ubiquitous games – cf. www.comeoutandplay.org/blog), the initial design goal of the game was to create an on-site experience during which teams of players could try to claim territory in a physical city. Trefry and his co-designers ended up settling for an interesting and appropriate technological solution that catered to the game's high concept: because GPS receivers proved to be too costly and too imprecise in the urban canyon of Manhattan, payphones, which feature a unique caller ID and have a fixed location, were chosen instead to serve as checkpoints in the game. Players in teams of four claimed a checkpoint by dialing the game server from the payphone and punching in their team's number. The goal of the game was to control as many payphones as possible during the 30 minutes of the gameplay session by making calls, listening to the pre-programmed audio feedbacks, and moving around in the game area outlined by the layout and position of the payphones (see http://payphonewarriors.com and Trefry (2007)). Figure 59 shows the map of the game played during the Come Out and Play Festival along with its rules.
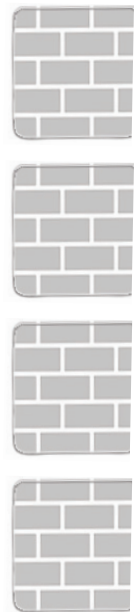
Figure 59
A game demonstrating technological decorum: Payphone Warrior. Reproduced by permission from Gregory Trefry.

Whereas in *CYSMN?* and other games that take advantage of ubiquitous computing research, technologies are often used to demo technological novelty, *Payphone Warriors* takes a somewhat different approach. The game not only takes advantage of a somewhat outdated, yet pre-existing technology and, more importantly, a functioning hard- and software infrastructure that caters to the game's design task and thereby reminds the player of the existence of a seemingly outdated means of telecommunication. The game also makes a case for low-technology being capable of solving a typical ubiquitous game problem – that of exact positioning, territorial control, and atmospheric orchestration. In *Payphone Warriors*, the core technology of the game fulfills several functions:

- **A spatio-contextual function:** Plotted onto a top down map of midtown Manhattan, the payphones serve as vertices of the gamespace. At the same time, the payphones are part of a seemingly antiquated, yet ever present networked and urban system that is brought back into the player's spatial perception via the game.

- **An enabling function:** The payphones, without even being a novel ubiquitous technology, create a hybrid gamespace by combining physical location and virtual phone network in one ubiquitous gaming experience. The example of *Payphone Warriors* demonstrates that there is no need to use ubiquitous or cutting edge technology to create a ubiquitous, accurate location tracking game system.

- **A task function:** In *Payphone Warriors*, the goal of the game is to claim (and control) payphones by making a call from a payphone booth. Ultimately, without the payphone, the game would lack a goal.

- **A procedural function:** The game includes a number of sub-procedures centered around the central Capture the Flag-like procedure of controlling the payphones. The payphones, then, not only act as positioning entities and gamespace outliners, but also as tasks and resources.

- **A social interaction programming function:** *Payphone Warriors* has players compete over payphones in real time. This builds physical sports-like action and a high competition model of conflict into the game because players are trying to literally hold on to their payphone banks.

Payphone Warriors demonstrates more than just how ubiquitous games set up, control, and influence a (collaborative) ludic architecture mainly by technological means. The game also shows how a wisely chosen technology makes a game on almost every level, leading to a high degree of technology decorum and letting players re-discover abandoned urban space. *SoS*, on the other hand, suggests that technology should only be considered in light of the given circumstances, and that technology does not always imply computerization.

In *REXplorer*, the technology most visible to the player is the game controller. The

form and functionality of the detector and keypad – i.e. game controller – went through many iterations before reaching its final design so that technology decorum was guaranteed. Figure 60 shows a number of detector prototypes. In a design studio class supervised by the author, a small group of students co-created the detector, seeking input from industrial design professionals as well as from a manufacturer specializing in lightweight metal bending and laser cutting. In addition to decorum aspects, there were many considerations that needed to be addressed in the design itself. For example, the design needed to:

- house the phone and GPS receiver together in a tamper-proof, protective shell;

- support the atmosphere of the game by providing a look that fit the story description of a scientific detector and a feel that mimicked a techno-magic wand ready for spell-casting;

- provide a skin for the phone keypad to provide a customized game interface;

- amplify the phone's default audio volume to compensate for the outdoor situation[65];

- allow for quick recharging of devices.

---

65 Note: For security reasons, we opted against headphones. A mono headphone was also excluded because of the additional cables that the tourist information staff would have had to look after.

Figure 60
Prototype stages of the REXplorer game controller.

During the prototyping phases, different materials were tested. Plastic was the first choice, but it proved not to be robust enough. A thin aluminum skeleton was used in the final design, wrapped with a soft and stretchable textile into which the keypad layout was laser-printed in a series of 30 pieces. Professional production of this small series, as seen in the Figure, proved to be feasible, yet costly. The final design result fulfilled the requirements and was warmly received by players in the playtesting.

The use of technology (or a technological interface) as a play-ground or in service of another play-ground implies that design documentation should be written with the technology in mind. For example, in *REXplorer*, formal player interface state charts were important for defining exactly what text needed to be written for each character that the player could encounter. By formally flushing out the design, we were able to ensure that we had accounted for every possible game state and error condition before the narrative script was written and recorded. Most importantly, the state charts also served as design documents for the software implementation of the game engine. Figure 61 depicts an exemplary finite state machine showing the reaction to a spell cast by the player.
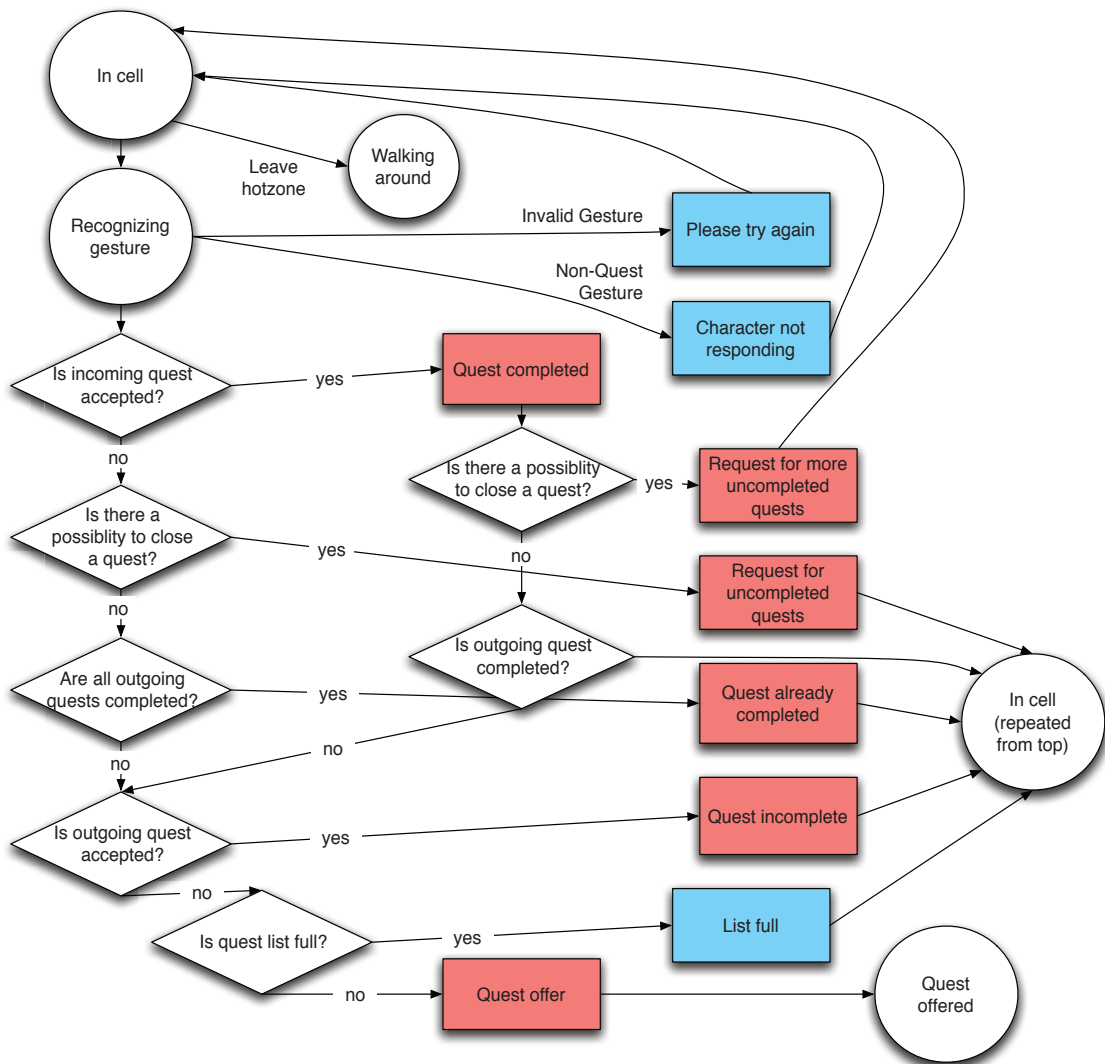
Figure 61
Finite state machine showing the reaction to a gesture in the *REXplorer* game. Other state charts were created, for example for in-cell states and other game states. The colors determine whether the spoken text stems from the character or the detector.

Technology, when permeating our lives, can affect and ultimately control all other play-grounds in order to create forms of ludic architecture. For example, technology simplifies the generation of **Possible Worlds** and **Impossible Worlds**, equips the **Body** for novel types of play, and lets us control natural space for ludic activity. Technology automates **Tessellation** and organizes a game **Board**. Technology shapes and enhances **Caves** as well as **Labyrinths (and mazes)**. It enables us to design and map playful **Terrains** as well as enhancing our **Playgrounds**. It turns our **Campuses** into exciting adolescent play-grounds, and much, much more. Technology is not only a tool or a medium of play, games, and their space today; it is, increasingly, a *conditio sine qua non* that must exert control to empower the pleasure-seeking player.

35. Ambiguity

What if it is unclear where, when, how, or with whom to play if the locative and possibly other dimensions of ludic space are ambiguous[66] – if, in other words, we cannot make out a play-ground? How can such a play-un-ground be, which spatially links nowhere and is not linked to from anywhere else? In our pool of possible architectural formats that embody ludic qualities, this last entry addresses what can be called the "disclosure problem."

In fact, game design researcher Markus Montola argues that pervasive games such as *REXplorer* exhibit an "ambiguity of expanding beyond the basic boundaries of the contractual magic circle" (Montola 2005:1). Montola further argues that games that have been grouped under the concept of pervasive games "do not have a single common denominator making them pervasive, though each of them has salient design features

---

66 As a side note, it is amusing to consider how in this context, the term "utopia" – as in, "a non-place" – takes on a new meaning.
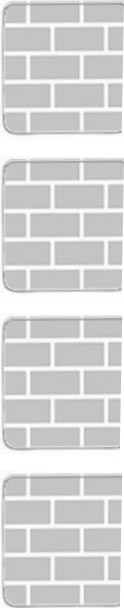
systematically working their way out of the magic circle of play" (2005:1). Montola holds that pervasive games consciously take advantage of the expansion mentioned above, and that it is the resulting "uncertainty" (ibid.) that is the defining signature trademark of the pervasive game. According to Montola, a pervasive game can thus be defined as "a game that has salient features that expand the contractual magic circle of play socially, spatially or temporally" (Montola 2005:3). Montola also underlines that none of the mentioned expansions necessarily affords technology, but that they can appear in mixed form to produce genuine experiences. As we have seen in the preceding section, technology can appear in many forms ranging from low to high.

Staffan Björk, one of the designers/researchers behind the pioneering pervasive game *Pirates!*[67] (Björk and Ljungstrand 2007:256f.), supports Montola's view and suggests expanding his three-layered ambiguity-based definition. According to Björk, the pervasiveness of a game can manifest itself not only through spatial, temporal, and social ambiguity, but also in the form of interface-related interaction ambiguity (Björk 2007:277f.).

