THE REPUBLIC OF TURKEY
BAHÇEŞEHİR UNIVERSITY

THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

MASTER OF ARCHITECTURE

ARCHITECTURAL EXPERIENCE
IN VIDEO GAMES:
SPATIAL, TEMPORAL & NARRATIVE

M. S. Thesis

OĞUZ ORKUN DOMA

Supervisor: Assoc. Prof. Dr. Emine Özen EYÜCE

ISTANBUL, 2014

THE REPUBLIC OF TURKEY
BAHÇEŞEHİR UNIVERSITY

THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
MASTER OF ARCHITECTURE

Title of the Master's Thesis: Architectural Experience in Video Games: Spatial, Temporal and Narrative

Name / Last Name of the Student: Oğuz Orkun DOMA

Date of the Thesis Defense: 15.04.2014

The thesis has been approved by the Graduate School of Natural and Applied Sciences.

Assoc. Prof. Dr. Tunç BOZBURA
Graduate School Director

I certify that this thesis meets all the requirements as a thesis for the degree of Master of Architecture.

Assoc. Prof. Dr. Emine Özen EYÜCE
Program Coordinator

This is to certify that we have read this thesis and that we find it fully adequate in scope, quality and content, as a thesis for the degree Master of Science.

Examining Comitee Members   Signatures

Thesis Supervisor
Assoc. Prof. Dr. Emine Özen EYÜCE   :

Member
Assist. Prof. Dr. Nilay ÜNSAL GÜLMEZ   :

Member
Assist. Prof. Dr. Güven ÇATAK   :

ACKNOWLEDGEMENTS

ABSTRACT

ARCHITECTURAL EXPERIENCE IN VIDEO GAMES:
SPATIAL, TEMPORAL & NARRATIVE

Oğuz Orkun Doma

Master of Architecture

Supervisor: Assoc. Prof. Dr. Emine Özen Eyüce

April 2014, 134 pages

Existence of humankind is temporal and spatial. Our experiences of acts are temporal and take place in spaces. When we tell stories, we design a spatiotemporal construction which mimics the reality while addressing to our deeper senses. Therefore the design of time and space is essential in narrative. Through ages, humankind has been telling their stories in evolving narrative forms: starting with a verbal tradition and developing into literature, theater, cinema, and most recently: video games. As a new form of design work in which the production and consumption cycles entirely take place in a digital medium, video games can also give us new perspectives on the experiential and representational relationships of the physical architecture, especially in an age when the borders between physical and virtual are blurring gradually. Interaction, agency and the significant role of flexible operational time in gameplay; creates a fundamental difference between video games and other narrative media. This thesis focuses on a framework of qualitative and phenomenological analysis of video game spaces, complementing and recontextualizing narrative and architectural theories of Gerard Genette, Kevin Lynch, Christian Norberg-Schulz and Michael Nitsche from a multidisciplinary perspective. Starting with an introduction to the history, theory and genres of videogames, this thesis intends to get inspired from frameworks of narrative, space and time discussed in various types of media like cinema, affiliating with architecture. Then an original analytic framework for spatial and temporal experience in video game spaces will be delivered. The framework will be illustrated on levels from *Prince of Persia* and *Assassin's Creed* series, and possible ways to utilize the insights of this framework in the design of architecture and video games will be discussed.

Keywords: Video games, Temporality, Narrative space, Phenomenology, Architecture

ÖZET

VİDEO OYUNLARINDA MİMARİ DENEYİM:

MEKANSAL, ZAMANSAL ve ANLATISAL

Oğuz Orkun Doma

Mimarlık Yüksek Lisans Programı

Tez Danışmanı: Doç. Dr. Emine Özen Eyüce

Nisan 2014, 134 sayfa

İnsanoğlunun varoluşu zamansal ve mekânsaldır. Eylemleri mekanların içinde zamansal olarak deneyimleriz. Hikayeler anlatırken de -duygularımıza da hitap edecek şekilde- gerçekliği taklit eden uzam-zamansal (spatiotemporal) bir kurgu tasarlarız. Anlatıda zaman ve mekanın tasarımı temeldir. Çağlar boyunca insanoğlu hikayesini değişen anlatı biçimlerinde anlatagelmiştir: sözlü bir gelenekten başlayarak, edebiyat, tiyatro, sinema ve son olarak etkileşimli bir anlatı türü olan video oyunlarına kadar. Video oyunları, üretim ve tüketim döngülerinin tamamen dijital ortamda gerçekleştiği yeni bir tasarım ürünüdür. Özellikle de fiziksel ve sanal olan arasındaki sınırların giderek belirsizleştiği günümüzde, fiziksel mimarinin deneyimsel ve temsili ilişkileri konusunda video oyunları bize yeni bakış açıları kazandırabilir. Etkileşim, mümessillik (agency) ve eylemsel zamanın esnekliğinin oynanıştaki önemli rolü, video oyunları ve diğer anlatı ortamları arasında temel bir ayrım yaratıyor. Bu çalışmanın amacı, Gerard Genette, Christian Norberg-Schulz, Kevin Lynch ve Michael Nitsche'nin anlatı ve mimari kuramlarını mimari bağlamda tamamlayıcı bir şekilde uyarlayarak, video oyunu mekanlarının niteliksel ve fenomenolojik analizinde kullanılacak bir çerçeve önerisinde bulunmaktır. Video oyunlarının tarihi, kuramı, türleri ve mimarlık-video oyunu ilişkisine kısa bir giriş yaptıktan sonra; çalışmada ortaya konulan video oyunlarında mekansal ve zamansal deneyimi inceleyen analitik çerçeve Prince of Persia ve Assassin's Creed oyunlarından seçilen bölümler üzerinde denenerek, bu çerçeveden ortaya çıkan kavrayışın mimarlık ve video oyunu tasarımında olası kullanımları tartışılacaktır.

Anahtar Kelimeler: Video oyunları, Zamansallık, Anlatısal mekan, Fenomenoloji, Mimarlık

TABLE OF CONTENTS

TABLES

FIGURES

ABBREVIATIONS

2D   :   Two-dimensional
3D   :   Three-dimensional
AC   :   Assassin's Creed
AI   :   Artificial Intelligence
CoD   :   Call of Duty
FPS   :   First-person shooter
NPC   :   Non-playable Character
MMO   :   Massive Multiplayer Online
PC   :   Personal Computer
PoP   :   Prince of Persia
PoP: SoT :   Prince of Persia: The Sands of Time

1. INTRODUCTION

Architecture can be thought as interactive environmental-spatial storytelling. Interaction has always been a pivotal element of artistic expression. Starting with verbal to visual and plastic narrative, artists always aimed to create the awe for the audience. Every age creates its own medium of arts and spirit of age. So the storytellers, or artists, utilize the tools and media of their own age as interpreters of their own time.

The world is at the early periods of such a breakpoint, a digital revolution. One of the distinctive features of this digital revolution is that the developments are occurring faster than ever, owing to the acceleration in the process and transfer of information. In this atmosphere of rapid information flow, various branches get developed in the same time from particle physics and the concept of origin of time to the human genome. In the present age, rapid innovations in computational technologies made interactive media more prominent in communication and entertainment. Thanks to the technology revealed more and more ways of production –and postproduction– and removes limitations, artists and designers started to use the new kind of the digital medium as an interactive vehicle. Most kinds of arts utilized the fruits of the digital revolution, from music to literature, cinema and architecture. Moreover, new storytelling forms and types emerged and evolved, like websites, hypertexts and interactive fictions. Video games are one of these many forms of the digital arts.

Video games received a significant attention and popularity among the other digital art forms. Video games are considered to be one of the most successful applications of interactive narratives, due to their audiovisual language, evocative atmosphere, and user-oriented interactive fiction. Architecture is one of the essential elements which constitute the visualized physical and spatial characteristics of the imagined environment and atmosphere of the fiction. Whether it be digital or not, acts and occurrences happen, in other words, "take place" due to place phenomenon; therefore space reveals itself as our "existential foothold" (Norberg-Schulz, 1980).Hence the narrative always needs space to take place, which makes it a subject of architecture.

Architecture has played a pivotal role in fictions through the ages. The virtual architecture embedded in the fiction not only serves as a mere background but deeply affects the sensorial atmosphere of the scenario, in both literature and cinema. In video games, architecture takes it to another level; the interactivity of the space creates an atmosphere to be experienced by the human being from inside the cyberspace via a *digital persona*, or *avatar*[1]. Everything player experiences during a video game directly addresses to player's senses; through the visual and auditory inputs, the video game space creates an ambiance, spatial mood, and visually transferred tactile feelings. Developing technologies allows more human senses to be involved in this process, yet the relationship of video games and architecture gets more and more concrete.

Following the call for an interdisciplinary approach, experiences of spatiality, temporality and narrative in video games will be discussed drawing on many other disciplines such as literature, architecture and cinema. Firstly, how time and space are structured in the narrative in general will be examined. Through a careful reading of narrative theory of different forms, and approaches of various disciplines for the video game studies will help to form an original analytical framework. After an overview of the foundational concepts, the framework will be illustrated with relevant video game titles as example case studies.

1.1. VIDEO GAMES AS A FIELD OF STUDY

It is useful to define what is meant by "video game[2]" to avoid any conflicts on terminology in the beginning.

