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## A Semiotic Framework for the Analysis of Virtual Architecture in Digital Games

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**Abstract.** This paper proposes a semiotic framework for the analysis of architecture in digital games that combines the theory of Umberto Eco of denotation and connotation in architecture with the concept of “anticipatory play” devised by Brian Upton. Virtual architecture is a central signifier in digital games, and its design heavily influences the gameplay as well as the narrative. In 3D games players interact with virtual environments that closely resemble our real architecture, and as such many of the tools we use to analyse real architecture can be successfully applied to virtual architecture as well. Through a series of examples this paper will illustrate how architectural signs in games communicate to players and how they can be used to enhance gameplay, narration, and immersion.

**Keywords:** Semiotics, Architecture, Digital Games, Space.

### 1 Introduction

Digital games have come a long way in their fifty years of history, so much so that even the definition of “games” can now be seen as restrictive. Players are interested in games for factors that go well beyond the simple action or competition, but now inhabit proper virtual worlds. Fortes Tondello et al.'s neurobiological enquiry into why people play games resulted in three main motivations: 1. Action orientation: players who seek competition and risk-taking; 2. Aesthetic orientation: players who enjoy exploration, the visuals of the game world and socialization; and 3. Goal orientation: players who favours the completion of activities, solving puzzles, and physically engaging experiences, such as fear [1]. As we can see from the aesthetic orientation, the interest in the visual aspect and the virtual worlds is motivation enough for players to

be interested in a game. As with much of our real world, virtual worlds are made of architectural constructs. Obviously, even the *natural* part of any digital game, such as a lush forest or a grassy valley, is man-made, but many environments are inevitably populated with buildings of some sort, for gameplay or narrative reasons. How do digital game environments communicate to players? How can they allow and enhance gameplay, narration, and immersion? This paper proposes a semiotic framework for the analysis of digital games architecture, in order to understand how players decode and react to architectural signs within games, as well as offer developers a system that helps them in the design of digital games environments. This framework is based on the semiotic theories developed by Umberto Eco in regard to architecture [2], and Brian Upton as concerns digital games [3].

## 2 The Aesthetics of Digital Games

Philosopher Grant Tavinor affirms that the artistic status of digital games is due to their visual qualities, as “they do have perceptual and formal structures that are the object of an aesthetic and interpretive engagement in much the same way as other artworks” and “employ much of the same aesthetic vocabulary” [4]. Reaching a similar conclusion as Fortes Tondello et al., but from an aesthetics point of view, Tavinor affirms that players are attracted to digital games by the same interests as traditional art appreciators. Indeed, the artistic component of digital games is often a cardinal element of their success, and in fact visual artists and designers usually account for almost half of the development cost of games – second only to programmers – [5–7] demonstrating the importance of the visual, and arguably architectural, aspect of digital games.

This approach to the analysis of digital games is also known as “Prop Theory”, which affirms that games are not a unique medium separated from other arts due to its interactive nature, but rather a medium that shares many traits with other representative arts. For instance, in a painting we can identify oils on a canvas as a landscape or a person; papier-mâché on a theatre stage can be crafted to reproduce a building or a landscape. These are the “props”, the elements of visual arts that prompt specific imagery to the viewer. Digital games are no different, not only we interpret the pixels on screens as characters, buildings, and objects, but these objects are themselves 3D or 2D models, textures, and sounds designed, crafted, and placed by the developers within the game world.

Unlike the “props” of most other media, in digital games players can interact with the environment, and as such, virtual architecture is much closer to real architecture, since it can be experienced in a way close to its real counterpart. Unlike a static photograph, we can move around a building and change our point of view as we would in real life. Even without considering the possibilities allowed by virtual reality, such as the perception of depth, we interpret the perspective representation on screen as a close representation of real architecture. Moreover, the interaction in digital games is not limited to walking and looking around, but the form of spaces, their size and

shape all influence how the game is played, and as such the design of virtual architecture is rather close to the one of real architecture.

Here we can draw a parallel with the concept of *utilitas*, brought forth by Roman architect Vitruvius in his *De architectura*, the only surviving Western architectural treatise of the ancient world, written in the 1<sup>st</sup> century BCE. Vitruvius recommends that all buildings be built in a way that is appropriate to their use, location, and occupants. In digital games, virtual architecture has to be equally designed to be appropriate to the gameplay style, players and level type. The architectural design of a level of a third-person action-adventure game such as *Shadow of the Tomb Raider* [8] (see Fig. 1), where players have to jump, climb, and fight, will be different from a first-person horror game such as *Layers of Fear* [9] (see Fig. 2), where there is no combat, but rather exploration aimed at building tension. Furthermore, virtual architecture is not limited to satisfy gameplay needs, but it also determines the characterization of the environment and the tone of the game. The aforementioned *Layers of Fear* is set in a haunted mansion, which characterizes the game as horror, and would of course have been a completely different experience if the architectural background was, for instance, a colourful shopping centre.