However plausible the argument is, note that Montola does not differentiate between the terms "uncertainty" and "ambiguity," but rather uses them interchangeably (in contrast to Montola, Björk uses the term "ambiguity" only, but remains unspecific as to what it exactly means). In our context, the meaning of (and difference between) the terms ambiguity and uncertainty seems to be rather ambiguous or uncertain itself. Therefore,

---

67 *Pirates!* was developed in 2000 at the PLAYstudio of the Interactive Institute together with researchers from Nokia Research Center Tampere. In *Pirates!*, players roleplay ship captains in physical space who "sail" (virtual) seas by moving about in physical space with a handheld computer (their "ship"), seeking (virtual) islands, collecting resources, fighting monsters, and completing game quests and quest tasks. The gameplace of *Pirates!* must be equipped with WLAN, which the ship client uses to communicate with the game server, and a short range radio system. Stand-alone radio beacons in the gameplace represent the islands to which the players are sailing as well as serving to detect player proximity. Senders attached to the handheld computers allow the system to detect players in range of one another. Thus "what makes *Pirates!* different from ordinary computer games is that the movement within the game is prompted by the player's movement in the real world" (Björk and Ljungstrand 2007:256).

let us seek to make the ambiguity play-ground more precise in order to frame the ludic architecture that it engenders.

Strictly and economically speaking, game(spaces) of uncertainty are situations in which a player is unable to securely forecast future states of a game she's playing, i.e. the player must make incalculable decisions: kinesis under uncertainty. As opposed to a risky game such as a state lottery, in which at least the odds are calculable, in a game of uncertainty, the player – who acts as the decision-maker – only knows the relevant states that depend on her choice(s) in the game and may potentially occur. Still, the player cannot judge the likelihood that these states become reality. In a state lottery game, by contrast, the player knows or, with a little effort, can easily calculate the probability distributions. This somewhat rational perspective on gameplay has been further mathematized by John von Neumann and Oskar Morgenstern (1944), whose monumental treatise propelled the *Theory of Games and Economic Behavior* into the mainstream of economic thought and well beyond. Von Neumann and Morgenstern also helped to establish the theory of games as a sub-discipline of decision theory, which incorporates "theories of preference, utility and value, subjective probability and ambiguity, decision under risk or uncertainty, Bayesian decision analysis, probabilistic choice, social choice, and elections" (Fishburn 1991:27). As the quote shows, decision theory is of particular interest to those aiming to refine Montola's interchanging of ambiguity and uncertainty.

Decision theory distinguishes three key decision-making situations that help us to explain, analyze, and model decision-making:

1. **Risk situations:** Situations in which the decision-maker knows potential outcomes as well as their odds, i.e. their probability distributions (Knight 1921). Example: A player participates in a state lottery game, which has calculable odds.
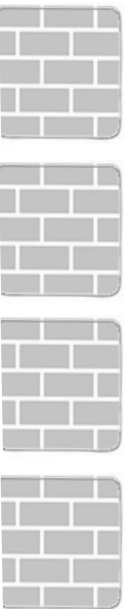
2. **Uncertainty situations:** Situations in which the decision-maker knows potential outcomes, but there are no odds available (Tversky and Wakker 1995:1270). In uncertainty, according to Knight (1921), the player has imprecise information.

3. **Ambiguity situations:** A class of choice-situations where outcomes are ambiguous because the odds are ambiguous (Ellsberg 1961). Daniel Ellsberg had shown experimentally that when gambling, many people sometimes prefer to bet on known rather than unknown or vague probabilities, thereby violating the expected utility prediction put forth by Savage (1954) and serving as proof of the phenomenon of ambiguity aversion. Much later, C.R. Fox and Amos Tversky (1995) showed that ambiguity aversion occurs only when the choice set allows the actor to compare the ambiguous proposition with another, less vague proposition. In other words, ambiguity aversion depends both on the source of uncertainty and on the degree of uncertainty (Tversky and Wakker 1995:1255). In addition, it has been shown that a subject's measured ambiguity aversion is related to his or her psychological tolerance for ambiguity, i.e. the less tolerant a player is of ambiguity, the more the player prefers to know the odds (Sherman 1974:169). As opposed to uncertainty, which is not necessarily avoidable, ambiguity – a synonym for vagueness – is always avoidable.

The preceding list implies that at least the first two decision-making situations can be derived from the relationship between decision and outcome / odds. By creating a matrix (see Table 10), we can, however, derive even more decision-making proto-situations. These are listed below and tentatively named for the sake of completeness, but are not further discussed:

4. **Possibility situations:** Situations in which the decision-maker does not know the exact nature of potential outcomes, but knows the odds of those outcomes.

5. **Zero feedback situations:** Situations in which the decision-maker knows neither the outcomes nor the odds of those outcomes materializing.

Ignoring, for a moment, situation number three (i.e. ambiguity situation), we can think of another outcome–probability relationship that is not subject to degrees of insecurity:

6. **Certainty situations:** Situations in which outcomes and associated odds are completely predetermined (Fishburn 1991).

DECISION		**PROBABILITIES ASSOCIATED WITH OUTCOMES**	
	3. Ambiguity	Known	Unknown
EXPECTED	Known	1. Risk	2. Uncertainty
OUTCOMES	Unknown	4. Possibility	5. Zero feedback

Table 10
An overview of relationships between decision and outcome / odds.

As can be seen, in each of the categories 1 to 5, probability plays a defining and standard role in insecure decision-making processes and has thus been chosen for the sake of argumentative clarity. Still, the question remains of whether or not probability could be replaced by an alternative in decision theory.

In the field of game studies, uncertainty is an agreed-on term used to express a feature designed into games in which chance is central to play. Caillois, for example, classifies chance-based play alea as one fundamental category of ludic activity – i.e. "all games
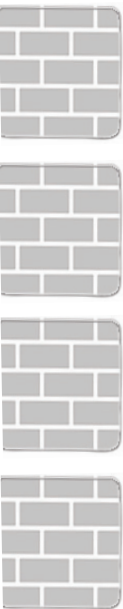
that are based on a decision independent of the player, an outcome over which he has no control, and in which winning is the result of fate rather than triumphing over an adversary" (Caillois 1962:17). From Callois' category, it generally follows that uncertainty is the result of chance, and that chance can be a game's main feature – a feature that some games have in common and that allows for these games to be grouped and categorized.

Notice how in the quotation cited above, Caillois considers chance to be a gameplay progression factor that is entirely player-independent, ascribing a passive, control-less role to the player, who needs no further resources or skills in order to play. Salen and Zimmerman disagree with this depiction of games of pure chance, pointing out that Caillois may accurately describe the emotions of some players while playing a game of chance, but that "even in a game of pure chance, a well-designed game continually offers players moments of choice. Meaningful play requires that at some level a player (...) is making choices with meaningful outcomes" (Salen and Zimmerman 2004:179). Merely casting dice and waiting, trembling, to see the result, as Caillois has observed, does not result in meaningful play. If the outcome of a game has been predefined, no meaningful play will arise for the player.

Salen and Zimmerman hence argue that games of pure uncertainty – that is, games whose outcomes are completely unknown to the player and in which no player choice exists at all – are neither widespread nor much fun to play.

In our second example of how the word uncertainty is used in game studies, Salen and Zimmerman, although rejecting games of pure chance as quasi unplayable, argue that "uncertainty is a central feature of every game" (2004:174), thereby claiming that there is an intrinsic bond between uncertainty and the authors' concept of meaningful play. In their schema, which highlights games as systems of uncertainty, Salen and Zimmerman break down the relationship between a game decision and a game outcome into three

degrees of uncertainty, i.e. types of mathematical probability. This model differs slightly from the decision theory-based model that was introduced earlier:

- a certain outcome is entirely predetermined;

- a risk is an outcome with a known probability of taking place;

- an uncertain outcome is entirely unknown to the player (2004:189).

Salen and Zimmerman argue that in all games, even games of skill, the overall outcome of a well-designed game is uncertain for the player; on a macro-level, all games possess uncertainty (2004:174).

How the player ultimately experiences uncertainty, however, may not necessarily correspond to the amount of mathematical chance designed into the game: "Uncertainty is in the eye of the beholder, or perhaps, in the play of the player" (2004:187). For example, assume a single standard six-sided die, with each side of the die showing one number from one to six. When cast, the chance for each side to appear is 1/6, or 16.67%. When all chances are added up – 6*16.67% – they total 1, or 100%. In *Das grosse Buch der Würfelspiel* (Knizia 2000), game designer (and mathematician) Reiner Knizia calls the numbers one to six the elementary outcomes, which are, as can be seen, not only equally likely to appear, but which also represent the possible set of basic outcomes that a player's cast can produce (2000:51).

Let us imagine a simple dice game that requires a single die, in which the player wins when he throws a six. The probability of throwing a six is always, for every cast, 1/6. The player can calculate this risk and thus choose to play a risk game when, for example, she bets on the next throw. The chance to succeed and thus win the bet is 1/6, while the risk of losing the bet is 5/6. However, psychologically, this kind of game can quickly take on a higher degree of felt uncertainty if, for example, the player hasn't cast a six in many throws, or if other players are gambling for the accumulated bet, or against the
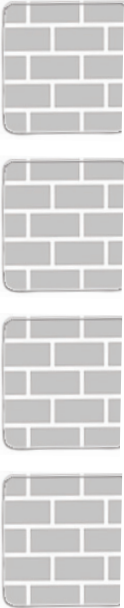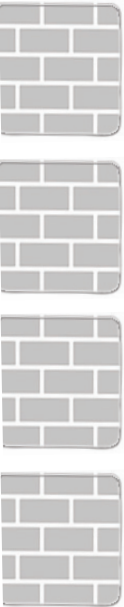
bank, or both. In games that feature probability elements, the player interacts with the game system, while the system – although quite formal and somewhat predictable – together with the player forms a unique and highly situational gameplay loop that grows in complexity the more players or the more dice are involved.

As has been demonstrated using examples from both decision theory and chance gaming, the play-ground of ambiguity can be made more precise and further broken down. Pervasive games may blur the locative dimension of gamespace, thereby introducing player uncertainty concerning the site of gameplay. Yet because of its game-nature, the play-ground of that game will be, naturally, subject to uncertainty in terms of outcome quantification.

In conclusion, the play-ground of ambiguity is realized whenever a game is at play; and whenever players play freely, they cannot be certain of where play may take them. In the end, and considering the described differentiation of uncertainty, ambiguity and risk, we have come full circle back to Brian Sutton-Smith's ambiguity of play (1997), and find that play is not only subject to contextual and rhetorical uses all across the sciences, but also that play and games are spatially framed.

GAME OVER! INSERT COIN.

*"The real key to the architecture of gamespace,
like any other architecture, is the entrance and the exit" (Wigley 2007:486).*

1. Summary

In this book, we have set out to architecturally frame play and games, both analytically and, where appropriate, designerly. We have structured the treatise according to three main sections, all of which contribute to our task of introducing the notion of a ludic architecture.

In the first section, we investigated the conceptual dimensions of the space of play, differentiating between an ambiguity dimension, a player dimension, a modality dimension, a kinetic dimension, an enjoyment dimension, and, finally, a culture and context dimension. The major finding and contribution of this section consists in a novel approach towards play that couples play with architectural thinking and practice. A second contribution is the introduction of F. J. J. Buytendijk's work to the game studies and the architectural community.

In the second section, we reviewed and updated existing notions of space and spatiality in digital games based on recent game and game design research, as well as on architectural research, with the goal of mapping a conceptual gamespace. In the concluding sub-section, we sketched out an analysis framework for investigating the spatiality of games. In this framework, we related dimensions of playspace to dimensions of gamespace; the resulting matrix can be considered the main finding of this section.

In the third section, we applied our framework where appropriate in our critical and essayistic discussion of "play-grounds," i.e. prototypical and historically persistent spatial topoi of play and gameplay. The major contribution of this section consists of the enumeration of these play-grounds and their conceptual linking.

2. Final Remarks

Games and play are here to stay. With technological developments, games and play will further evolve, and so will the gamespaces they produce and augment. Ultimately, some of us will live fully immersed in ludic machines – hybrid environments made to be played in, similar to Le Corbusier's vision of houses as machines to live in (Le Corbusier 1928/2008:170). The question is: Will we play to dream or play to work?