"Computer game" or "digital game" is sometimes used synonymously with "video game". Nevertheless a computer game does not necessarily require any video qualities

---

[1] An *avatar* or *digital persona* is the graphic representation of a user in virtual worlds, e.g. video games.

[2] There is a debate about one word and two word spellings of "video game". The term "video game" presents the form's status as a "game" and its use of "video" technology, and is consistent with other forms such as card game and board game; whereas the term "videogame" is consistent with video technologies such as videotape and videodisc (Wolf, 2008), and in a similar manner calling computer games as "computergames" would be grammatically incorrect.

or visuals; moreover, a video game could work on different platforms and consoles which are not being called "computers."

Status of "game" is equally important in the definition of video game; something that runs on a video game engine and has similar technical and visual qualities might not be a video game but a video animation or simulation. In the game literature, common defining elements of games are usually listed as: [1] challenge, [2] rules, [3] player interaction and [4] valued outcome. Therefore, before labeling a digital simulation as a "video game", one should consider these ludic qualities.

Video game is not only a design field, but also a significant industry. In its forty years of history, video games made from a niche market to a global cultural and commercial industry of enormous proportions. Only in 2012, the video game industry made a record $67 billion in the global market, which is expected to grow up to $82 billion by 2017 (Gaudiosi, 2012). Influence of video games is increasing on the other media: film and television series adaptations of video games are being made, and online multiplayer video games are being played over Internet by hundreds of millions worldwide (Wolf, 2008). None the less, video game studies have only recently managed to call the attention of academia.

The literature review shows that video games have been investigated from diverse perspectives since they have entered academia. One challenge of the video game studies is that there are several disciplines involved in video games, and its theory is a convergence of a wide range of approaches including film theory, semiotics, ludology, narratology, simulation, performance, literature, aesthetics, psychology, art theory, et cetera. (Wolf & Perron, 2003). The next challenge is that it is a still expanding media form and keeps rapidly changing while the critical literature is being written.

Video games cannot be reduced to any of its components or properties in its rich and vivid nature. Thus, it is incomprehensible to expect any single theory to respond this form sufficiently: to get a richer picture of video games, a new approach of a wide spectrum covering different yet interconnected perspectives is needed (Nitsche, 2008).

Architects, who are interested in video game studies, are primarily concerned on what spatial qualities and characteristics arise from computer games, and what could be their implications on contemporary architecture. On the other hand, game designers are interested in constituting game space, utilizing certain architectural attributes to trigger intended types of interaction. Many game level[3] designers take inspiration from physical architecture, just as filmmakers: Certain places and configurations retroactively shape the perception of the audience, and designers make use of it in their interactive fiction. Thus, video game design is not only about the "rules of play" but also about the "rules of place" (Von Borries et al., 2007).

As discussed above, the fact that architecture is one of the many components which structure a video game brings one to the conclusion that an interdisciplinary approach is required to analyze video games. The author being interested in both disciplines; this thesis intends to look from the phenomenological perspective of both the architect, amateur video game designer, and passionate video game player. Therefore, the resulting framework of this thesis aims to be not only an analysis framework, but also a design tool which is useful for video game designers and architects.

1.2. METHODOLOGY

There were three main concerns during the development of an analytic framework for video games: The first one is not to restrict the approach to an architectural-only perspective in video games, given that architecture is just one of the key components of a video game. Analysis of architectural experience in video game spaces is more than a reading and classification of architectural elements in the video games. Nevertheless, reconsidering the theory of architectural typologies, for instance, can be useful in video game theory to widen the perspective with the knowledge of architecture. The second concern is, as explained previously that video games cannot be reduced to their components, the analytical approach should be deductive rather than inductive. The

---

[3] A video game *level*, *map*, *area*, *stage*, *world*, or *zone* is a section or portion of the game which loads at one time, and includes the space and challenges during the course of completing an objective.

third concern is to define the scope of the work carefully, given that one single theory cannot be applied to all video games. In this thesis, the video games discussed: [1] have to be available on consumer hardware [4], and [2] have to offer 3D navigable environments.

There are existing frameworks for analyzing the space and time in interactive narratives, which are detailed in the Chapter 3. They are mostly derived from other narrative forms like literature or cinema. Moreover, there are also works that are focusing on reading and classification of architectural elements in the video games. Getting inspired from these existing frameworks, this thesis aims to complement and recontextualize narrative and architectural theories of scholars like Gerard Genette, Christian Norberg-Schulz, Kevin Lynch and Michael Nitsche, and finally deliver an original framework which can be used in the analysis of 3D adventure games. In this study, mixed research methods are used. Namely "case studies with combined strategies" and more specifically "interpretive research with simulations", and "modeling research with argumentation" (Groat & Wang, 2013).

Following the above mentioned methodology, the study follows these five steps:

i.   *Literature review:* Existing approaches and theories on video games and architecture, focusing on spatiality, temporality, and narrative are examined.

ii. *Criticizing the existing models.* In order to create a combined and complementary original framework; the missing, inadequate, and impractical parts of the existing models are argued through a comparison on the literature review.

iii. *Developing an analytical framework.* Considering the scope of this thesis, which is the spatial and temporal experience in 3D adventure video games, the framework has been developed.

iv. *Development of a pictographic visualization.* Each category and element of the framework is visualized with distinct and memorable pictograms, which serve as an interface for the analysis.

---

[4] *Consumer hardware* refers to the computers or video game consoles such as PC, Mac, PlayStation, Xbox or Wii.

v. *Analysis of video games with the framework.* The final framework is illustrated in detail, and two levels from *Prince of Persia* and *Assassin's Creed* series are analyzed as case studies.

1.3. SCOPE OF THE STUDY

In this first chapter, the aims, motivations, content and methodology of this work are explained and the thesis is introduced.

The second chapter, *Video Games and Architecture,* starts with the definition and a concise history of video games and refers to the key issues and debates -such as the conflict between narratologists and ludologists- in current video game studies literature. Then the focus shifts to how can one read the architecture that constitutes the place for video games in terms of spatiality, temporality and narrative; avoiding to read it only through the theory of physical architecture as a professional reflex. In this perspective, elements of video games and design phases of video games will be compared with the works of architecture, and then the inspirations and interactions between these two fields will be briefly mentioned. This chapter also introduces the philosophical basis of the thesis: After a brief introduction to philosophies of Bergson, Husserl and Heidegger, the temporality and phenomenology of the ludic spaces are studied from an architectural perspective.

In the third chapter, *Space and Time Studies in Video Game Narratives*, a literature review on the background of space and time studies, and evaluation and comparison of these different approaches are given.

In the fourth chapter, *Development of a Framework*, following a review of the existing studies; a new hybrid video game-specific analysis framework is developed. The categories of the framework are explained, and the framework is visualized with pictograms.

In the fifth chapter, *Analysis of Selected Video Games with the Framework*, the framework is applied on to the selected video game levels.

The sixth chapter, *Conclusion*, concludes the work with a self-criticism of the framework, examples of possible uses of the pictographic framework in the design of video games, and envisions future studies that might be based on this thesis by the author or other scholars.

2. VIDEO GAMES AND ARCHITECTURE

Architecture has played a crucial role in fictions through the ages. The virtual architecture embedded in the fiction not only serves as a mere background but deeply affects the atmosphere of the scenario, in both literature and cinema. In video games, architecture takes it to another level; owing to their interactive nature, video game spaces create an atmosphere to be experienced by the players from inside the cyberspace via a digital persona. In this chapter, discussions on video game studies in current literature are briefly introduced. Afterwards, the concept of architecture in video games has been elucidated with its philosophical background. Architecture's role in narratives has been explained, then the design and representation of architecture and video games have been discussed.

1.1. A BRIEF HISTORY OF VIDEO GAMES

History of video games starts with the application of interactive narratives in video format. Historians call *Spacewar [1962]* the first real video game, *Computer Space [1971]* the first commercial video game, *PONG [1972]* the first hit game (Wolf & Perron, 2003). With the rise of market of home computers and consumer hardware for video games between 1970s and 1980s, video games developed into a huge industry.

Video games have been investigated from various perspectives since they have entered academia. One challenge of the video game studies is that there are several disciplines involved in video games, and its theory is a convergence of a wide range of approaches including film theory, semiotics, ludology, narratology, simulation, performance, literature, aesthetics, psychology, art theory, etc. (ibid., 2003). The next challenge is that it is a still expanding media form and keeps rapidly changing while the critical literature is being written.

In the study of video games, there are two often conflicting viewpoints embraced by the theorists: *ludology* and *narratology* (Jenkins, 2004). Ludologists think that the central

element in a video game is the ludic[5] structure of the gameplay. On the other hand, narratologists believe a video game is mainly a form of narrative, so the prominent element of a video game is narrative (Adams, 2010a). There is a vast array of examples of video games which prove both approach is not entirely accurate, but a video game is an interactive narrative, where the ludic elements and gameplay provide the basis of the interaction.

Space and time play equally vital roles in the construction of narrative: both in the process of narrative authoring and narrative comprehension. The temporal and spatial structures of a game determine how the players engage with the game (Bridgeman, 2007). Therefore, narrative comprehension is directly related to the player's experience of the game, thus to phenomenology.