**Fig. 1.** A scene from *Shadow of the Tomb Raider* © Eidos-Montréal 2018.



**Fig. 2.** A corridor of the haunted mansion in *Layers of Fear* © Blooper Team 2018.

Semiotically, we can consider virtual architecture as composed of *iconic signs*, signs that resemble their original counterpart in virtue of their formal qualities, i.e. a door in a game will look like a door in the real world since its aim is convey the message of “door”. Moreover, virtual architecture, given its nature as part of a game, is always created with a meaning in mind related to players. In digital games, any prop has a dual function: one representational, similar to the oil on a canvas, and another functional to the gameplay. As much as the scenography of an opera must primarily allow for the singers to perform their role as singers, architectural elements in digital games must serve the function of gameplay. In other words, architectural signs that in the real world might be involuntary or incidental, such as deterioration or destruction, are instead planned and deliberate in virtual architecture in order to produce meaning, thus a semiotic framework of analysis is most appropriate [10].

### **3 The Semiotics of Virtual Architecture**

#### **3.1 Denotation and Connotation in Architecture**

Based on the observations made hitherto, Umberto Eco’s architectural semiotic theory of denotation and connotation is most appropriate for the analysis of virtual architecture. Eco affirms that architectural objects denote a primary function and connote a secondary “certain ideology of the function” [2]. The denotation of the function is based on the intrinsic physical properties of an object. For instance, a flight of stairs tells us that we can use it to ascend and descend by virtue of its shape, and our understanding of gravity and the space around us. An architectural sign can also connote a symbolic, additional meaning. Eco considers the symbolic aspect of architecture a function in and of itself, and the denomination of “primary” and “secondary” must be understood in the fact that the connotative function “rest[s] on the denotation of the primary function” [2], rather than in order of importance. Keeping our example of the flight of stairs, a barebone emergency staircase in a high-rise condo denotes the same function as the highly elaborate monumental staircase in Palazzo Barberini in Rome, designed by Francesco Borromini in 1633: they are both composed of a series of steps in a shape and size that allows for humans to easily climb or descend between floors of a building (see Fig. 3).



**Fig. 3.** The monumental staircase in Palazzo Barberini, Rome, designed by Francesco Borromini in 1633 (left), and an emergency staircase in a high-rise building (right) (photos by the author).

However, it is not hard to notice how the appearance of the two staircases differs. Evidently, while the primary denotative function is the same in both, the secondary connotative function led to visually very different designs: a monumental, colonnaded, spiral staircase in Palazzo Barberini, and a simply painted straight staircase in the high-rise condo. Naturally, this difference is also due to their primary denotative function. Borromini's staircase is one of the two main staircases in the palace, and the principal way of moving between floors, whereas the emergency staircase is designed to be used only in exceptional circumstances. As such, the secondary connotative function is a consequence of the primary one: firstly, the staircase is shaped as such for the necessity of fulfilling the function of a staircase, and secondly it is designed in a certain way based on its use and the image it wants to convey.

The connotative aspect of architecture is often used in corporate buildings to communicate their ideology. Let us take for instance banks, often some of the most notable buildings in many cities. In the city of Toronto, Canada, we can witness the changes in styles related to what the banks wanted to communicate in the span of a few blocks. From the opulently decorated neoclassical Bank of Montreal designed by Frank Darling and Samuel George Curry in 1886, displaying the wealth of the institution to its clients; to the massive and sparsely decorated tower of the Canadian Bank of Commerce, designed by York & Sawyer and Darling & Pearson in 1931, right after the Wall Street financial crash, aiming at demonstrating solidity and security, signs of a reliable institution that can be trusted, rather than extravagant expenditure; to finally the glass high-rise of the First Canadian Place, designed by B+H Architects in 1975,

which, in line with the current trend, aims to represent a transparent, clear, and honest institution. Naturally, we can see the same techniques used in digital games to connote narrative clues to the players. For instance, in the cyberpunk RPG *Deus Ex: Mankind Divided* [11], the corporations of the dystopian future when the game is set manifest their power with impenetrable monolithic structures (see Fig. 4).



**Fig. 4.** The Palisade Blade data-archiving facility building dominates the skyline of Prague in *Deus Ex: Mankind Divided* © Eidos-Montréal 2016.

### 3.2 Anticipatory Play

Brian Upton was the lead designer of the first *Rainbow Six* [12], a tactical first-person shooter considered a classic, and which spurred a very popular franchise still alive today. He bases his semiotic theory of digital games in his experience as a level and game designer, and brings forth the concept of “anticipatory play” to examine how virtual game spaces communicate to players. Upton affirms that in both digital and non-digital games, the planning, expectation, and anticipation of events is as important as the action itself. In his opinion “Anticipatory play gives us a model for talking about the non-interactive beats of a game such as *Rainbow Six* – those moments when the player stops, looks, and thinks about what he is doing. Instead of defining a play experience entirely by what the player is allowed to do, anticipatory play allows us to focus instead on what opportunities any play experience provides for elaborated analysis, contemplation, and reflection.” [3] Anticipatory play is thus expressed mostly through the architectural design in the game: “For example, if you are playing a shooter, a blank corridor is less exciting than a corridor with an open door on one side, even if there are no enemies beyond the door. The anticipatory chain triggered by the open door (“Is there an ambush ahead? I have to move carefully. I can’t see anything. Can I peek around the corner?”) is an interesting experience even though the play is taking place entirely inside your head.” [3]