Alexander/Ishikawa/Silverstein (1977:Pattern 58), writing on entertainment, suggest that in a world where rites of passage have diminished and where circuses and carnivals have died out, there is an even stronger desire to live out dreams. Architects and city planners, then, are supposed to accommodate this desire and build dreams straight into the city in the form, for example, of an amusement park, where competitions, dance, music, tombolas, street theater, and one's own non-everydayness can take place. In many ways, digital games in all modalities are a realization of these dreams. The crazy games that Alexander et al. want to see … well, put simply, they are already here.

But as dream worlds, games have a societal function. "Dream worlds are a reflection of our society, its desires and fantasies. As such they are not utopias, but play their part in the search for meaning" (Herwig and Holzherr 2006:17). What makes off-the-shelf sandbox games such as *Grand Theft Auto IV* (2008) so appealing for the masses?

Commercial digital games seek to sell optimized dreams, which, to borrow from another context, "represent an ideal order. Reality is spontaneous, chaotic, and parallel; dream worlds are, by contrast, controlled and sequential, a precisely planned route without detours or shortcuts, so the visitors can be sure of replicating that same experience as often as they like, in the spirit of the notion that happiness is nothing other than the desire for repetition. Satisfaction guaranteed" (Herwig and Holzherr 2006:17). In the case of *GTA IV*, this optimized dream takes place in Liberty City, the fully traversable re-design of New York City – an **Amusement Park**-like shadow of the urbanity and an ironic and quite delirious interpretation at once.

If we assume that games as dream worlds have the potential to stabilize society because, as Crawford has put it, they frame "a safe way to experience reality" (whether or not reality is seen as too chaotic or too controlled), what will be the stabilizing factor if games become 100% pervasive? What will happen if we meet Super Mario in real life? How will we dream within an everlasting dream? Or if the political goal of pervasive games is to destabilize or at least transform, then what kind of society do we want? What are our options? The "complete environment" of a *New Babylon*, as Constant would have described it? The ones who criticize control, but propose control as a solution will either govern a post-revolutionary world or maybe be the first ones eaten by their own revolution.

Just as utopias always tell their own story as well as the story of a counter-concept of the space and times during which they were created, the fantasies that play out in games tell us something about the world in which we play our game fantasies.

Back when digital gaming first hit the mass market in the 1970s, movies such as *Star Wars,* the *Star Trek* TV series and movies as well as games such as *Space Invaders*, *Defender*, or *Asteroids* fired our imagination with "the infiniteness of space" (Schütte 2000:9) – and every since, games from independent as well as from commercial developers continue to do so. The impact of games onto culture has also led to games

inspiring physical architecture. For example, London-based architectural practice FAT has conceived a community building and landscape for an economically underprivileged town on the outskirts of Rotterdam, Netherlands. Employing participatory as well as interventionist design tactics toward a suburban regeneration effort, FAT's *Heerlijkheid* project in Hoogvliet displays bubbly, colorful and videogame-like elements such as a golden portico. The design not only explicitly resembles the *Super Mario Bros.* (1985) gameworld; it also reflects the residents' stories and dreams, thereby manufacturing a *place* in a double sense. Surely, *Heerlijkheid* is "an archetypal decorated shed, using sign-like popular imagery to communicate to its audience" (Long 2008). At the same time, attacking Modernist masterplan architecture, both the building and the landscape are emblematic of participative design as well as of videogame culture at least on the façade, the material and the topological level.

What of the structural level? With Marcos Novak's *transArchitecture* theory and related projects, we came to think of cyberspace and physical space as merging to create an architecture beyond architecture: "The significance of this transition into, then through and eventually out of the looking-glass is the exploration of ideas and phenomena such as the fourth dimension will not remain limited to computer screens and head-mounted displays but will occupy the actual spaces we inhabit" (Novak 1996). Now that pantopian games such as *REXplorer* exist, what will feed our fantasies when the fantasy can be anywhere? How technological will these fantasies be, and how technologized do they have to be, really? See Figure 62, which displays the low technology example of the bronze "Glockenhopse", a popular nine-tone glockenspiel lowered into Berlin-Spandau's market square. Will we use games to jazz architecture, as Ludger Hovestadt (2007) suggests? Will we construct greater Liberty Cities to spice up games – or re-construct as well as augment the everyday with ephemeral, yet sustainable game rules and fictions to turn our networked, sensor- and actuator-rich urban environments into, potentially, neverending games or game-like experiences?

While "we are struggling to fully comprehend the possibilities of cross media experiences" (Davidson 2008:163), on the next level, where Game Design and Architectural Design truly merge, the questions become: who will be the architects of ubiquitous dreams, and what kind of ludic architectures will they build, for us to play?

Figure 62
Ludic architecture: Ground glockenspiel in Berlin-Spandau.
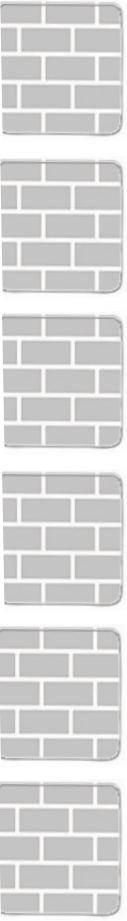
BIBLIOGRAPHY

1. Writings

Aarseth, Espen (1997): Cybertext: Perspectives on Ergodic Literature. Baltimore, MD: Johns Hopkins University Press.

Aarseth, Espen (2007): "Allegories of Space. The Question of Spatiality in Computer Games." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 44-47.

Adams, Ernest (2002): "The Role of Architecture in Video Games." Retrieved April 2, 2008, from http://www.designers-notebook.com/Columns/047_The_Role_of_Architecture/047_the_role_of_architecture.htm.

Adams, Ernest (2003): "The Construction of Ludic Space." Retrieved September 14, 2008, from http://www.designers-notebook.com/lectures/The_Construction_of_Ludic_Spaces.ppt.

Adams, Ernest & Rollings, Andrew (2006): Fundamentals of Game Design. Upper Saddle River, NJ: Pearson Prentice Hall.

Adams, Judith A. (1991): The American Amusement Park Industry. A History of Technology and Thrills. Woodbridge, CT: Twayne Publishers.

Addams, Jane (1909): The Spirit of Youth and the City Streets. New York, NY: Macmillan.

Albert, Réka, Jeong, Hawoong & Barabási, Albert-László (2000): "The Internet's Achilles' heel: Error and attack tolerance in complex networks." Nature 406, 378-382.

Alberti, Leon Battista (1435-36/1970): On Painting. Translated with Introduction and Notes by John R. Spencer. New Haven, CT: Yale University Press.

Alexander, Christopher, Ishikawa, Sara & Silverstein, Murray (1977): A Pattern Language. Towns - Buildings - Construction. New York: Oxford University Press.

Andrews, E. Benjamin (1912): History of the United States. Volume V. New York, NY: Charles Scribner's Sons.

Artaud, Antonin (1958): The Theater and Its Double (Richards, Mary Caroline, Trans.). New York, NY: Grove Press.

Asendorf, Christoph (2004): "Raum und Bewegung in der Moderne." Wolkenkuckucks-heim. Internationale Zeitschrift für Theorie und Wissenschaft der Architektur, 9(1).

Avedon, Elliott M. (1971): "The Structural Elements of Games." In Avedon, Elliott M. & Sutton-Smith, Brian (eds.), The Study of Games. New York, NY: John Wiley & Sons.

Baer, Ralph H. (2005): Videogames: In the Beginning. Springfield, NJ: Rolenta Press.

Bal, Mieke (2001): "Auf die Haut / Unter die Haut: Barockes steigt an die Oberfläche." In Burgard, Peter J. (ed.), Barock: Neue Sichtweisen einer Epoche. Vienna: Böhlau. pp. 17-51.

Ballagas, Rafael, Kuntze, André & Walz, Steffen P. (2008): "Gaming Tourism: Lessons from Evaluating REXplorer, a Pervasive Game for Tourists." In Proceedings of the 6th Intl. Conference on Pervasive Computing, May 19-22, Sydney, Australia.

Ballagas, Rafael, Rohs, Michael, Sheridan, Jennifer G. & Borchers, Jan (2005): "Sweep and Point & Shoot. Phonecam-based interactions for large public displays." In Extended abstracts of CHI '05: the SIGCHI Conference on Human Factors in Computing Systems, New York, NY. pp. 1200–1203.

Ballagas, Rafael & Walz, Steffen P. (2007): "REXplorer: Using Player-Centered Iterative Design Techniques for Pervasive Game Development." In Magerkurth, Carsten & Röcker, Carsten (eds.), Pervasive Gaming Applications. A Pervasive Gaming Research vol. 2. Aachen: Shaker. pp. 255-284.

Banham, Reyner (1977): "Centre Pompidou." Architectural Review (161), 270–294.

Bay Area Orienteering Club (1997): "BAOC Member Survey." Retrieved February 10, 2007, from http://www.baoc.org.

Barab, Sasha A., Ingram-Goble, Adam & Warren, Scott (2008): "Conceptual Play Spaces." Retrieved August 14, 2008, from http://inkido.indiana.edu/research/onlinemanu/papers/acad_play.pdf.

Barabási, Albert-László (2003): Linked: The New Science of Networks. How Everything is Connected to Everything Else and What It Means for Business, Science, and Everyday Life. New York. NY: Plume.

Barabási, Albert-László & Albert, Réka (1999): "Emergence of scaling in random networks." Science, 286(509), 509-512.

Barthes, Roland (1972): Mythologies. London: Hill and Wang.

Bartle, Richard A. (1996): "Hearts, Clubs, Diamonds, Spades: Players who suit MUDS." Retrieved December 21, 2007, from http://www.mud.co.uk/richard/hcds.htm.

Bartle, Richard A. (2004): Designing Virtual Worlds. Boston, MA: New Riders / Pearson Education.

Bartle, Richard A. (2007): "Making Places." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 158-163.

Bausinger, Hermann (1999): "Kleine Feste im Alltag: Zur Bedeutung des Fußballs." In Schlicht, Wolfgang & Lang, Werner (eds.), Über Fußball. Ein Lesebuch zur wichtigsten Nebensache der Welt. Schorndorf: Hofmann. pp. 42–58.

Becker, Katrin (2007): "Pedagogy in Commercial Video Games." In Gibson, David, Aldrich, Clark & Prensky, Marc (eds.), Games and Simulations in Online Learning. Research and Development Frameworks. Hershey, PA: Information Science Publishing. pp. 21-48.

Benford, Steve (2007): "Can You See Me Now." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 258-259.

Benford, Steve, Magerkurth, Carsten & Ljungstrand, Peter (2005): "Bridging the Physical and Digital in Pervasive Gaming." Communications of the ACM, 48(3), 54-58.

Björk, Staffan (2007): "Changing Urban Perspectives. Illuminating Cracks and Drawing Illusionary Lines." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 276-279.

Björk, Staffan & Holopainen, Jussi (2005): Patterns in Game Design. Hingham, MA: Charles River Media.

Björk, Staffan & Peitz, Johan (2007): "Pirates!" In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 256-257

Blume, Torsten (2001): "Oder die Welt gerät Tempo, Tempo vollständig aus den Fugen." In Bittner, Regina (ed.), Urbane Paradiese. Zur Kulturgeschichte modernen Vergnügens. Frankfurt/Main: Campus / Edition Bauhaus. pp. 36-52.

Blythe, Mark A. & Hassenzahl, Marc (2003): "The Semantics of Fun: Differentiating Enjoyable Experiences." In Blythe, Mark A., Overbeeke, Kees, Monk, Andrew F. & Wright, Peter C. (eds.), Funology. From Usability to Enjoyment. Dordrecht: Kluwer Academic Publishers. pp. 91-100.

Boal, Augusto (1992): Games for Actors and Non-Actors. London: Routledge.

Bogost, Ian (2006): Unit Operations. An Approach to Videogame Criticism. Cambridge, MA: MIT Press.

Bogost, Ian (2007): "Persuasion and Gamespace." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser. pp. 304-307.

Bollnow, Otto Friedrich (1963): Mensch und Raum. Stuttgart/Berlin/Köln: Kohlhammer.

Bolter, Jay David & Grusin, Richard (2000): Remediation: Understanding New Media. Cambridge, MA: MIT Press.

Borden, Iain (2001): Skateboarding, Space and The City. Architecture and the Body. Oxford and New York, NY: Berg.

Borden, Iain (2007): "Tactics for a Playful City." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture, and Urbanism: The Next Level. Basel: Birkhäuser. pp. 332-334.

