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:

1. **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.**
2. **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.**
3. **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 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 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.).

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	Engeli (2003)	How can games and game technology be used for research and teaching in	Technological

experimentation		**architecture and CAAD?**	
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 PLAYSPACE				
DIMENSIONS OF GAMESPACE	**Player**	**Modality**	**Kinesis**	**Enjoyment**	**Context and Culture**
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?**	**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?**
Representational	**How is the player represented in the gamespace? How is the game**	**What kind of spatial representation is chosen for which modality and**	**How does the game's spatial representation affect and determine kinesis and play rhythms**	**How and to what extent is the spatial representation responsible for enjoyment? How does**	**How does the spatial representation affect the culture and context and**

	represented to the player?	modality and vice versa?	between player and play-other?	enjoyment affect representation?	context 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?	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?
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?	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?
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?	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?
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?	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?
Form-functional & form-emotive	How do spatial functions affect the player?	How are functions spatially relayed? Using what modality?	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?
Technological	How do technologies affect the player spatially, and how can the player affect game	How do technologies enable facets of modalities and new types of space, and how do modalities	How do technologies enable kinesis and play rhythms?	Which technologies and technological products are enjoyable for which type of	How do color and context affect the application of technologies? How do game technologies affect the

	game technologies in space?	affect technologies?		play pleasure?	space of culture?
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?	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?

DIMENSIONS OF PLAYSPACE

DIMENSIONS OF GAMESPACE	Player	Modality	Kinesis	Enjoyment	Context and Culture
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?	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?
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?	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?
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?	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?
Form-functional & form-emotive	How do spatial functions affect the player?	How are functions spatially relayed? Using what modality?	Which functions cause specific types of kinesis and play rhythm and vice	How are primary and secondary spatial functions coupled with enjoyment types?	How do context and culture determine the game's functional structure?

			versa?	types?	
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?	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?
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?	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 8A

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

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