1.2. PHENOMENOLOGY AND VIDEO GAMES

The word *phenomenology* describes the philosophical study of *phenomena*, the structure of experience of beings, how things appear in human experience, experienced from the first-person point of view (Smith, 2011). The main argument of this thesis is the concept of space and spatial experience achieved via audiovisual representations created by the video game. As Nitsche put it: "players want to engage not with the screen but with a fictional world these images bring to mind" (Nitsche, 2008). Therefore, references to phenomenology might be useful to investigate in this thesis.

1.2.1. Background of Phenomenology

At the beginning of 20th century, this philosophical movement was started by Edmund Husserl (Safranski, 2008). The original maxim of phenomenology was '*zurück zu den Sachenselbst* in German or *back to things themselves* in English.

---

[5] Originated from the Latin word *ludo* ("to play"), *ludic* means pertaining to game or gameplay. Words originated from *ludo* and *ludus* became popular in the terminology of game studies, after the Dutch historian and cultural theorist Johan Huizinga published *Homo Ludens* ("Playing Man") in 1938.

Phenomenology is a philosophical movement which was founded with enthusiasm of an inception, in search of oneself, when the western world was in a psychological collapse in the early 20th century (ibid.). In its original form, by Husserl's conception, phenomenology is concerned with the interactions of consciousness and phenomena. This conception of phenomenology then has been criticized and developed by a number of 20th century philosophers, including his students like Martin Heidegger and Edith Stein (ibid.).

Edmund Husserl responds to thinkers including Hegel and Schopenhauer, but his approach methodologically differentiates. Husserl's conception takes the bare fact of human existence to its center. He criticizes that the immediate contact with existence has been blurred in contemporary society (Sharr, 2007). Contrary to the Cartesian tradition and its epistemology based approach, people should try to re-establish the connection with the existence itself and its philosophical status.

As for Heidegger, phenomenological attributes of being were primary, rather than its cerebral descriptions (ibid.). The concept of a self-aware being was broadly accepted in between the prevailing philosophers, though Heidegger stated that all beings exist before they start thinking about their own existence, they are already alive before they try to think about life. The argument that draws a line between Heidegger and the prevailing conception was that philosophical pursuit of being inevitably started from the condition of being. His notion of being is established in relation to its alternative: nothing. The existence, the first question of philosophy, should have been fundamentally highlighted by the possibility of its opposite: non-existence (ibid.). Therefore, Heidegger's philosophy began with a long-forgotten question of being; the overlooked fact that human life exists (Heidegger, 1996). Heideggerian concepts of existence and non-existence becomes key concepts disclosing the architectural space.

1.2.2. Phenomenology and Architectural Space

Heidegger's argument about the hypothetical jug in *The Thing* links the notions of existence and non-existence better: The jug's use consists in its void. Although the jug is something recognized in its physicality, it is the void inside –the nothing at its core-

that makes it something useful. A scientist might tell that a jug could never be empty; it contains some fluid whether liquid or gas (Heidegger, 2001). The jug example concludes that the science is unable to measure nothingness of things, even if it is the very existence of its use. Phenomenology provides a new way of looking at spaces to understand voids and immaterial qualities, contrary to the analytical approaches that measure the solids and material qualities. This section will further deal with the relationship of phenomenology and architecture.

The concept of phenomenology also created a sensation in the world of architecture. The attempt of returning to things themselves and to disclose the dwelling act via experiences might clarify prevailing situations, which were dominated by visual and scientific limitations (Pérez-Gómez, 2006).

Since the contemporary approach of phenomenology is based on Heideggerian conception, it might be useful to take a look at Heidegger's relationship with architects. Heidegger was interested in various disciplines, other than philosophy as well. At his time, he took the opportunity of meeting with creative people who inspired or interested him, including writers, artists and poets. Although he wrote a few articles related to architecture, *Building Dwelling Thinking* and *Poetically Man Dwells* to name a few (Heidegger, 2001), he took a little interest in architects and their work. Petzet recorded that he visited Le Corbusier's chapel at Ronchamp in 1953, but the building did not excite him, and he preferred to pay attention to the Mass by a young Priest instead (Petzet, 1993). Heidegger's contact with Alvar Aalto is an exception to his ambivalence to meeting architects; he sent his greetings to Aalto after hearing that Aalto keeps a copy of *Building Dwelling Thinking* on his desk (ibid.). It is also noted that they attempted to meet, but they never could due to Aalto's death (ibid.).

Despite the fact that Heidegger did not have remarkable relationships with the architects of his age, plenty of architects of the late 20th century showed interest in his writings. Architects like Christian Norberg-Schulz, Juhani Pallasmaa, Peter Zumthor and Steven Holl became developers and practitioners of phenomenology movement in architecture.

In *Genius Loci*, Norberg-Schulz states that our everyday lifeworld consists of 'phenomena': people, animals, vegetation, stone, earth, celestial bodies, night and day, and changing seasons (Norberg-Schulz, 1980). He describes the phenomena as the content of our existence, and criticizes that the contemporary world gives more importance to the tools than the *everyday life-world*, which is a term introduced by Husserl in his 1970 work *The Crisis of European Sciences and Transcendental*.

Norberg-Schulz puts forward that our given world is being constituted by concrete things, which are interrelated in complex and sometimes contradictory ways. For example, the forest phenomenon is constituted by concrete coexistence of trees. The forest phenomenon makes way to the comprehensive phenomenon of landscape, the same way the tree phenomenon makes way to the forest phenomenon. This brings us to the conclusion that some phenomena form an environment for the others. *Place* is the concrete term for environment. Our everyday acts and occurrences happen, in other words *take place*, by virtue of the place phenomenon. Therefore, Norberg-Schulz describes *place* as our existential foothold (Norberg-Schulz, 1980). The term *place* here refers to a concrete thing with material substance, shape, texture and color. These elements determine the environmental character of the place. This essential character defines the 'atmosphere' of the place, which is being perceived by humans.

Such a way of thinking concludes that *place* is a total phenomenon, which cannot be reduced to any of its properties –like spatial relationships– within its concrete nature (Norberg-Schulz, 1980). The complete phenomenon of space creates the context of the fiction throughout the history.

Architecture's participation level has been gradually increasing in narratives, from theatre *mise-en-scène*s to film sets. Lately, developing technologies allowed photorealistic representations of architectural space to be an integral and interactive part of the video games. In the following section, architecture's role in video games is further explained.

1.2.3. Architecture in Video Game Spaces

The interaction between the discipline of architecture and video games are not unilateral. Architecture not only creates space for the video games, but also gets affected by the developments of visual language and new perspectives of video games; very similar to the inspirations and interactions between architecture and cinema. In this section, these relationships will be detailed concisely.

Started with the verbal tradition of storytelling, the architecture has been constituting the place for the acts and occurrences of fiction to take place. Architecture can be involved in literature, theatre and cinema in different roles: as a theme or a spatiotemporal component. The fiction can put the theme of architecture in the center of its plot, e.g. the life of an architect or an architectural activity. Ayn Rand's novel *Fountainhead* and Jacques Tati's movie *Mon Oncle* can be given as instances of fictions that criticize the discipline of architecture.

Besides the role as a theme, architecture also constitutes the spatiotemporal context of the story. An existing physical architectural artifact may be reproduced in the virtual universe of the fiction as an atmospheric description. Furthermore, the fiction may describe virtual architectural setups which do not exist in reality. In these instances, sometimes description of this redefined architecture can be so complete and evocative that the work of architecture can seem like another character. Existing architectural pieces like Notre Dame de Paris in Victor Hugo's novel *Hunchback of Notre Dame*, the city of Rome in Fellini's movie *Dolce Vita* and future New York City in Crytek's video game *Crysis 2* became the dramatis personaes of their fictional universes. On the other hand Thomas More's book of *Utopia*, Ridley Scott's movie *Blade Runner* and Bioware's videogame *Mass Effect* tell their stories within imagined universes of their own creations.

The necessity of architectural space in video games is explained before; this recognition can be summarized as follows: "The defining element in computer games is spatiality. Computer games are essentially concerned with spatial representation and negotiation;

therefore the classification of a computer game can be based on how it represents or, perhaps, implements space" (Aarseth, 2007).

Creating a space in a video game ontologically differs from modeling a space in the digital environment; it also includes the reactions, interactions and narrative of a space. A video game space is not a representation of an idea or a physical thing; it constitutes a space for the player to be-inside, in which the transmission of the interaction is obtained between player and their *persona* or *avatar*[6] via the interfaces, through emphatic insideness.

1.2.4. Being-there via Persona

Video games somehow create a virtual simulation environment where player can experience and interact with a spatial setting with most of their senses. However, a simulation "is not a mere imitation of its referential reality, it has its own existence as a hyperreality" (Baudrillard, 1999). The created digital world is a new existence level or layer inside the simulation, given that the simulation is disclosable by a being-who-is-there, this leads one to realize that a player-driven *avatar* or *persona*. Avatars enable *Daseins*[7] to be-in-digital-world. Through these new modes of interaction and communication, one can re-read Heidegger's basic concepts like *Dasein as Being-in-the-world*. Since digital persona is a *Dasein-driven* being in the digital world, phenomenology can be used for disclosure of this digital realm.