Borges, Jorge Luis (1962): "The Garden of Forking Paths." In Borges, Jorge Luis (ed.), Ficciones. New York, NY.

Boron, Dariusz Jacob (2007): "A Short History of Digital Gamespace." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 26-31.

Borries, Friedrich von (2004): Who's afraid of Niketown? Nike Urbanism, Branding and the City of Tomorrow. Rotterdam: Episode Publishers.

Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (2007): Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing.

Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (2007): "Why should an architect care about computer games? And what can a game designer take from architecture?" In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 10-13.

Boyd, Danah M. & Ellison, Nicole B. (2007): "Social Network Sites: Definition, History, and Scholarship." Journal of Computer-Mediated Communication, 13(1), Article 11.

Braun, Tibor (2004): "Hungarian Priority in Network Theory." Science, 304(5678), 1745.

Brecht, Bertolt (1967): Gesammelte Werke in 20 Bänden. Hrsg. vom Suhrkamp Verlag in Zusammenarbeit mit Elisabeth Hauptmann. Frankfurt / Main: Suhrkamp.

Brecht, Bertolt & Willett, John (1964): Brecht on theatre. The development of an aesthetic (1st ed.). New York, NY: Hill and Wang.

Brosterman, Norman (1997): Inventing Kindergarten. New York, NY: Harry N. Abrams Publishers.

Buck, Linda & Axel, Richard (1991): "A novel multigene family may encode odorant receptors: a molecular basis for odor recognition." Cell, 5;65(1), 175-187.

Bunschoten, Raoul (2007): "Scenario Games. Vital Techniques for Interactive City Planning." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 384-387.

Buxton, William A. & Sniderman, Richard (1980): "Iteration in the design of the human-computer interface." In Proceedings of the 13th Annual Meeting of the Human Factors Association of Canada. pp. 72–81.

Buytendijk, Frederik Jacobus Johannes (1933): Wesen und Sinn des Spiels. Das Spielen des Menschen und der Tiere als Erscheinungsform der Lebenstriebe. Berlin: Kurt Wolff Verlag / Der Neue Geist.

Buytendijk, Frederik Jacobus Johannes (1995): "Das gewagte Spiel." Deutsches Architektenblatt, 27(1), 12-14.

Caillois, Roger (1962): Man, Play, and Games. Glencoe, NY: The Free Press.

Caillois, Roger (2001): Man, Play, and Games. Urbana, IL: University of Illinois Press.

Cardwell, Diane (January 10, 2007): "New York Tries to Think Outside the Sandbox." The New York Times Retrieved May 17, 2008, from http://www.nytimes.com/2007/01/10/nyregion/10play.html?pagewanted=1&ei=5090&en=1b5ba382 c90c37c8&ex=1326085200&partner=rssuserland&emc=rss.

Carrera, Fabio (1997): Campo Santa Maria Formosa, Venice, Italy: A case study of the application of visual, dynamic and scale-invariant analyses for the description, interpretation and evaluation of City Form. Massachusetts Institute of Technology, Department of Urban Studies and Planning.

Chalmers, Matthew (2004): "Space/Place Reconsidered." Proceedings of the second workshop on Space, Spatiality and Technology Retrieved February 1, 2008, from http://www.dcs.gla.ac.uk/~matthew/papers/spaceSpatiality2004.pdf.

Chen, Jenova (2007): "Flow in Games (and Everything Else)." Communications of the ACM, 50(4), 31-34.

Cheok, Adrian David, Wei, Liu, Tat, Khoo Eng & Soon, James Teh Keng (2007): "Mixed Reality for Future Social and Physical Entertainment Systems." In Magerkurth, Carsten & Röcker, Carsten (eds.), Pervasive Gaming Applications. A Reader for Pervasive Gaming Research vol. 2. Aachen: Shaker. pp. 127-158.

Ching, Francis D.K. (1995): A Visual Dictionary of Architecture. New York, NY: John Wiley & Sons.

Choy, Edward (2004): "Tilting at Windmills - The Theatricality of Role-playing Games." In Montola, Markus & Stenros, Jaakko (eds.), Beyond Role and Play - Tools, Toys and Theory for Harnessing the Imagination. Helsinki: Solmukohta/Ropecon ry. pp. 53-65.

Christiaanse, Kees (2007): "Campus to City: Urban Design for Universities." In Hoeger, Kerstin & Christiaanse, Kees (eds.), Campus and the City: Urban Design for the Knowledge Society. Zurich: gta Verlag. pp. 45-58.

Christiaanse, Kees & Lehnerer, Alexander (2007): "Rule-Based Urban Planning." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 372-375.

Chtcheglov, Ivan (1958): "Formulary for a New Urbanism." Internationale Situationniste(1).

Crawford, Chris (1982/1997): "The Art of Computer Game Design." Retrieved March 13, 2008, from http://www.vancouver.wsu.edu/fac/peabody/game-book/Coverpage.html.

Cross, Nigel (2007): "From a Design Science to a Design Discipline: Understanding Designerly Ways of Knowing and Thinking." In Michel, Ralf (ed.), Design Research Now. Essays and Selected Projects. Basel: Birkhäuser Publishing. pp. 41-54.

Csíkszentmihályi, Mihályi (1975): Beyond Boredom and Anxiety: The Experience of Work and Play in Games. San Francisco: Jossey Bass Publishers.

Csíkszentmihályi, Mihályi (1991): Flow. The Psychology of Optimal Experience. New York, NY: Harper Perennial.

Davidson, Drew (2007): "ICO. Holding Hands in a Castle." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 54-55.

Davidson, Drew (2008): stories in between: narratives and mediums @ play. Pittsburgh, PA: ETC Press.

de Certeau, Michel (1984): The Practice of Everyday Life. Berkeley, CA: University of California Press.

De Landa, Manuel (1991): War in the Age of Intelligent Machines. New York, NY: Swerve Editions / Zone Books.

Debord, Guy-Ernest (1955/2004): "Introduction to a Critique of Urban Geography." Les Lèvres Nues Retrieved November 19, 2007, from http://library.nothingness.org/articles/SI/en/display/2.

Debord, Guy-Ernest (1958): "Theory of the Dérive." Internationale Situationniste(2).

Debord, Guy-Ernest & Wolman, Gil (1956): "A User's Guide to Détournement." Les Lèvres Nues(8).

Deleuze, Gilles (1993): The Fold: Leibniz and the Baroque. Minneapolis, MN: University of Minneapolis Press.

Dena, Christy (2007): "Creating Alternate Realities. A Quick Primer." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 238-241.

Dibie, Pascal (1993): Wie man sich bettet. Von Bärenfellen, Prunkgemächern, Lasterhöhlen und Lotterbetten. Munich: dtv.

Diderot, Denis (1994): Selected Writings on Art and Literature. London: Penguin.

Digital Bridge (2006): "Crime Channel." Retrieved August 26, 2006, from http://www.digitalbridge.org.uk/sdtv/crimechannel.php.

Disney, Walt (Director) (1966): EPCOT. Distributed by Walt Disney Corp.

Dix, Alan J., Finlay, Janet E., Abowd, Gregory D. & Beale, Russell (1998): Human-Computer Interaction. Upper Saddle River, NJ: Prentice-Hall, Inc.

Dourish, Paul (1999): "Where the footprints lead: Tracking down other roles for social navigation." In Munro, Alan J., Höök, Kristina & Benyon, David (eds.), Social navigation of information space. London: Springer. pp. 15-34.

Drechsler, Wolfgang (2006): "The Contrade, the Palio, and the Ben Comune: Lessons from Siena." TRAMES, 10(2), 99-125.

Dundes, Alan & Falassi, Alessandro (2005): La Terra in Piazza. An Interpretation of the Palio of Siena. Siena: nuova imagine.

Dunlop, Beth (1996): Building a Dream. The Art of Disney Architecture. New York, NY: Harry N. Abrams.

Duran, Sheila (2006): ""J" is for Jungle Gym." Retrieved June 10, 2008, from http://www.winnetkahistory.org/gazette/winnetkaatoz/j.htm.

Ellsberg, Daniel (1961): "Risk, Ambiguity, and the Savage Axioms." The Quarterly Journal of Economics, 75(4), 643-669.

Engeli, Maia (2003): "Levelsbyarchitects." In GameSetandMatch. Proceedings of the GSM conference, TU Delft, December 13, 2001. pp. 51-59.

Ernst, Bruno (2007): The Magic Mirror of M.C. Escher [25th Anniversary Edition]. Cologne: Evergreen / Taschen.

Ertz, Christoph (2007): "Wie von Geisterhand." emotional pur. Das Europa-Park-Journal, (02), 28-29.

Falstein, Noah (2004): "Natural Funativity." Retrieved May 7, 2008, from http://www.gamasutra.com/features/20041110/falstein_01.shtml.

Feireiss, Lukas (2007): "New Babylon Reloaded. Learning from the Ludic City " In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 218-221.

Fernández-Vara, Clara (2007): "Labyrinth and Maze. Video Game Navigation Challenges." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 74-77.

Fingerhuth, Carl (2004): Learning from China – das Tao der Stadt. Basel: Birkhäuser Publishing.

Fishburn, Peter C. (1991): "Decision Theory: The Next 100 Years?" The Economic Journal, 101(404), 27-32.

Flanagan, Mary (2007): "The Sims. Suburban Utopia." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias

(eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 150-151.

Flusser, Vilém (1997): Medienkultur. Frankfurt / Main: Fischer.

Fogg, B.J. (2003): Persuasive Technology. Using Computers to Change What We Think and Do. San Francisco, CA: Morgan Kaufmann Publishers.

Foucault, Michel (1997): "Of Other Spaces: Utopias and Heterotopias." In Leach, Neil (ed.), Rethinking architecture: a reader in cultural theory. London: Routledge. pp. 350-356.

Fox, C.R. & Tversky, Amos (1995): "Ambiguity Aversion and Comparative Ignorance." The Quarterly Journal of Economics, 110(3), 585-603.

Frasca, Gonzalo (2003): "Ludologists love stories, too: notes from a debate that never took place." Retrieved April 11, 2008, from http://www.ludology.org/articles/Frasca_LevelUp2003.pdf.

Frederick, Matthew (2007): 101 things I learned in architecture school. Cambridge, MA: MIT Press.

Fritz, Jürgen (2004): Das Spiel verstehen. Eine Einführung in Theorie und Bedeutung. Weinheim: Juventa-Verlag.

Fröbe, Turit (2004): "Weg und Bewegung in der Architektur Le Corbusiers." Wolkenkuckucksheim. Internationale Zeitschrift für Theorie und Wissenschaft der Architektur, 9(1).

Fuhrmann, Manfred (1990): Die antike Rhetorik. Eine Einführung. Munich and Zurich: Artemis.

Fuller, R. Buckminster (1971): The World Game: Integrative Resource Utilization Planning Tool. Carbondale, IL: Southern Illinois University.

Fullerton, Tracy (2008): Game Design Workshop. A Playcentric Approach to Creating Innovative Games. Burlington, MA: Morgan Kaufmann.

Gibson, James J. (1977): "The Theory of Affordances." In Shaw, Robert E. & Bransford, John (eds.), Perceiving, Acting, and Knowing. Hillsdale, NJ: Lawrence Erlbaum Associates.

Gibson, James J. (1979): The Ecological Approach to Visual Perception. Mahwah, NJ: Lawrence Erlbaum Associates.

Giedion, Siegfried (1941): Space, Time & Architecture: The Growth of a New Tradition. Cambridge, MA: Harvard University Press.

Gingold, Chaim (2003): Miniature Gardens & Magic Crayons: Games, Spaces, & Worlds. Georgia Institute of Technology, Atlanta, GA.

Gleich, Michael (1998): Mobilität. Warum sich alle Welt bewegt. Hamburg: Hoffmann und Campe.

Glonnegger, Erwin (1988/1999): Das Spiele-Buch: Brett- und Legespiele aus aller Welt. Herkunft, Regeln und Geschichte. Uehlfeld: Drei Magier Verlag.

Goffman, Erving (1959): The Presentation of Self in Everyday Life. New York, NY: Anchor Books / Doubleday.

