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 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 – a shadow of the urbanity and an ironic 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?

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