Everything players experience during a video game directly addresses to their senses; through the visual and auditory inputs, the video game space creates an ambiance, spatial mood, and visually transferred tactile feelings. Figure 2.1 shows the player-persona transition scheme proposed by this thesis. Developing technologies allows more human senses to be involved in this process. Phenomenology again proves itself to be useful in giving meaning to this digital spatial experience.

---

[6] An *avatar* or *digital persona* is the graphic representation of a user in virtual worlds, e.g. video games.

[7] *Dasein*: In Heideggerian terminology, a human-being; especially the nature of being; existance, presence, hereness, suchness, essence.
Source: Dasein. 2014. In *Wiktionary*. Retrieved from: http://en.wiktionary.org/wiki/dasein

Throughout the discussion of virtual space, fundamental concepts like experience, comprehension and spatial practice are repeated. Hitherto, how this experience is generated in video game spaces is a quite new field of research. What is crucial here during this thesis' phenomenological investigation of video game spaces is to consider the differences between the experience of virtual and physical space.

Figure 2.1: Scheme of player-persona transition in video game spaces
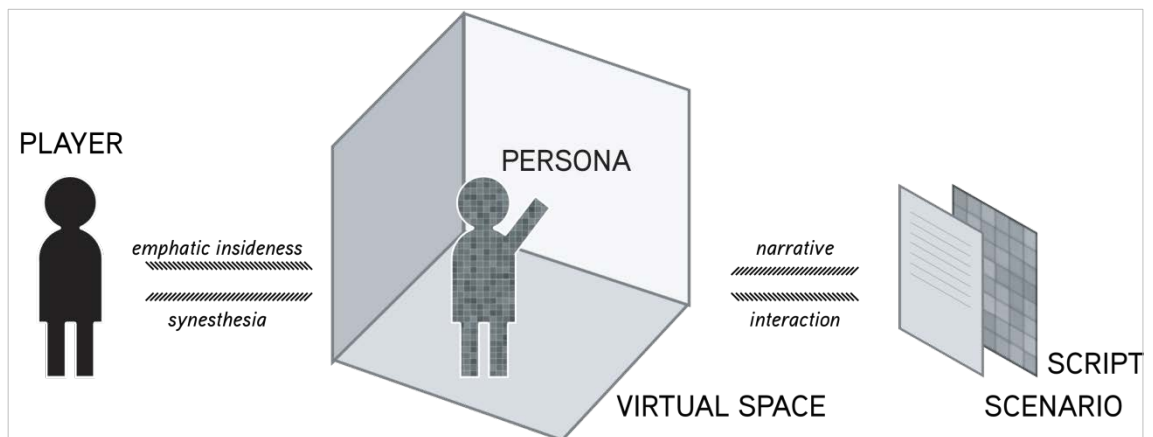
Heidegger's fundamental of analysis of Dasein in *Being and Time* points out temporality to be the primal meaning of Dasein's being. Similarly, all spatial experiences of a Dasein-driven persona take place in the spatiotemporal context of the video game space. Therefore, another subject in video game spaces reveals to be temporality.

1.2.5. Phenomenology of Temporality in Video Game Spaces

Time and space can be seen as separate aspects of game design and experience, but they are not unrelated. Remarking the importance of player experience to examine game time, Nitsche claims that the mapping of game time onto game world can only be done with spatial reference due to the continuity of space (Nitsche, 2008). In video games time can be stopped, rewound or bent, which makes the time a less reliable marker to

denote certain time point in a game; therefore, spatial reference seems more stable in comparison (ibid.).

Video games inherit certain temporal design conventions from predecessor media like film: flashback, flash-forward and bullet-time to name a few. However, the interactive and ludic nature of video games makes new ways of temporal manipulations possible, which grows the gap between actual play time and video game's chronology.

In previous studies, temporal analysis has been limited to identifying a few typologies of time schemes or frames, which is further discussed in Chapter 3. This section discusses how the experience of space is interconnected with temporality from the perspective of phenomenology.

The changing notion of time made time a field of interest for the twentieth century philosophers. Many philosophers started to examine time in a four-dimensional continuum, from a subjective point of view of consciousness.

Henri Bergson was among the philosophers of th 20th century who studied time thoroughly. Bergson's revitalized concepts of *time*, *memory* and *being* have been an important influence upon the modernists (Quirk, 1990). Moss states that: "Feeling disillusioned with the state of the world around them, the authors began to turn inward, searching for self-consciousness, spiritual fulfillment, and inner peace" (Moss, 2008). Bergson's philosophy, which takes consciousness of being into its center, helped modernists to express the spiritual void of welfare they were in.

The most essential concepts of Bergson's radical notion of time appear to be time as non-linear, simultaneous and intersecting planes of *consciousness* and the concept of *durée*.

The Bergsonian notion of time discards time as a linear progression of images and isolated states of consciousness (Wagner, 2010). Bergson approaches it phenomenologically, with the perspective of consciousness: "We exist in the continual

change of forms and essence," which reveals itself as time. "What we perceive as form is a snapshot view of a transition" (Bergson, 1998). In his 1889 book *Time and Free Will*, in which he introduces his revolutionary ideas about the *simultaneous* nature of time, Bergson (2001) writes:

> *"When we add to the present moment those which have preceded it, as is the case when we are adding up units, we are not dealing with these moments themselves, since they have vanished forever, but with the lasting traces which they seem to have left".*

Here one sees that what is diffused into the consciousness from past experiences should be considered as a whole, a manifold rather than singular memories. The nature of time is simultaneous states of consciousness. He further explains the concept of memory in *Duration and Simultaneity*:

> *"Where there is not some memory, some consciousness, real or virtual, established or imagined, actually present or ideally introduced, there cannot be a before and an after; there is one or the other, not both; and both are needed to constitute time" (Bergson, 1999).*

Therefore, memory is the bounding factor which unites the successive and intersecting planes of consciousness. Without an elementary memory which connects two moments, there is no before or after, no succession, or no time (Bergson, 1999). Being a whole in itself, time consists of parts which are in a continual interaction and persistent flux. Like the concept of *simultaneity*, Bergson introduces the new concept of *durée* for the first time in *Time and Free Will*:

> *"Pure duration is the form which the succession of our conscious states assumes when our ego lets itself live, when it refrains from separating its present state from its former states. For this purpose it need not be entirely absorbed in the passing sensation or idea; for then, on the contrary, it would no longer endure. Nor need it forget its former states: it is enough that, in recalling these states, it does not set them alongside its actual state as one point alongside another, but forms both the past and the present states into an organic whole" (Bergson, 2001).*

Duration is a heterogeneous whole, which absorbs the present and memory together, in a similar manner which simultaneous intersecting planes of consciousness do. Also, what is peculiar here is the involvement of ego itself. Marrati argues at this point this sense of duration not only constitutes real time, but also the entire existence, which takes place or is made of duration (Marrati, 2005). Ergo, duration is all about real time, which is perceived and lived by the consciousness.

Speaking of the subjective perspective of consciousness, it is better to mention phenomenology movement again, which was introduced by Edmund Husserl, who was a contemporary of Henri Bergson[8].

Husserl's phenomenology pays particular attention to temporality, for it would be impossible to experience the world for beings if they do not have a sense of temporality. For temporal aspects, Husserl uses the terms *protention* and *retention*, which are on a level dimensionally different from *now*, rather than past and future. Retention is a presentation of what is not before the consciousness anymore, but it is a temporally extended present rather than a representation of a memory. Protention is our anticipation of the moment which has yet to be perceived (Bernet, Welton, & Zavota, 2005).

Heidegger argues that temporality is the existential and ontological basis of Da-sein. Then he examines the temporality of spatial characteristic of Da-sein, stating "Da-sein must be addressed coordinately as *temporal and also* as spatial" (Heidegger, 1996).

Heideggerian concept of phenomenology and Bergsonian concept of *durée* influenced many 20th and 21st century artists, philosophers and architects. These philosophical concepts were also considered during the spatial and temporal discourse of thesis.

1.3. REPRESENTATION OF SPACE IN VIDEO GAMES

Design of video games and architecture has a lot in common. Both being great industries being developed as a result of a teamwork, and consumed by the end user -or client- there are similarities and analogies between the video game design and architecture as a theory and a profession.