Goldammer, Hermann (1872): Der Kindergarten. Handbuch der Fröbel'schen Erziehungsmethode, Spielgaben und Beschäftigungen. Nach Fröbels Schriften und den Schriften der Frau Bertha Maria von Marenholtz-Bülow bearbeitet. Mit Beiträgen von Bertha Maria von Marenholtz-Bülow. 2nd printing. Berlin: Carl Habel.

Gottdiener, Mark (1997): The Theming of America: Dreams, Visions, and Commercial Spaces. Boulder, CO: Westview Press.

Gould, John D. & Lewis, Clayton (1985): "Designing for usability: key principles and what designers think." Communications of the ACM, 28(3), 300–311.

Graft (1999): "Las Vegas - Stillstand ist Tod." Stadtbauwelt(9).

Granovetter, Mark S. (1973): "The Strength of Weak Ties." American Journal of Sociology, 78(6), 1360-1380.

Granovetter, Mark S. (1983): "The Strength of Weak Ties: A Network Theory Revisited." Sociological Theory, 1, 201-233.

Green, Penelope (June 12, 2008): "Mystery on Fifth Avenue." The New York Times Retrieved June 12, 2008, from http://www.nytimes.com/2008/06/12/garden/12puzzle.html?_r=2&pagewanted=1&oref=slogin.

Greenfield, Adam (2008): "Cities Are All About Difficulty. PICNIC speaker Adam Greenfield on urban savoir faire and the loss of solitude." Retrieved August 21, 2008, from http://www.picnicnetwork.org/page/24083/en.

Günzel, Stephan (2007): ""Eastern Europe, 2008". Maps and Geopolitics in Video Games." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 444-449.

Gustafsson, Anton, Bichard, John, Brunnberg, Liselott, Juhlin, Oskar & Combetto, Marco (2006): "Believable environments - Generating interactive storytelling in vast location-based pervasive games." In Proceedings of SIGCHI Advances in Computer Entertainment 2006.

Hansmann, Claus & Von Wilckens, Leonie (1959): Puppen aus aller Welt. Munich: Bruckmann.

Häntzschel, Jörg (2001): "Das Paradies in der Wüste - Las Vegas." In Bittner, Regina (ed.), Urbane Paradiese. Zur Kulturgeschichte modernen Vergnügens. Frankfurt/Main: Campus / Edition Bauhaus. pp. 297-302.

Hattori, James (2000): "Video game 'Sim'-mers at top of game charts." Retrieved March 13, 2008, from http://edition.cnn.com/2000/TECH/computing/12/02/index.sims/cover.sims/.

Hébert, Jacques (2004): "A Mathematical Notation for Medieval Labyrinths." Caerdroia. The Journal of Mazes & Labyrinths, 34(34), 37-43.

Henderson, Justin (2003): Casino Design. Resorts, Hotels, and Themed Entertainment Spaces. Gloucester, MA: Rockport Publishers.

Hendricks, Barbara E. (2001): Designing for play. Aldershot / Burlington, VT: Ashgate.

Hermida, Alfred (2005): "Katamari creator dreams of playgrounds (November 10, 2005)." BBC NEWS Retrieved December 20, 2006, from http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/4392964.stm.

Hertz, J.C. (1997): Joystick Nation. London: Abacus.

Herwig, Oliver & Holzherr, Florian (2006): Dream Worlds. Architecture and Entertainment. Munich: Prestel.

Hess, Alan (1993): Viva Las Vegas: After-Hours Architecture. San Francisco, CA: Chronicle Books.

Himmelsbach, Sabine (2007): "Ops Room. I Like Instant Nirvana." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 412-413.

Hinske, Steve, Lampe, Matthias, Magerkurth, Carsten & Röcker, Carsten (2007): "Classifying Pervasive Games: On Pervasive Computing and Mixed Reality." In Magerkurth, Carsten & Röcker, Carsten (eds.), Concepts and Technologies for Pervasive Games. A Reader for Pervasive Gaming Research vol. 1. Aachen: Shaker. pp. 11-37.

Hoeger, Kerstin (2007): "Campus and the City – A Joint Venture?" In Hoeger, Kerstin & Christiaanse, Kees (eds.), Campus and the City: Urban Design for the Knowledge Society. Zurich: gta Verlag. pp. 13-24.

Hopkins, Keith & Beard, Mary (2005): The Colosseum. Cambridge, MA: Harvard University Press.

Hou Je Bek, Wilfried (2007): ".Walk. The Universal Psychogeographic Computer (UPC)." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 308-309.

Hovestadt, Ludger (2006): "Strategien zur Überwindung des Rasters. 33 Episoden über Architektur und Information - eine Positionierung des CAAD." archithese. Zeitschrift und Schriftenreihe für Architektur, 36(4), 76-84.

Hovestadt, Ludger (2007): "Why Games for Architecture?" In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 335-339.

Huizinga, Johan (1971): Homo ludens. New York: Beacon.

Huizinga, Johan (1987): Homo Ludens. Vom Ursprung der Kultur im Spiel. Reinbek: Rowohlt.

Hummel, C.C.M. (2000): An exploratory expedition to create engaging experiences through gestural jam sessions. Unpublished Doctoral dissertation, Delft University of Technology, Delft.

Hunt, Bernard (2001): "Sustainable Placemaking." Retrieved November 8, 2007, from http://www.sustainable-place-making.org/about.htm.

Hutchinson, Ann (1977): Labanotation or Kinetography Laban. The System of Analyzing and Recording Movement (Third edition, revised ed.). New York, NY: Theatre Arts Books.

Inchbald, Guy (1997): "The Archimedean honeycomb duals." The Mathematical Gazette(81), 213-219.

Jacobs, Jane (1961): The death and life of great American cities. New York: Random House.

Jenkins, Henry (2001): "From Barbie to Mortal Kombat: Further Reflection." In Playing By The Rules: The Cultural Policy Challenges of Video Games Conference, University of Chicago.

Jenkins, Henry (2007): "Narrative Spaces." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 56-60.

Jenkins, Henry & Squire, Kurt (2002): "The Art of Contested Spaces." In King, Lucien (ed.), Game On. The History and Culture of Videogames. New York, NY: Universe Publishing. pp. 64-75.

Jerz, Dennis G. (2007): "Somewhere Nearby is Colossal Cave: Examining Will Crowther's Original "Adventure" in Code and in Kentucky." digital humanities quarterly, 1(2).

Johnson, John William (1981): "Killer: The Game of Assassination." In Jackson, Steve (ed.), Killer: The Game of Assassination. Austin, TX: Steve Jackson Games. p. 75.

Joost, Gesche (2006): Grundzüge der Filmrhetorik. Theorie, System und Praxis einer audio-visuellen Medienrhetorik. Universität Tübingen, Tübingen.

Jung, Carl G. (1990): Archetypen. Munich: dtv.

Juul, Jesper (2005): Half-Real. Video Games between Real Rules and Fictional Worlds. Cambridge, MA: MIT Press.

Juul, Jesper (2007): "Asteroids. Forgotten Futurism." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 34-35.

Kaschadt, Katrin (2002): "Jeremy Bentham: The Penitentiary Panopticon or Inspection House." In Levin, Thomas Y., Frohne, Ursula & Weibel, Peter (eds.), CTRL [SPACE]. Rhetorics of Surveillance from Bentham to Big Brother. Karlsruhe / Cambridge, MA: ZKM / MIT Press. pp. 114-119.

Kelley, Heather (2007a): "Animal Crossing. A Game in Time." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 180-181.

Kelley, Heather (2007b): "Wii Sports. Breaking the Fourth Wall." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 24-25.

Kern, Hermann (1982): Labyrinthe. Erscheinungsformen und Deutungen. 5000 Jahre Gegenwart eines Urbildes. Munich: Prestel.

Kim, John H. (2004): "Immersive Story. A View of Role-Played Drama." In Montola, Markus & Stenros, Jaakko (eds.), Beyond Role and Play. Tools, Toys and Theory for Harnessing the Imagination. Helsinki: Ropecon ry. pp. 31-38.

Kleinfeld, Judith (2002): "Six Degrees: Urban Myth?" Psychology Today(7).

Klemmer, Scott R., Hartmann, Björn & Takayama, Leila (2006): "How Bodies Matter: Five Themes for Interaction Design." In Proceedings of the ACM Conference on the Design of Interactive Systems, State College, PA.

Klimmt, Christoph (2001): "Computer-Spiel: Interaktive Unterhaltungsangebote als Synthese aus Medium und Spielzeug." Zeitschrift für Medienpsychologie, 13(1), 22-32.

Knight, Frank Hyneman (1921): Risk, uncertainty, and profit. New York: Houghton Mifflin.

Knightly, Arnold M. (February 25, 2007): "Blink and you'll miss him." Las Vegas Review-Journal.

Knizia, Reiner (2000): Das Grosse Buch der Würfelspiele: Hugendubel.

Kolb, David (1994): Socrates in the Labyrinth: Hypertext, Argument, Philosophy. Watertown, MA: Eastgate Systems.

Koolhaas, Rem (1978/1994): Delirirous New York. A Retroactive Manifesto for Manhattan. New York, NY: The Monacelli Press.

Koolhaas, Rem (2003): "Globalisierung (1993)." In de Bruyn, Gerd & Trüby, Stephan (eds.), architektur_theorie.doc. Texte seit 1960. Basel: Birkhäuser Publishing. pp. 48-51.

Korris, James H. (2007): "Ender's Game. Towards a Synthetic View of the World." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 425-429.

Koster, Raph (2005): A Theory of Fun for Game Design. Scottsdale, AZ: Paraglyph Press.

Küttler, Dörte (2006): /spiel/architektur. Architektur und Stadtraum in Computer- und Konsolenspielen. Unpublished Master's thesis, University for Applied Sciences Bochum, Bochum.

Küttler, Dörte (2007): "Tony Hawk's American Wasteland. New Functions of Architecture." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 124-125.

Laurel, Brenda (1993): Computers as Theatre. Reading, MA: Addison-Wesley.

Lazzaro, Nicole (2004): "Why We Play Games: Four Keys to More Emotion Without Story." Retrieved March 1, 2007, from http://www.xeodesign.com/xeodesign_whyweplaygames.pdf.

Lazzaro, Nicole (2007): "The 4 Most Important Emotions of Game Design " In Proceedings of Game Developers Conference, San Francisco, CA.

Le Corbusier (1928/2008): Toward an Architecture. London: Frances Lincoln.

Le Corbusier (1962): An die Studenten. Die `Charte d`Àthènes´. Hamburg: Rowohlt.

Le Corbusier (1975): "Ausblick auf eine Architektur - Leitsätze." In Conrads, Ulrich (ed.), Programme und Manifeste zur Architektur des 20. Jahrhunderts. Braunschweig: Vieweg. pp. 56-59.

Lefebvre, Henri (1991): The Production of Space (Nicholson-Smith, Donald, Trans.). Oxford: Basil Blackwell.

Lefebvre, Henri (1996): "Elements of Rhythmanalysis." In Kofman, Eleonore & Lebas, Elizabeth (eds.), Writings on Cities. Oxford: Blackwell Publishers. pp. 219-240.

Leggewie, Claus & Bieber, Christoph (2004): "Interaktivität - Soziale Emergenzen im Cyberspace?" In Bieber, Christoph & Leggewie, Claus (eds.), Interaktivität. Ein transdisziplinärer Schlüsselbegriff. Frankfurt/Main: Campus Verlag. pp. 7-14.

Lehnerer, Alexander (2007): "Kaisersrot. Roundtableware and Statistical Design." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 364-365.

Lewin, Kurt (1931/1982): "Umweltkräfte in Verhalten und Entwicklung des Kindes." In Weinert, Franz E. & Gundlach, Horst (eds.), Kurt-Lewin-Werkausgabe. Band 6. Bern: Huber. pp. 169-210.

Lewin, Kurt (1933): "Vorwort." In Buytendijk, Frederik Jacobus Johannes (ed.), Wesen und Sinn des Spiels. Das Spielen des Menschen und der Tiere als Erscheinungsform der Lebenstriebe. Berlin: Kurt Wolff Verlag / Der Neue Geist. pp. 7-8.