Hence, anticipatory play is particularly apt to analyse how architectural spaces in digital games are read by players, and constitutes a useful instrument in the planning of game levels. Architectural cues in games can be instructions for the player on how

to play, they give indications on where to go next, or which areas might be dangerous and which ones are safe. In a role-playing-game the sight of a city is usually interpreted as a sign of a safe space, such as the city of Lestallum in *Final Fantasy XV* [13], where the players can expect safety from the dangers of the wilderness, and points of interest where to communicate with other characters and acquire items in shops. The looks of the city itself express its role as a safe hub, the squares are lined with shops and cafes, and only humans populate its streets (see Fig. 5). Conversely, in a first-person shooter, where the interaction is usually limited to shooting and being shot at, a city can be a dangerous place, full of hideouts for the enemy, but also a location that offers numerous covers and gameplay possibilities.



**Fig. 5.** The city of Lestallum in *Final Fantasy XV* © Square Enix 2016.

### 3.3 The Semiotics of Architecture in Digital Games

We have established in 3.1 that architecture has a primary denotative function, the utilitarian function of the architectural object in virtue of its forms and material properties. Similarly, architecture in digital games has a denotative function as well. It might differ from the one of its real counterparts, but architectural elements in digital games are functional to the gameplay. We can thus parallel the primary denotative function of real architecture to the ludic function of virtual architecture.

The secondary connotative function of architecture, which can be incidental or absent in real architecture, is all the more present in virtual architecture, as every architectural element is deliberately created and placed in the game by the designers. It is the connotative function that allows for anticipatory play, and that communicates to players through architectural signs information about the gameplay, the narrative, or instructions on how to play and proceed in the game.

For instance, seemingly secondary architectural elements can be important for anticipatory play, and as such carefully planned and placed. To wit, air vents can be used as hidden passages in *Deus Ex: Mankind Divided* [11], in order to sneak past enemies unseen, or to reach hidden locations. In the game *Alien: Isolation* [14], on the contrary, the air vents are used by the titular alien to travel through the space station



and ambush the player. In this case the architectural element of the air vent is visually rather similar in the two games, both 3D first-person games with realistic graphic styles, but its semiosis is different if not opposite. The anticipatory play it allows is also different, where in *Deux Ex: Mankind Divided* the sight of an air vent will be interpreted by players as a sign of various gameplay possibilities, or even of safety in case they are pursued by an enemy, it is a sign of danger in *Alien: Isolation*, leading to an opposite planning and strategy.

Moreover, the connotative function of architecture influences the narrative of the game, and not just its ludic aspect. A certain design of architectural elements can give players indication and context of the game world. We can observe the use of connotation in architecture in *古劍奇譚三 (Gujian3)* [15]. *Gujian 3* pertains to the *xuanhuan* genre, an offshoot of the *xianxia* tradition of fantasy fiction based on Chinese mythology, but with elements borrowed from Western conventions. While the visual style is for the most part based on Chinese elements, there are visual inspirations from both the West and Japan for some of their aspects.

In *Gujian 3* the “mortal” realm, as in, our normal world, is traditionally represented with vernacular Chinese architecture, as we can find in reality (see Fig. 6). The “spiritual” realm instead, in order to be clearly differentiated from the mortal one, takes architectural cues from a mix of Western architectural and Japanese digital games tradition. The buildings of the city of Skyelk (see Fig. 7) are designed in a whimsical art nouveau styles mixed with Nordic elements, which more than accurately resembling real examples of these architectural styles – such as the works of architect Hector Guimard, who designed the Paris Metro entrances in 1900 – takes inspiration from the reinterpretations we can see in Japanese role-playing games, especially in the *Final Fantasy* series [16].



**Fig. 6.** The city of Yangping in *古劍奇譚三 (Gujian3)* © Aurogon Shanghai 2018.



**Fig. 7.** The spiritual realm city of Skyelk in *古劍奇譚三 (Gujian3)* © Aurogon Shanghai 2018.

The dichotomy between the two worlds, the mortal and the spiritual, is thus highlighted through the connotation of their architectural design. In order for the players to understand that they are in a world radically different from the normal one, the choice of an unusual architectural style is a most effective way to achieve this effect. Naturally other elements help players understand the narrative and situate themselves within the game world, there are characters who are dressed differently, as well as dialogues explaining the context, but the effectiveness of architecture communicates the otherworldliness of the location without even the need of additional explanations.

## 4 Conclusions

Architecture is a central signifier in digital games. Players constantly interact and traverse digital game spaces, and understating how the virtual environment communicates with them is of paramount importance for the development of effective digital game environments, but also for a deeper understanding of how we perceive the space around us, virtual or otherwise. We have seen in the examples how a semiotic analysis of digital games architecture can be appropriate for various genres of games to help us understand how they are developed and how architectural design impacts both narration and the gameplay.

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