In a 3D action-adventure game, the components of the video game can be listed as follows as seen in Figure 2.2:

---

[8] Edmund Husserl and Henri Bergson were both mathematician philosophers, who also work on the multiplicity notion of German mathematician Bernhard Riemann [1826-1866], and developed the philosophical concept of Multiplicity by analogy with Riemann's description (Deleuze, 1986).

i.   Terrain,

ii.   Entities (Geometric and Scripted)

iii.   Lights

iv.   Areas / Volumes

v.   Sounds

vi.   Camera

vii.   Avatar/Persona

Figure 2.2: Elements of a video game as shown in a video game engine editor
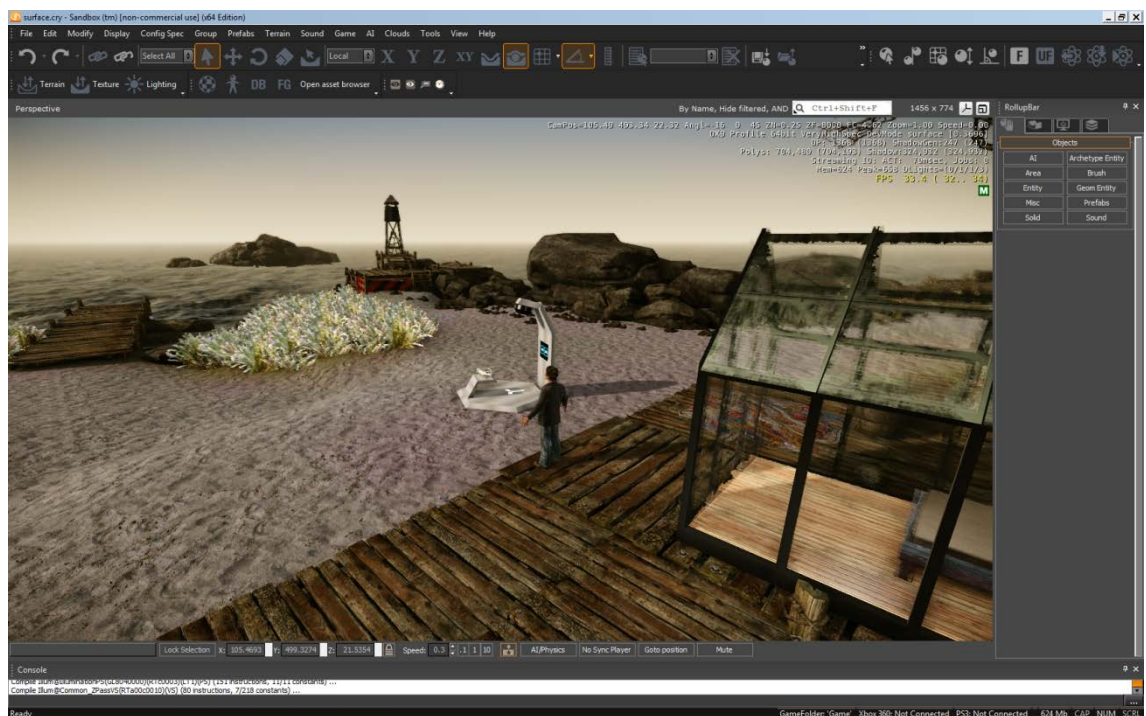
Source: Screenshot from CryEngine 3 by Crytek, ©2013.

The representations of body and space are the basis of architecture, cinema and video games. Whereas 3D graphics is the key element of video games, use of 3D graphic representations actually intends to generate fictional immersive and evocative worlds in the player's imagination. Space is an essential element for player's experience. The player generates new meanings from game spaces through comprehension of signs and interactions with them. These game spaces do not contain the story themselves but trigger an important part of the narrative process in player's mind; thus, they are called

"evocative narrative elements" (Nitsche, 2008). The fundamental difference between film spaces and video game spaces is that the film space represented on the silver screen is limited to what the director wants the audience see. However, the video game space is experienced by players themselves as a spatiotemporal continuum.

A good example to show architecture's role in fiction, and transition from one narrative form to another is the castle of *Hogwarts*, the fictional school of witchcraft and wizardry in the *Harry Potter* series. This transition also reflects itself on the evolution of representation of the castle of *Hogwarts* between the different forms, in this case, from a work of literature to film, then from film to video games.

The author of the series, J.K. Rowling describes the castle:[9] "A huge, rambling, quite scary-looking castle, with a jumble of towers and battlements. […] it isn't a building that *Muggle*s[10] could build, because it is supported by magic." The castle was first introduced in the novel *Harry Potter and the Philosopher's Stone* in 1997. Figure 2.4 shows a sketch of *Hogwarts*' plan that J.K. Rowling drew to give an idea to the production designers of the film adaptation about the layout of the *Hogwarts* in the novels.

In 2001, Warner Bros. adapted the series to film. In the novels, the castle is described to be built in the 10th century, and cast under spells which support the castle and makes some minor changes in its architectural details and plan organization regularly. Accordingly, the castle shown in the films has a Romanesque style with Gothic components, with some Victorian characteristics in the interior details. In the first two movies, the preliminary layout of *Hogwarts* was used as a reference. Some scenes were shot in real historic settings[11], some scenes were shot in the film sets which were also

---

[9] Online chat transcript, Scholastic.com, 3 February 2000. Available at: http://www.accio-quote.org/articles/2000/0200-scholastic-chat.htm

[10] In *Harry Potter* universe, *Muggle*s are people without any magical abilities and often unaware of the existence of the magical world.

[11] Alnwick Castle is known to be used for some interior and exterior shots.

using real historical settings as a reference[12]. The director of the third film, Alfonso Cuarón, made revisions on the layout of the castle for different locations to be placed more consistently within the complex of the castle and its grounds, and finally a more complete image of *Hogwarts* was created. Then the castle kept undergoing minor changes until the eighth and the last film. Figure 2.3 shows the production designer Stuart Craig's first sketch of *Hogwarts*, created for the first film. Figure 2.5 shows the 3/16"=1'-0" scale plan of the *Hogwarts* castle model created for the last two films. Figure 2.6 shows the 1:24 *Hogwarts* model in the film studio.

Starting with the first movie, EA Games adapted each *Harry Potter* film to a video game, which was released for computers and various game consoles. The *Hogwarts* castles presented in the first four video games were created independently for each game and did not resemble the one in the movies. However, starting with the fifth game, the video game studio purchased the rights of using the *Hogwarts* castle in the films, which is also an iconic image for the audience. So they created the most complete *Hogwarts* model ever. Kelvin Tuite, the art director of *Harry Potter Order of the Phoenix* video game, explains their work in the development diaries[13]:

> *"This year we are trying to build the Hogwarts that you see in the film. So we were working a lot closer to film people; people like Gary Tomkins who [...] designed most of the blueprints for the miniature of Hogwarts.*
>
> *[...] Where everything was? Like where do I cross the Viaduct? Where do I get? What locations are they? What floor are they? How does that work within the fiction? So we've been basically trying to answer the questions which is like a large jigsaw puzzle. And it is something that the film people themselves have not even considered. Because they don't need to. They don't need to be able to work from A to B. They can just cut the camera, and there you're in a new location, whereas for us [...] the player is able to work all around Hogwarts.*
>
> *[...] we had the blueprints; we were looking to consolidate the miniature castle, the film sets, and the books. We tried to put in all the shortcuts that are mentioned in the books. We didn't just stop*

---

[12]*The Great Hall* of Hogwarts is inspired from Christ Church College of Oxford. *The Bell Towers* are adapted from the Durham Cathedral with the addition of Gothic spires.

[13]Electronic Arts. 2007. *Harry Potter and the Order of the Phoenix: The Video Game, Development Diaries: Creating Hogwarts*. [Video]. Retrieved from https://www.youtube.com/watch?v=312EO-Nm4tI

looking at the Goblet of Fire [the fourth book] or Order of the Phoenix, or even the Prisoner of

Azkaban [the third book]. We went back to the first two where Hogwarts was slightly different."

The example of *Hogwarts* castle illustrates the changing participation level and perception of architecture in different types of narrative media. In the novels, Hogwarts was a recreation of verbal descriptions in the readers' minds. The movies had to present a concrete image of the castle with its details. However, what the audience sees on the screen is predetermined by the director. Suspension of disbelief allows the audience to pretend that there is a complete and consistent castle. It is different for the video games. Almost all the perspectives, viewpoints, actions and the player determines the navigation though the castle. The directors and designers can no longer intervene in the visual experience, instead –just like the architects do– they create a complete setting with a given program, function, and atmospheric values. Also, they play the god and predetermine the key events of the narrative. Then they push the players into an immersive story experience in the likeness of the *Hogwarts* castle.

Figure 2.3: Sketch of Hogwarts drawn by Stuart Craig.
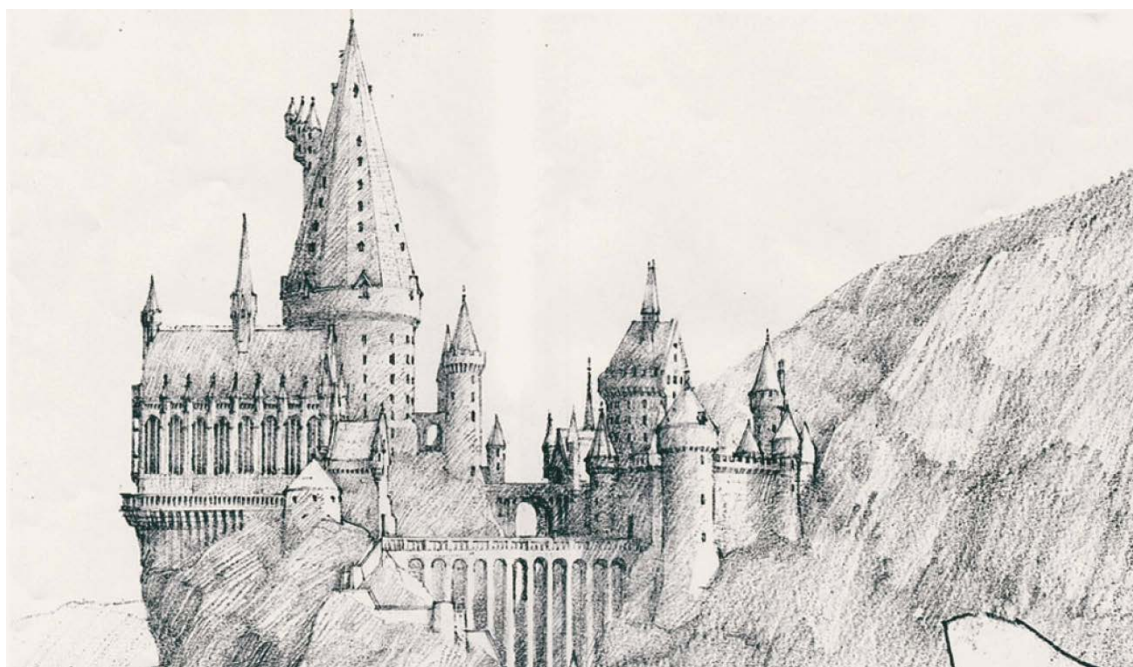
Source: Warner Bros. Entertainment Inc. 2011. *Harry Potter Film Wizardry* (Version 1.2) [iPad app]. Retrieved from https://itunes.apple.com/us/app/harry-potter-film-wizardry/id449182715

Figure 2.4: The sketch of Hogwarts' plan drawn by J.K. Rowling.