Lewin, Kurt (1982): "Feldtheorie." In Lewin, Kurt & Graumann, Carl-Friedrich (eds.), Kurt-Lewin-Werkausgabe. Band 4: Feldtheorie. Bern / Stuttgart: Huber / Klett-Cotta. pp. 41-312.

Lidwell, William, Holden, Kritina & Butler, Jill (2003): Universal Principles of Design. 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design. Gloucester, MA: Rockport Publishers.

Liljeros, Fredrik, Edling, Christofer R., Nunes Amaral, Luís A., Stanley, H. Eugene & Åberg, Yvonne (2001): "The web of human sexual contacts." Nature, 411, 907-908.

Loke, Lian, Larssen, Astrid T., Robertson, Toni & Edwards, Jenny (2007): "Understanding Movement for Interaction Design: Frameworks and Approaches." Personal and Ubiquitous Computing, 11(8), 691-701.

Long, Kieran (2008): "Heerlijkheid Hoogvliet, Rotterdam, Netherlands by FAT." Retrieved June 25, 2009, from http://www.architectsjournal.co.uk/buildings/heerlijkheid-hoogvliet-rotterdam-netherlands-by-fat/1943035.article.

Lootsma, Bart (2007): "Koolhaas, Constant and Dutch culture in the 1960's." Architekturtheorie.eu (September 4).

Loponen, Mika & Montola, Markus (2004): "A Semiotic View on Diegesis Construction." In Montola, Markus & Stenros, Jaakko (eds.), Beyond Role and Play. Tools, Toys and Theory for Harnessing the Imagination. Helsinki: Ropecon ry. pp. 39-52.

Ludwig, Ralf (1997): Hegel für Anfänger: Phänomenologie des Geistes. Munich: dtv.

Lynch, Kevin (1960): The Image of the City. Cambridge, MA: MIT Press.

Lynch, Kevin (1972): What time is this Place? Cambridge, MA: MIT Press.

Mackay, Daniel (2001): The Fantasy Role-Playing Game. A New Performing Art. Jefferson, NC: McFarland & Company.

Magerkurth, Carsten & Röcker, Carsten (2007): "Towards the Emergence of A New Application Domain." In Magerkurth, Carsten & Röcker, Carsten (eds.), Concepts and Technologies for Pervasive Games. A Reader for Pervasive Gaming Research vol. 1. Aachen: Shaker. pp. 5-10.

Mann, Steve (2003): "Existential Technology." Leonardo 36(1), 19-26.

Manovich, Lev (2001): The Language of New Media. Cambridge, MA: MIT Press.

Marg, Volkwin (2008): "Stadionarchitektur: Kathedralen für das Fernsehen." Retrieved June 20, 2008, from http://www.tagesspiegel.de/sport/EM-2008-Volkwin-Marg-Stadionarchitektur;art17481,2550380.

Marx, Karl (1867/1962): Das Kapital. Kritik der politischen Oekonomie. Buch I: Der Produktionsprozess des Kapitals. Berlin: Dietz.

Mathews, Harry & Brotchie, Alastair (eds.) (1998): Oulipo Compendium. London: Atlas Press.

Mathews, Stanley (2005): "The Fun Palace: Cedric Price's experiment in architecture and technology." Technoetic Arts: A Journal of Speculative Research, 3(2), 73-91.

Mattern, Friedemann (2003): "Vom Verschwinden des Computers - Die Vision des Ubiquitous Computing." In Mattern, Friedemann (ed.), Total vernetzt. Berlin: Springer. pp. 1-41.

McCullough, Malcolm (2004): Digital Ground. Architecture, Pervasive Computing, and Environmental Knowing. Cambridge, MA: MIT Press.

McGonigal, Jane (2007): "Ubiquitous Gaming. A Vision for the Future of Enchanted Spaces." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 233-238.

McGregor, Georgia Leigh (2006): "Architecture, Space and Gameplay in World of Warcraft and Battle for Middle Earth 2." In CyberGames 2006. Proceedings of the international conference on Game research and development, Perth, Australia. pp. 69-76.

McGregor, Georgia Leigh (2007): "Situations of Play: Patterns of Spatial Use in Videogames." In Proceedings of DiGRA 2007: Situated Play. The 3rd International Conference of the Digital Games Research Association, University of Tokyo, September 24-28, 2007. pp. 537-545.

McIntosh Lloyd, Susan (1988): "The Putney School: A Progressive Experiment." The Journal of American History, 75(2), 657-658.

Meyer, Steffen (2008): "Bodenständig. Positionsbestimmung per WLAN statt GPS." Retrieved March 26, 2008, from http://www.heise.de/mobil/suche/ergebnis/?rm=result;words=GPS;q=gps;url=/mobil/artikel/105369/.

Milgram, Stanley (1967): "The small-world problem." Psychology Today(1), 61-67.

Mitchell, William J. (1999): e-topia: Urban Life, Jim - But Not as We Know It. Cambridge, MA: MIT Press.

Mitchell, William J. (2007): "Action in the Hands of the User." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 407-409.

Mitscherling, Jeff (1992): "Hegelian elements in Gadamer's notions of application and play." Man and World, 25(1), 61-67.

Moles, Abraham, Rohmer, Elisabeth & Friederich, P. (1977): "Of mazes and men: Psychology of Labyrinths." In Semiotics of the Environment - 8th Annual Meeting of the Environmental Design Research Association (EDRA), Strasbourg. pp. 1-25.

Montfort, Nick (2007): "Zork. Text-based Spatiality." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 64-65.

Montola, Markus (2005): "Exploring the Edge of the Magic Circle: Defining Pervasive Games." In Proceedings of the

Digital Arts and Culture 2005 Conference, IT University of Copenhagen, Denmark.

Montola, Markus (2007): "Tangible Pleasures of Pervasive Role-Playing." In Proceedings of Situated Play. DiGRA 2007 - The 3rd International Digital Games Research Conference, Tokyo, Japan, September 24-28, 2007. pp. 178-185.

Montola, Markus & Stenros, Jaakko (2008): "Introduction." In Montola, Markus & Stenros, Jaakko (eds.), Playground Worlds. Creating and Evaluating Experiences of Role-Playing Games. Helsinki: Solmukohta/Ropecon ry. pp. 5-10.

Morabito, Margaret (1985): On-Line with PlayNet. RUN, August.

More, Thomas (2002): Utopia. Cambridge: Cambridge University Press.

Morrison, Walter Frederic & Kennedy, Phil (2006): Flat Flip Flies Straight! True Origins of the Frisbee. Wethersfield, CT: Wormhole Publishers.

Mumford, Lewis (1961): The City in History. Its Origins, Its Transformations, and Its Prospects. San Diego, CA: Harvest / Harcourt.

Murray, Janet (1997): Hamlet on the Holodeck: The Future of Narrative in Cyberspace. Cambridge, MA: MIT Press.

Naos, Ted (2000): Street Architecture. Play cards published by Naos Inc.

National Scrabble Association (2008): "History of SCRABBLE." Retrieved June 2, 2008, from http://scrabble-assoc. com/info/history.html.

Natural Standard & Harvard Medical School (2007): "Reflexology." Retrieved June 1, 2008, from http://www.intelihealth. com/IH/ihtIH/WSIHW000/8513/34968/360060.html?d=dmtContent.

Ndalianis, Angela (2000): "Baroque Perceptual Regimes." Senses of Cinema, 1(5).

Newman, Mark E. J. (2001): "The structure of scientific collaboration networks." Proceedings of the National Academy of Sciences of the USA, 98(2), 404-409.

Nielsen, Jakob (1993): "Iterative user-interface design." IEEE Computer, 26(11), 32–41.

Nieuwenhuys, Constant (1964/2001): "New Babylon: An Urbanism of the Future." Architectural Design, 71(3), 12-14.

Nieuwenhuys, Constant (1974): "New Babylon. A nomadic town." In Gemeetenmuseum, Haags (ed.), Exhibition catalogue. The Hague: Haags Gemeetenmuseum. Published Online at http://www.notbored.org/new-babylon.html (retreived 08/30/2006).

Nitsche, Michael (2008): Video Game Spaces: Image, Play, and Structure in 3D Worlds. Cambridge, MA: MIT Press.

Nohr, Rolf F. (2007): "The Truman Show. Simulating Life." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 470-471.

Norberg-Schulz, Christian (1980): Genius Loci: Towards a Phenomenology of Architecture. London: Academy Editions.

Norman, Donald A. (1990): The Design of Everyday Things. New York, NY: Doubleday/Currency.

Norman, Donald A. (1999): "Affordance, Conventions, and Design." Interactions, 6(3), 38-43.

Norman, Donald A. & Draper, Stephen W. (1986): User-Centered System Design: New Perspectives on Human-Computer Interaction. Hillsdale, NJ: Lawrence Erlbaum Associates.

Novak, Marcos (1996): "transArchitecture. Beyond the Edge Of Thought." Telepolis, December 9.

Oechslin, Werner (2007): "Barock / Bewegung: Einführung." Retrieved June 10, 2008, from http://www.bibliothek-oechslin.ch/d/veranstaltungen.php?id_events=43&nav=4.

Oerter, Rolf (1999): Psychologie des Spiels. Ein handlungstheoretischer Ansatz. Weinheim: Beltz Taschenbuch.

Olsen, Dell (2001): "Degrees of Liveness, Live and Electronic Subjects: Leslie Scalapino, Fiona Templeton and Carla Harryman." How2, 1(6).

Oosterhuis, Kas & Feireiss, Lukas (2006): GameSetandMatch II. On Computer Games, Geometries, and Digital Technologies. Rotterdam: episode publishers.

Oosterhuis, Kas & Jaskiewicz, Tomasz (2007): "798 Multiplayer Design Game. A New Tool for Parametric Design." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 358-361.

Palmer, Peter (1997): The Complete Orienteering Manual. Wiltshire: The Crowood Press Ltd.

Panofsky, Erwin (1927): "Die Perspektive als 'symbolische Form'." In Saxl, F. (ed.), Vorträge der Bibliothek Warburg 1924-1925. Leipzig/Berlin. pp. 258-330.

Passini, Romedi (1999): "Labyrinth traces. From archaic to contemporary labyrinths." Retrieved March 6, 2008, from http://www.spaceplay.net/Trace/trace.html.

Patel, Amit (2006): "Amit's Thoughts on Grids." Retrieved February 14, 2008, from http://www-cs-students.stanford.edu/~amitp/game-programming/grids/.

Patel, Riya (2009): "Top 10: The architecture of computer games (part I)." Retrieved June 25, 2009, from http://www.architectsjournal.co.uk/the-critics/top-10-the-architecture-of-computer-games-part-i/5203763.article.

Paulk, Charles (2006): "Signifying Play: The Sims and the Sociology of Interior Design." Game Studies. The International Journal of Computer Game Research, 6(1).

Pearce, Celia (1997): The Interactive Book. A Guide to the Interactive Revolution. Indianapolis, IN: Macmillan Technical Publishing.

Pearce, Celia (2004): "Towards a Game Theory of Game." In Wardrip-Fruin, Noah & Harrigan, Pat (eds.), First Person: New Media as Story, Performance and Game. Cambridge, MA: MIT Press.

Pearce, Celia (2007): "Narrative Environments. From Disneyland to World of Warcraft." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 200-205.

Perla, Peter P. (1990): The Art of Wargaming. Annapolis, MD: Naval Institute Press.

Perner-Wilson, Hannah & Satomi, Mika (2007): "Massage me." Retrieved June 12, 2008, from http://massage-me.at.

Pestalozzi, Heinrich & Buss, Johannes (1803): ABC der Anschauung, oder Anschauungs-Lehre der Massverhältnisse. Tübingen: J.G. Cotta.

Piaget, Jean (1951): Play, Dreams, and Imitation in Childhood. New York, NY: W. W. Norton.

Piaget, Jean (1992): Das Erwachen der Intelligenz beim Kinde. Stuttgart: dtv/Klett-Cotta.

Pias, Claus (2002): Computer Spiel Welten. Munich: sequenzia / Diaphanes.

Polyzoides, Stefanos (1997): "On Campus-Making in America." In Moore, Ruble & Yudell (eds.), Campus and Community: Moore Ruble Yudell Architecture and Planning. Rockport, MA: Rockport Pub.

Queneau, Raymond (1947): Exercises de style. Paris: Editions Gallimard.

Queneau, Raymond (1961): Cent Mille Milliards De Poèmes. Paris: Editions Gallimard.

Reeves, Byron & Nass, Clifford (1996): The Media Equation. How People Treat Computers, Television, and New Media Like Real People and Places. Cambridge: CSLI Publications and Cambridge University Press.

Richards, Kenneth & Richards, Laura (1990): The Commedia dell'Arte: A Documentary History. London: Basil Blackwell.

Robles-De-La-Torre, Gabriel (2006): "The Importance of the Sense of Touch in Virtual and Real Environments." IEEE Multimedia. Special issue on Haptic User Interfaces for Multimedia Systems, 13(3), 24–30.

Rojas, Raúl (1997): "Konrad Zuses Rechenmaschinen Z1 und Z3." Spektrum der Wissenschaft(5), 54.

Role, Raymond E. (1999): "The War Games of Central Italy." History Today, 49(6), 8-13.

Rossignol, Jim (2009): "Evil Lair: On the Architecture of the Enemy in Videogame Worlds." Retrieved June 25, 2009, from http://bldgblog.blogspot.com/2009/05/evil-lair-on-architecture-of-enemy-in.html.

Rothman, Hal (2002): Neon Metropolis: How Las Vegas Started the 21st Century. London: Routledge.

Ryan, Marie-Laure (1999): "Immersion vs. Interactivity: Virtual Reality and Literary Theory." SubStance, 28(89), 110-137.

Sadler, Simon (1998): The Situationist City. Cambridge, MA: MIT Press.

Salen, Katie & Zimmerman, Eric (2004): Rules of Play. Game Design Fundamentals. Cambridge, MA: MIT Press.

Salen, Katie & Zimmerman, Eric (2006): "Game Space. What does space contribute to the experience of play?" In Salen, Katie & Zimmerman, Eric (eds.), The Game Design Reader. A Rules of Play Anthology. Cambridge, MA: MIT Press. pp. 64-69.

Samuda, Joseph d'Aguilar (1841): A Treatise on the Adaptation of Atmospheric Pressure to the Purposes of Locomotion on Railways. London: John Weale.

Schell, Jesse (2007): ""Can I Teleport Around?". Jesse Schell in conversation with the Editors of Space Time Play." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and

Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 401-403.

Schell, Jesse (2008): The Art of Game Design. A Book of Lenses. Burlington, MA: Morgan Kaufmann Publishers.

Schulze-Marmeling, Dietrich (2000): Fußball. Zur Geschichte eines globalen Sports. Göttingen: Die Werkstatt.

Schütte, Uwe (2000): "Bits, Bleeps & Bright Plastic." In Klanten, Robert & Gielens, Jaro (eds.), Electronic Plastic. Berlin: Die Gestalten. pp. 5-13.

Schwartz, David G. (2006): Roll the Bones: The History of Gambling. New York, NY: Gotham Books.

Schwingeler, Stephan (2008): Die Raummaschine. Raum und Perspektive im Computerspiel. Boizenburg: vwh.

Sellers, Michael (2006): "Designing the Experience of Interactive Play." In Vorderer, Peter & Bryant, Jennings (eds.), Playing Video Games. Motives, Responses, and Consequences. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers. pp. 9-24.

Shannon, Claude Elwood (1950): "Programming a Computer For Playing Chess." Philosophical Magazine, 41(314).

Sherman, Roger (1974): "The Psychological Difference Between Ambiguity and Risk." The Quarterly Journal of Economics, 88(1), 166-169.

Sherrington, Charles S. (1906): The integrative action of the nervous system. New Haven, CT: Yale University Press.

Siemens, George (2005): "Connectivism: A Learning Theory for the Digital Age." International Journal of Instructional Technology & Distance Learning, 2(1), 3-10.

Sinn, Ulrich (2004): Das antike Olympia - Götter, Spiel und Kunst. Munich: C.H. Beck.

Sitte, Camillo (1909/2001): Der Städtebau nach seinen künstlerischen Grundsätzen. Vermehrt um "Großstadtgrün". Basel: Birkhäuser.

Sitte, Camillo (1945): The art of building cities: city building according to its artistic fundamentals. Translated by Charles T. Stewart. New York, NY: Reinhold Publishing Corporation.

Sloterdijk, Peter (2006): "The New Babylonians - About Constant." In Zweifel, Stefan, Steiner, Juri & Stahlhut, Heinz (eds.), In Girum Imus Nocte Et Consumimur Igni - The Situationist International (1957-1972). Zurich: JRP | Ringier. pp. 97-98.

Sloterdijk, Peter (2008): "Spielen mit dem, was mit uns spielt. Über die physischen und metaphysischen Wurzeln des Sports zwischen griechischem Stadion und römischer Arena." Retrieved June 15, 2008, from http://www.nzz.ch/nachrichten/kultur/literatur_und_kunst/spielen_mit_dem_was_mit_uns_spielt_1.758795.html.

Smith, Keri (2007): The Guerilla Art Kit. New York, NY: Princeton Architectural Press.

Society of Creative Anachronism (2008): "Forward into the Past. An Introductory Guide to the S.C.A." Retrieved June 6, 2008, from http://www.sca.org/officers/chatelain/ForwardIntothePast.pdf.

Spencer, John R. (1970): "Introduction." In Alberti, Leon Battista (ed.), On Painting. New Haven, CT: Yale University Press.

Stahlhut, Heinz, Steiner, Juri, Tettero, Siebe & Zweifel, Stefan (2006): "In Girum Imus Nocte Et Consumimur Igni - The Situationist International (1957-1972)." In Zweifel, Stefan, Steiner, Juri & Stahlhut, Heinz (eds.), In Girum Imus Nocte Et Consumimur Igni - The Situationist International (1957-1972). Zurich: JRP | Ringier. pp. 7-14.

Staun, Harald (December 2, 2007): "Mit den besten Empfehlungen. Unsere Bücher, CDs und DVDs des Jahres." Frankfurter Allgemeine Sonntagszeitung, p. B12.

Sternfeld, Joel (2006): Sweet Earth: Experimental Utopias in America. Göttingen: Steidl Publishers.

Stilgoe, John R. (1998): Outside lies magic. Regaining history and awareness in everyday places. New York: Walker and Co.

Stockburger, Axel (2007): "Listen to the Bulk of the Iceberg. On the Impact of Sound in Digital Games." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 110-113.

Suchman, Lucy (1987): Plans and Situated Actions. Cambridge: Cambridge University Press.

Sullivan, Louis H. (1896): "The tall office building artistically considered." Lippincott's Magazine(March).

Sun, Huiting (1997): An investigation of humanizing elements as a factor of visitor satisfaction found in two atrium-type casino resort hotels (Nevada). University of Nevada, Las Vegas, Las Vegas, NV.

Sutton-Smith, Brian (1997): The Ambiguity of Play. Cambridge, MA: Harvard University Press.

Tan, Philip Boonyew (2003): Tensions in Live-Action Roleplaying Game Design. Massachusetts Institute of Technology, Cambridge, MA.

Taylor, T. L. & Kolko, Beth E. (2003): "Boundary Spaces. Majestic and the uncertain status of knowledge, community and self in a digital age" Information, Communication & Society, 6(4), 497-522.

Templeton, Fiona (1990): YOU - The City. New York, NY: Roof Books.

Thackara, John (2006): In the Bubble: Designing in a Complex World. Cambridge, MA: MIT Press.

Thomas, David (2007a): "Shadow of the Colossus. Player versus Terrain." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 460-461.

Thomas, David (2007b): "SimCity. Simulating Nothing" In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 210-211.

Thompson, Clive (2003): "Suburban Rhapsody." Retrieved February 24, 2008, from http://www.psychologytoday.com/articles/pto-20031028-000005.html.

Thorp, Edward O. (1998): "The Invention of the First Wearable Computer." In The Second International Symposium on Wearable Computers: Digest of Papers. pp. 4-8.

Thrift, Nigel (1996): Spatial Formations. London: Sage.

Thrift, Nigel (2004): "Movement-space: the changing domain of thinking resulting from the development of new kinds of spatial awareness." Economy and Society, 33(4), 582-604.

Trefry, Gregory (2007): "Big Games: Playing in the streets." Retrieved March 6, 2008, from http://www.adobe.com/designcenter/thinktank/trefry.html.

Trüby, Stephan (2003): "Ort, Region, Globalisierung." In de Bruyn, Gerd & Trüby, Stephan (eds.), architektur_theorie.doc. Texte seit 1960. Basel: Birkhäuser. pp. 34-35.

Tufte, Edward R. (1990): Envisioning Information. Cheshire, CN: Graphics Press.

Turing, Alan (1954): "Solvable and Unsolvable Problems." Science News, 31, 7-23.

Tversky, Amos & Wakker, Peter (1995): "Risk Attitudes and Decision Weights." Econometrica, 63(6), 1255-1280.

Urry, John (2000): Sociology beyond Societies: Mobilities for the Twenty-First Century. London: Routledge.

Venturi, Robert, Scott Brown, Denise & Izenour, Steven (1977): Learning from Las Vegas: the forgotten symbolism of architectural form. Cambridge, Mass.: MIT Press.

Vitruvius Pollio, Marcus (1796/2001a): Baukunst. Erster Band. Bücher I-V (Rode, August, Trans.). Basel: Birkhäuser Publishing.

Vitruvius Pollio, Marcus (1796/2001b): Baukunst. Zweiter Band. Bücher VI-X (Rode, August, Trans.). Basel: Birkhäuser Publishing.

Von Mahrenholtz-Bülow, Bertha (1891): Reminiscences of Friedrich Froebel (Mann, Mary, Trans.). Boston: Lee and Shepard.

Von Neumann, John & Morgenstern, Oskar (1944): Theory of Games and Economic Behavior. Princeton, NJ: Princeton University Press.

Von Vegesack, Alexander & Remmele, Mathias (2000): Verner Panton: The Collected Works. Weil am Rhein: Vitra Design Museum.

Vorderer, Peter (2000): "Interactive Entertainment and Beyond." In Zillmann, Dolf & Vorderer, Peter (eds.), Media Entertainment: The Psychology of Its Appeal. Mahwah, NJ: Lawrence Erlbaum Publishers. pp. 21-36.

Vygotsky, Lev S. (1978): Mind in Society. The Development of Higher Psychological Processes. Cambridge, MA: Harvard University Press.

Walz, Steffen P. (2005): "Constituents of Hybrid Reality: Cultural Anthropological Elaborations and a Serious Game Design Experiment merging Mobility, Media, and Computing." In: Buurman, Gerhard M. (Ed.): Total Interaction. Theory and Practice of a New Paradigm for the Design Disciplines. Basel: Birkhäuser. pp. 122-141.

Walz, Steffen P. (2006a): "A Spatio-Ludic Rhetoric: Serious Pervasive Game Design for Sentient Architectures." In Proceedings of game set and match II. International Conference 2006 on Computer Games, Advanced Geometries and Digital Technologies, TU Delft, Netherlands. pp. 50-56.

Walz, Steffen P. (2006b): "Welcome to my Playce!" Retrieved October 14, 2006, from http://spw.playbe.com.

Walz, Steffen P. (2007): "Pervasive Persuasive Play: Rhetorical Game Design for the Ubicomp World." In Fogg, B.J. & Eckles, Dean (eds.), Mobile Persuasion: 20 Perspectives on the Future of Behavior Change. Palo Alto, CA: Stanford University / Stanford Captology Media. pp. 101-108.

Walz, Steffen P. & Ballagas, Rafael (2007): "Pervasive Persuasive: A Rhetorical Design Approach to a Location-Based Spell-Casting Game for Tourists." In Proceedings of Situated Play. DiGRA 2007 - The 3rd International Digital Games Research Conference, Tokyo, Japan, September 24-28, 2007. pp. 489-497.

Walz, Steffen P., Ballagas, Rafael, Borchers, Jan, Mendoza, Joel, Kratz, Sven, Wartmann, Christoph, Hameed, Bilal & Bardos, Laszlo (2006): "Cell Spell-Casting: Designing a Locative Gesture Recognition Smartphone Game for Tourists." In Proceedings of PerGames 2006, held in conjunction with the 4th Intl. Conference on Pervasive Computing, Dublin, 7 May 06.