Figure 2.5: The blueprint of the Hogwarts castle model used in films.

Figure 2.6: The model of Hogwarts castle used in films.
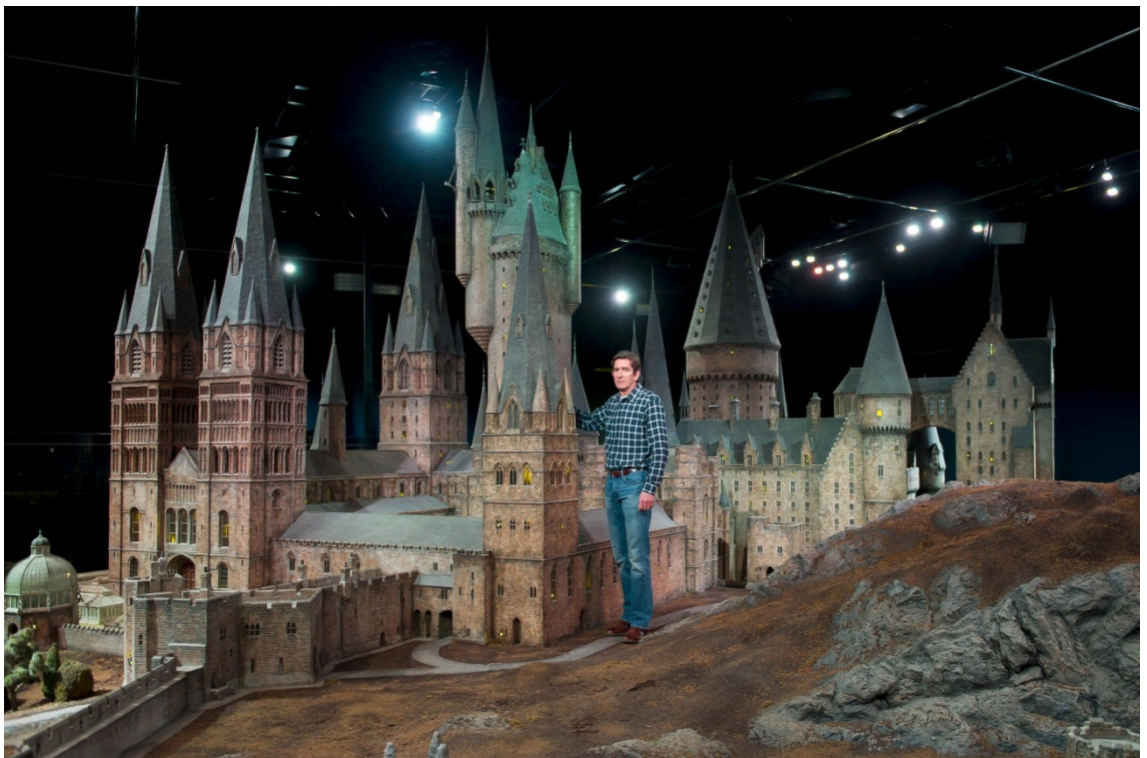
Today, there's a common delusion that architecture is something that is produced via orthographic projections, such as plans, sections and elevations. Withal, these representation tools are only interpretations of architecture: something that makes the architectural idea tangible for builders. Of course, educated eyes can somewhat see the architecture in a well-drafted plan, but architecture is more than the solids and voids created with those lines, architecture is the atmosphere which is being experienced by subjects 'those who are there' among the poetic relationships between the masses.

Video game designers avoid orthographic representation techniques while designing a video game space. The possible navigation tracks are determined considering the scenario, gameplay elements, and movement abilities of the player. The designers and artists define the visual language of the spaces in conceptual artworks. Geometric mesh maps are modeled and textured according to the foresight of the concept artists. In the end, a realistic space is modeled which has simulation qualities in terms of imitating reality in the digital world, allows interaction within the space, in which almost all senses are included. See the Figure 2.7 to Figure 2.10 for further illustration.

Figure 2.7: Editing process of level design for videogame Uncharted 2
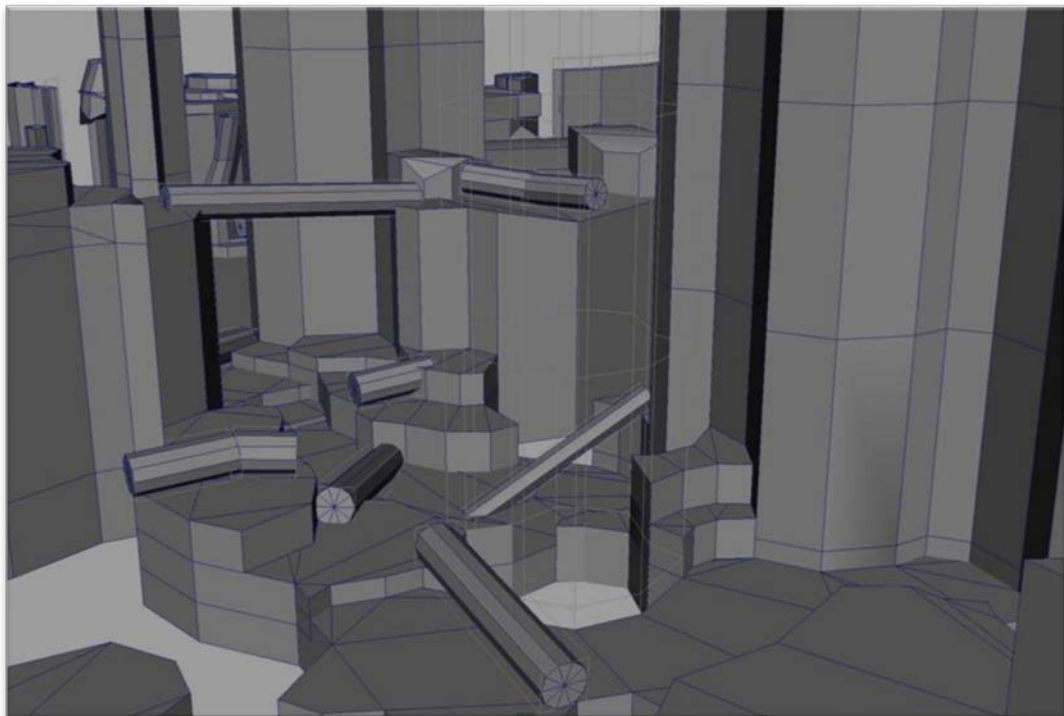
Source: Pangilinan, E., 2010. *Uncharted 2 Level Design Art.* Santa Monica: Naughty Dog Studios.

Figure 2.8: Sculpting the block mesh and texturing the level, Uncharted 2
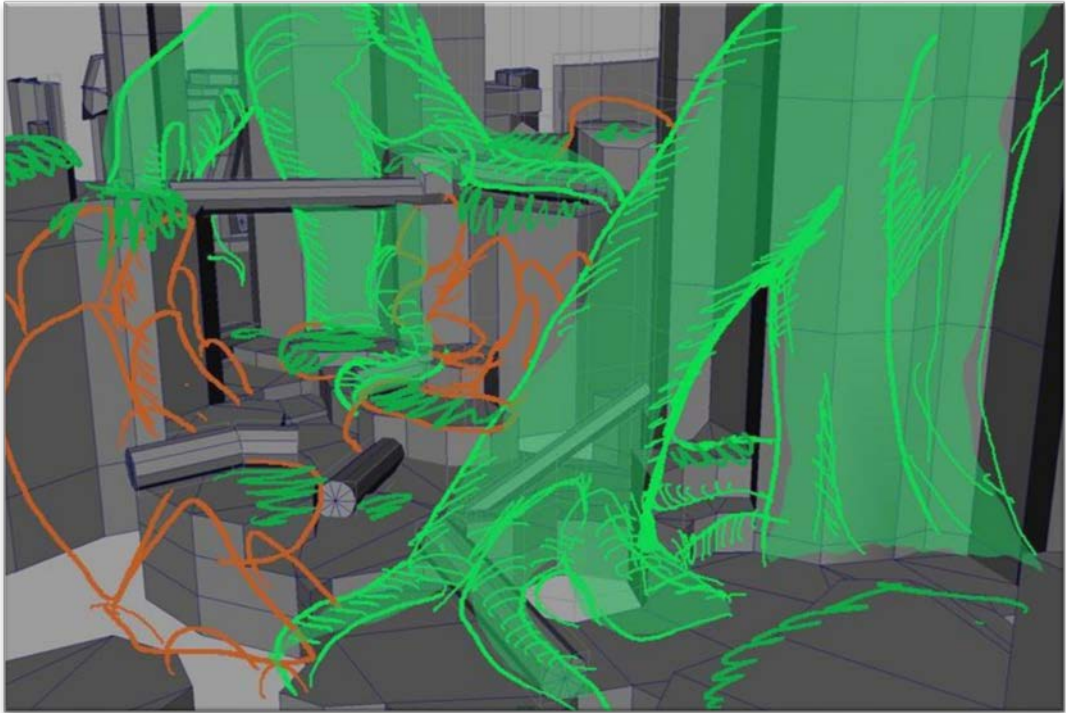
Source: Pangilinan, E., 2010. *Uncharted 2 Level Design Art*. Santa Monica: Naughty Dog Studios.