Walz, Steffen P. & Schoch, Odilo (2006): "Pervasive Game Design as an Architectural Teaching and Research Method." In Gibson, David, Aldrich, Clark & Prensky, Marc (eds.), Games and Simulations in Online Learning: Research and Development Frameworks. Hershey, PA: Idea Group Publishing. pp. 236-249

Walz, Steffen P., Schoch, Odilo, Schaerer, Philipp, Gmelin, Sebastian, Bonwetsch, Tobias, Hillner, Bergit, Schmidt, Rafael Georg, Mermans, Bart, Przerwa, Jan & Schlueter, Arno (2005): "Serious Bioplay: A Computer Integrated Building Service Game applying Psychophysiological Input." In Extended Proceedings of UbiComp 2005 - The 7th International Conference on Ubiquitous Computing, Tokyo, Japan.

Ward, Robert L. (2001): "The Art of Placemaking in Entertainment Development." In Iannacci, Anthony (ed.), Gensler Entertainment: The Art of Placemaking. New York, NY: Edizioni Press. pp. 4-7.

Wark, McKenzie (2007): Gamer Theory. Cambridge, MA: Harvard University Press.

Watterson, Bill (1996): There's Treasure Everywhere. A Calvin and Hobbes Collection by Bill Watterson. Kansas City, MO: Andrews McMeel Publishing.

Watts, Duncan J. & Strogatz, Steven H. (1998): "Collective dynamics of 'small-world' networks." Nature, 393(June), 440-442.

Weibel, Peter (2002): "Pleasure and the Panoptic Principle." In Levin, Thomas Y., Frohne, Ursula & Weibel, Peter (eds.), CTRL [SPACE]. Rhetorics of Surveillance from Bentham to Big Brother. Karlsruhe: ZKM | Center for Art and Media & MIT Press. pp. 206-223.

Weiser, Mark (1991): "The computer for the 21st century." Scientific American(265), 94-104.

Weiser, Mark (1996): "Ubiquitous Computing." Retrieved February 17, 2008, from http://www.ubiq.com/hypertext/weiser/UbiHome.html.

Weisman, Alan (1998): Gaviotas. A Village to Reinvent the World. White River Jct., VT: Chelsea Green Publishing.

Wertheim, Margaret (2000): The Pearly Gates of Cyberspace. A History of Space from Dante to the Internet. London: Virago.

Wigley, Mark (2001): "The Great Urbanism Game." Architectural Design, 71(3), 8-11.

Wigley, Mark (2007): "Gamespace." In Borries, Friedrich von, Walz, Steffen P. & Böttger, Matthias (eds.), Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Basel: Birkhäuser Publishing. pp. 484-487.

Willaume, Alain & Richez, Jean-Claude (1991): Hohkönigsburg - Das Märchenschloss der Hohenzollern. Nordhouse.

Wiltshire, Alex (2007): "Review - Book - Space Time Play." The Architects' Journal Retrieved September 1, 2008, from http://www.architectsjournal.co.uk/reviews/bookreviews/2007/11/review_book__space_time_play.html.

Winter, David (1996): "PONG-Story: A.S. Douglas' 1952 Noughts and Crosses game." Retrieved May 15, 2008, from http://www.pong-story.com/1952.html.

Wired (2007): "Finding Nemo at a Game Studio's Steampunk Office Suite." Retrieved October 17, 2007, from http://www.wired.com/culture/design/multimedia/2007/06/gallery_nemo_office.

Wisniowski, Howard (2006): "Analog Devices And Nintendo Collaboration Drives Video Game Innovation With iMEMS Motion Signal Processing Technology."   Retrieved May 20, 2008, from http://www.analog.com/en/press/0,2890,3__99573,00.html.

Wolf, Mark (2002): The Medium of the Video Game. Austin, TX: The University of Texas Press.

Zängler, Thomas (2000): Microanalysis of Mobility Behaviour in Everyday Life and Leisure. Berlin: Springer / Institute for Mobility Research.

Zinsmeister, Annett (2004): "Schöne Neue Welt: Konstruktionen im Virtuellen." In Zinsmeister, Annett (ed.), Constructing Utopia. Konstruktionen künstlicher Welten. Zurich: Diaphanes. pp. 77-87.

Zoche, Peter, Kimpeler, Simone & Joepgen, Markus (2002): Virtual Mobility: A Phenomenon with Physical Consequences? On the Impact of the Use of Internet Chat, Online Banking and Online Tourism Offerings on Physical Mobility Behaviour. Berlin: Springer.

2. Games

Abalone (1989), developed by Michel Lalet and Laurent Lévi, published by Abalone Games.

America's Army (2002), developed by America's Army Applications Team / MOVES Institute, published by US Army and Ubisoft.

Animal Crossing (2002), developed by Nintendo EAD, published by Nintendo.

Asteroids (1979), developed and published by Atari.

Bioplay5000 (2005), developed by Steffen P. Walz and CAAD MAS students, published by the ETH Zurich.

BioShock (2007), developed by 2K Boston/2K Australia, 2K Marin, published by 2K Games.

Can You See Me Now? (2001), developed and published by Blast Theory and Mixed Reality Laboratory, University of Nottingham.

Carcassonne (2000), developed by Klaus-Jürgen Wrede, published by Hans im Glück.

Civilization (1991), developed by MicroPose, published by MicroPose, Koei.

(Colossal Cave) Adventure (1976/1977), developed by Will Crowther & Don Woods.

Cruel 2 Be Kind (2006), developed and published by Jane McGonigal and Ian Bogost.

Frogger (1981), developed by Konami, published by Sega.

Das Spiel (1979), developed by Reinhold Wittig, published by Edition Perlhuhn. Published in English as The Game.

Dead Rising (2006), developed and published by Capcom.

Donkey Kong (1981), developed and published by Nintendo.

Doom (1993), developed by id Software, published by id Software and GT Interactive.

Dungeons & Dragons (1974), developed by Gary Gygax and Dave Arneson, published by Tactical Studies Rules.

Echochrome (2008), developed by SCE Japan Studio, published by Sony Computer Entertainment.

Grand Theft Auto IV (2008), developed by Rockstar North, published by Rockstar Games.

ETHGame (2005), developed by the ETHGame design class, Steffen P. Walz and Odilo Schoch, published by the ETH Zurich.

foursquare (2008), developed and published by Dennis Crowley and Naveen Selvadurai.

Free Running (2007), developed by Reef Entertainment, published by Rebellion.

Future Force Company Commander (2006), developed by Zombie, produced by Science Applications International Corporation (SAIC).

God of War (2005), developed by SCE Studios Santa Monica, published by Computer Entertainment.

Guitar Hero (2005), developed by Harmonix Music Systems, Inc., published by RedOctane in partnership with Activision.

ICO (2001), developed by Team Ico, published by Sony Computer Entertainment.

Katamari Damacy (2004), developed and published by Namco.

Killer (1981), developed and published by Steve Jackson Games.

Kriegsspiel (1811), developed and published by Georg Leopold Baron of Reißwitz.

M.A.D. Countdown (2002), developed by Steffen P. Walz, Thomas Seibert, Tim Ruetz and Mobile Application Design students, published by Zurich University for the Arts.

Majestic (2001), developed by Anim-X, published by Electronic Arts.

Mirror's Edge (2008), developed by EA Digital Illusions CE, published by Electronic Arts.

Ole Million Face (1920s), developed by Carey Orr, Chicago and published by Face Corporation. Also known as Changeable Charlie (Gaston Manufacturing).

OXO (1952), developed by Alexander S. Douglas, published by University of Cambridge.

Pac-Man (1980), developed by Namco, published by Namco and Midway.

PacManhattan (2004), developed by Frank Lantz with students, published by Interactive Telecommunications Program, New York University.

PainStation (2001), developed by Tilman Reiff and Volker Morawe, published by the Academy of Media Arts Cologne.

Payphone Warriors (2006), developed by Abe Burmeister, Gregory Trefry, Cory Forsyth et al., published by Come Out and Play Festival.

Pirates! (2000), developed and published by the PLAYstudio / Interactive Institute and Nokia Research Center Tampere.

PONG (1972), developed by Allan Alcorn, published by Atari.

PlayNET (1984), published by Quantum Link.

Prince of Persia: Sands of Time series (2003-2005), developed by Ubisoft Montreal, published by Ubisoft.

Rayman 2 (1999), developed and published by Ubisoft.

REXplorer (2007), developed by Steffen P. Walz, Rafael Ballagas et al., published by REX Museum, Regensburg Tourist Office, the ETH Zurich and RWTH Aachen University.

Rock Band (2007), developed by Harmonix Music Systems, Inc., published by MTV Games.

Scrabble (1948), originally created by Alfred Mosher Butts as Lexico in 1931, then trademarked as Scrabble by James Brunot in 1948; published by Hasbro / Mattel.

Second Life (2003), developed and published by Linden Research, formerly Linden Labs.

Settlers of Catan (1995), developed by Klaus Teuber, published by Kosmos.

Shadow of the Colossus (2005), developed by Team Ico, published by Sony Computer Entertainment.

SimCity (1989), developed by Will Wright, published by Maxis Software et al.

Space Invaders (1978), developed by Taito Corporation, published by Midway.

Spacewar! (1962), developed by Steve Russell and other students at the Massachusetts Institute of Technology.

Spirits of Split (2004), developed by Convivio student team and Steffen P. Walz, published by Convivio Summer School / Arts Academy of Split.

Spore (2008), developed by Maxis, published by Electronic Arts.

Super Mario Bros. (1985), developed by Nintendo EAD, published by Nintendo.

Telespiele (1977-1981), developed by Holm Dressler, Wolfgang Penk, Thomas Gottschalk et al., broadcast by S3, ZDF & ARD, and produced by SWF.

Tempest (1981), developed and published by Atari.

Tetris (1985), developed by Alexey Pajitnov and Vadim Gerasimov, published by Various.

THE aMAZEing LABYRINTH (board game) (1986), developed by Max Kobbert, published by Ravensburger.

The Journey to Wild Divine (2003) published by the Journey to Wild Divine.

The Sims (2000), developed by Maxis, published by Electronic Arts.

Tombstone Hold 'Em (2005), developed and published by 42 Entertainment.

Tony Hawk's Pro Skater (1999), developed by Neversoft, published by Activision.

Wii Sports (2006), developed by Nintendo, published by Nintendo.

World of Warcraft (2004), developed by Blizzard Entertainment, published by Vivendi Universal.

Yohoho! Puzzle Pirates (2003), developed by Three Rings Design, published by Three Rings Design and Ubisoft.

Zork (1980), originally developed by MIT students 1977-1979, then Infocom; published by Personal Software.

3. Films and Television Shows

Dawn of the Dead (1978), directed and written by George A. Romero, distributed by United Film Distribution Company et al., USA.

Lost (TV series) (2004 - 2010), created by Jeffrey Lieber, J.J. Abrams and Damon Lindelof, broadcast on ABC, USA.

Metropolis (1927), directed by Fritz Lang, written by Thea von Harbou and Fritz Lang, distributed by UFA / Paramount Pictures, Germany.

Six Degrees (2006 - 2007), created by Raven Metzner and Stuart Zicherman, broadcast on ABC, USA.

Six Degrees of Separation (1993), directed by Fred Schepisi, written by John Guare, distributed by MGM/UA, USA.

Star Trek (TV series) (1966 - 2005), originally created by Gene Roddenberry, USA.

Star Trek (film series) (1979 - present), directed by multiple directors and distributed by Paramount Pictures. Based on the Star Trek television series originally created by Gene Roddenberry in 1966, USA.

Star Wars (film series) (1977 - 2005), initially created by George Lucas, distributed by 20th Century Fox, USA.

Telespiele (1977 - 1981), created by Holm Dressler, Wolfgang Penk, Thomas Gottschalk et al., broadcast by S3, ZDF & ARD, produced by SWF, Germany.

The Promise of Play (2000), directed and written by David Kennard and Stuart Brown, produced by The Institute for Play and Independent Communications Associates Productions, Canada.

The Third Man (1949), directed by Carol Reed, written by Graham Greene, distributed by British Lion Films, United Kingdom.

The Truman Show (1998), directed by Peter Weir, written by Andrew Nicol, distributed by Paramount Pictures, USA.