Figure 2.9: Finalizing the design upon test play experience, Uncharted 2
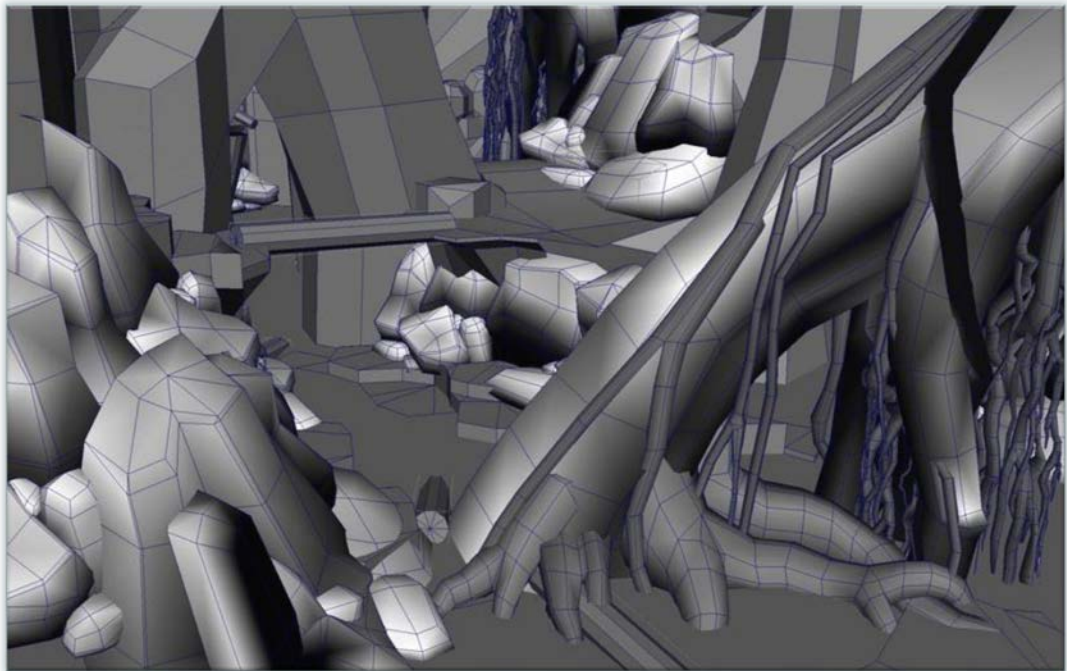
*Source:*Pangilinan, E., 2010. *Uncharted 2 Level Design Art.* Santa Monica: Naughty Dog Studios.

Figure 2.10: Editing a space upon the narrative of game scenario, Uncharted 2
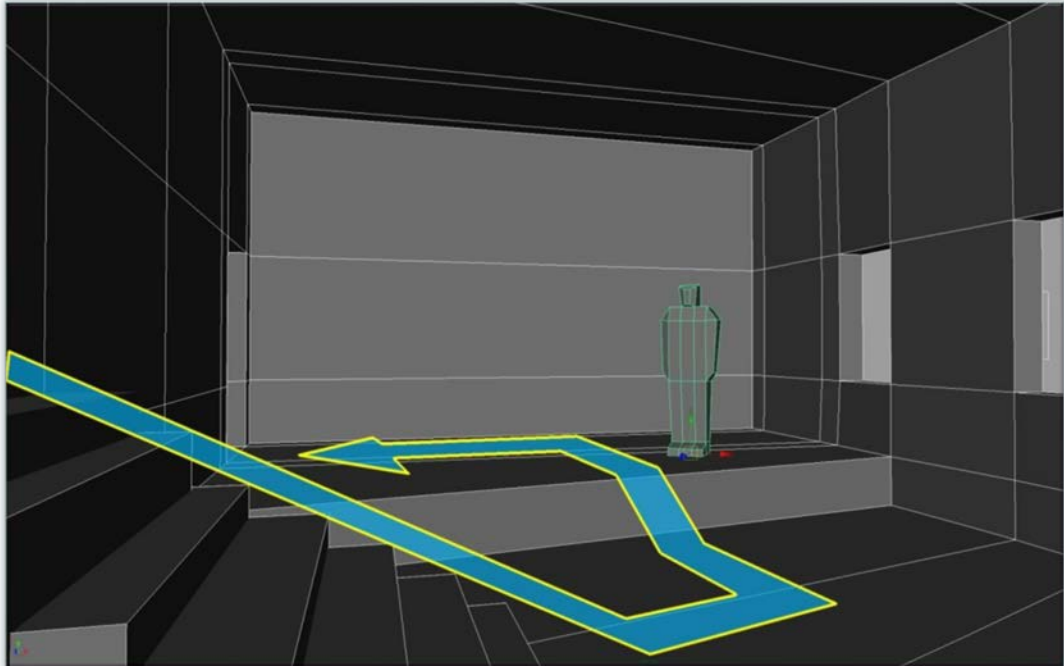
*Source:*Pangilinan, E., 2010. *Uncharted 2 Level Design Art.* Santa Monica: Naughty Dog Studios.

3. SPACE AND TIME STUDIES IN VIDEO GAME NARRATIVES

Classic tales always begin with "once upon a time" and often continues with "in a land so far away." More modern ones could start with "A long time ago in a galaxy far, far away…" [14]. Either way, such starting stock phrases clearly reveals two defining elements of stories as *time* and *space*. As Bridgeman put it: "Temporal and spatial relationships are essential to our understanding of narratives and go beyond the specification of a date and a location" (Bridgeman, 2007).

It is not different in the digital narratives and video games. In narrative theory, the temporality was discussed more than the spatiality (Wei, Bizzocchi, & Calvert, 2010). However, if the stories are considered as sequences of fictional events, space is always required for events to take place in a progression timeline. Digital narratives being more immersive and interactive than the other forms of narratives, space becomes a fundamentally defining component of them. Murray (1998) explains the importance of space in digital narratives in her own words: "The new digital environments are characterized by their power to represent navigable space."

The space not only provides a place for the story events, but also evokes images in the players' minds. The spaces may have symbolic meanings so that can address the audience's past experience and start to become a storytelling device. As Italo Calvino uses to describe the fictional city of Tamara in Invisible Cities, "The eye does not see things but images of things that mean other things" (Calvino, 1974). Similarly, Kevin Lynch states: "Nothing is experienced by itself, but always in relation to its surroundings, the sequence of events leading up to it, the memory of past experiences"(Lynch, 1960). Henry Jenkins (2004) also emphasizes the importance of space in video games, where he calls the video game designers as "narrative architects":

---

[14] All films in the *Star Wars* series start with a static text ""A long time ago in a galaxy far, far away...." in blue on black background, followed by the Star Wars logo and a text scrolling in the space, explaining the backstory.

"In the case of embedded narratives, the game space becomes a memory palace whose contents must be deciphered as the player tries to reconstruct the plot and in the case of emergent narratives, game spaces are designed to be rich with narrative potential, enabling the story-constructing activity of players. In each case, it makes sense to think of game designers less as storytellers than as narrative architects."

Therefore, the spatiality and temporality should be considered as an integrated complex of space-time in narrative.

In this chapter, a literature review on the of space and time studies in narratives are given with this spatiotemporal approach. Only a few of these studies are specific to digital narratives, but a careful adaptation of the works on other types of narratives would be useful in the scope of this thesis.

1.4. SPACE IN VIDEO GAMES

In the current literature on the concept of *space* in video games, Michael Nitsche's 2008 work *Video Game Spaces* is a pioneer one, which not only focuses on video game studies, but also looks from the perspective of media studies, performance studies, urban planning and architecture. Remarking the discussion of space in digital media in its title, Nitsche creates a short list of existing literature on the field, including Lefebvre, Norberg-Schulz, Kevin Lynch and Ching, and intends to suggest new principles based on the element of game spaces, connecting various approaches. In this section, these approaches will be further analyzed to develop this thesis's final framework.

In his 1974 book *The Production of Space*, Henri Lefebvre describes the social place with a classification which he calls "*a conceptual triad*" (see Figure 3.1):

- *Spatial practice* is the daily routine of spatial enactors, which is revealed through the physical and experiential deciphering of space
- *Representations of space* which is "[…] tied to the relations of production and to the 'order' which those relations impose, and hence to knowledge, to signs, to codes, and to 'frontal' relations"

- *Representational space* is the space experienced "through its associated images and symbols and hence the space of 'inhabitants' and 'users'"(Lefebvre, 1991).

Figure 3.1: Schematic of Lefebvre's spatial triad.
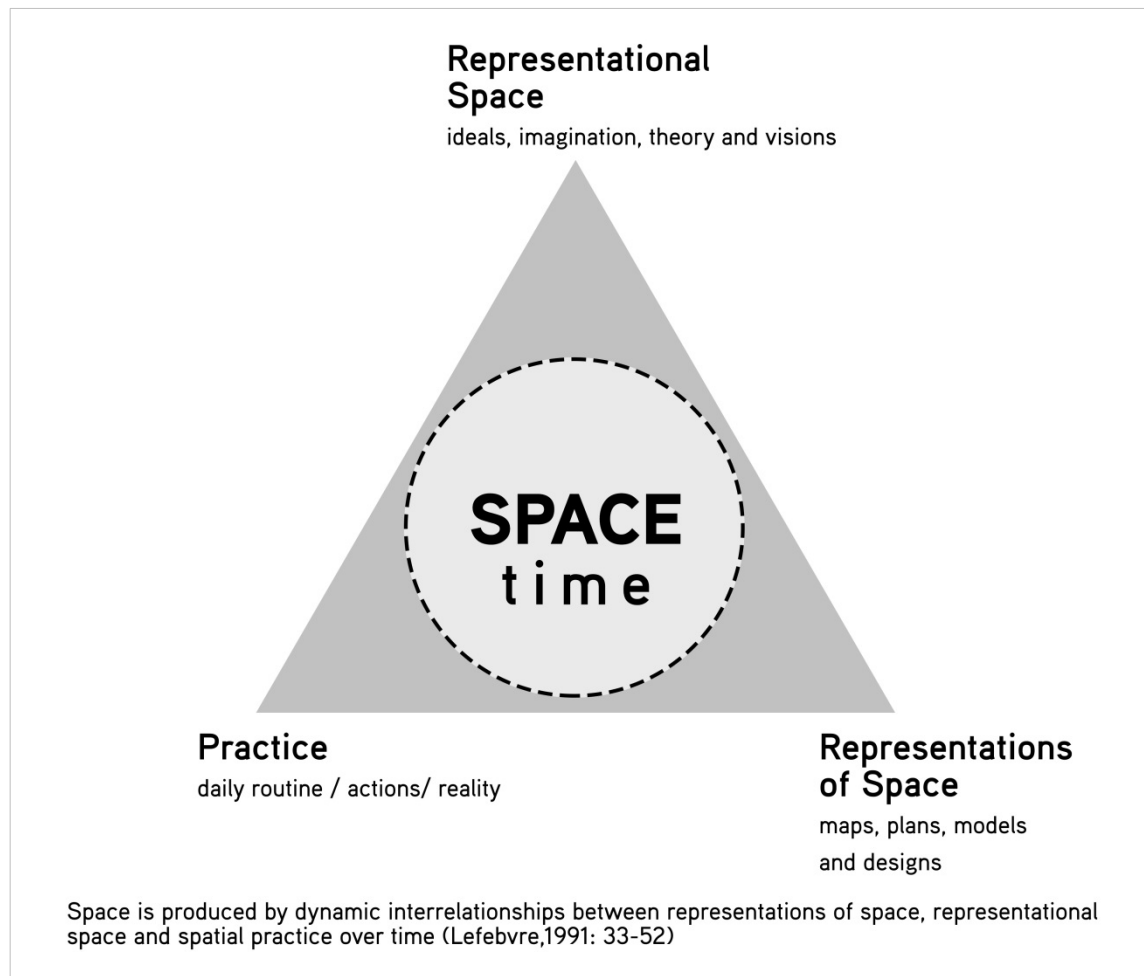
Source: Reproduced from Hannah Anderson's 2003 work applying Lefebvre's *The Production of Space* to *Critical Mass*, an urban cyclist movement. Original image is available at: http://hannahwinkle.com/ccm/Lefebvre.htm

Following a similar division for the video game spaces, Nitsche approaches the video game spaces in three parts:

- *Structure* looks at how 3D space forms the textual qualities of video games considering *rules*, *interaction*, *narrative* and *combining interaction and narrative*.

- *Presentation* concentrates on the role of *moving images*, relationship of *cinema and game spaces*, the use of *sound* and the *effects of narrative filters*.

- *Functionality* refers to the interaction of the game space and the player, and approaches the game world "as a spatially defined condition for interaction" (Nitsche, 2008). In this chapter, Nitsche builds a bridge with architectural theory, then examples spatial structures in video games.

Similar to the philosophical perspective of this thesis, Nitsche also approaches the architectural qualities of video game spaces through Norberg-Schulz's application of Heideggerian phenomenology to architecture.

The following paragraph details Nitsche's research and model. With a Heideggerian approach, Norberg-Schulz divides architectural space into two groups: *human-made spaces* (settlements) and *natural spaces* (landscapes). Characters of the natural places are defined through texture, color, and vegetation. On the other hand, human-made spaces show the human being's understanding and shaping of the natural space. "The existential purpose of building (architecture) is therefore to make a site become a place, that is, to uncover the meanings potentially present in the given environment" (Norberg-Schulz, 1980). So, human-made spaces are based on and always relate with the natural spaces in three different ways:

- The natural spaces can be made more *precise*, be visualized or enhanced, such as forming a path where the natural space indicates a direction
- The natural spaces can be *complemented*, as in the example of building a bridge over a chasm
- Human perception of nature can be *symbolized*, comprehended meaning of a space can be translated into another medium. As Norberg-Schulz explains in his own words: "The purpose of symbolization is to free the meaning from the immediate situation, whereby it becomes a 'cultural object,' which may form part of a more complex situation, or be moved to another place" (1980).

Therefore creating a space is a call for precision, complementation and symbolization of the natural spaces. An understanding as such requires a thorough reading and

comprehension of the space, which leads into spatial recognition and cognitive mapping (Nitsche, 2008).

Written by urban planner Kevin Lynch and published in 1960, The I*mage of the City* is one of the most influential books on mental maps of observers' comprehension of the city. Lynch (1960) extracted five common elements to shape individual cognitive maps (see Figure 3.2):

    i.   *Path* – linear axes, such as streets, trails, and other channels

    ii.   *Edge* – edges with directional qualities, such as buildings, walls

    iii.   *District* – relatively large sections of the cities, identified by its characters

    iv.   *Node* – focal points and intersections

    v.   *Landmark* – identified elements that also serve as reference points.

Figure 3.2: Lynch's five elements of urban cognitive maps.

Path   Edge   District   Node   Landmark
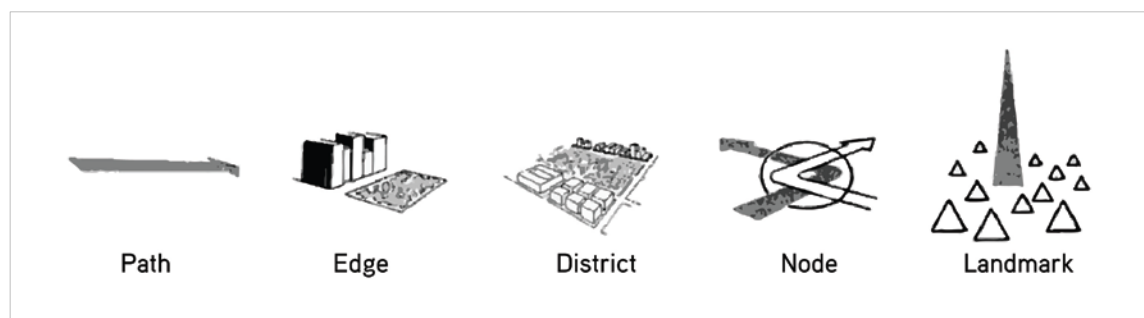
Source: Lynch, K. (1960). *The Image of the City*. Cambridge, MA: MIT Press.

A spatial structure can be identified with more than one of these elements according to the observer's position, or the defining elements can change in different scales. A city that consists of many *district*s can be recognized as a *node* in a larger map. In a similar manner, a bridge can be considered a *path* for those who walk on it, a *landmark* for who view it from afar, and a *node* for who takes photos of the panorama from the bridge in the same time.

Frank Ching, a professor of architecture who is known for his works on architectural design and graphics, is more focused on the visual properties of the *form*, *space,* and

order in architecture. Ching (2007) first introduces the primary elements of form and space, and describes the *spatial relationships* that two spaces may be related to each other (Figure 3.3):

i.   *Space within a space* – a space is contained within a larger space

ii.   *Interlocking spaces* – spaces are partially overlapping

iii.   *Adjacent spaces* – two spaces share a common border

iv.   *Spaces linked by a common space* – relationship of two linked spaces

Figure 3.3: Spatial relationship schemes established by Ching.
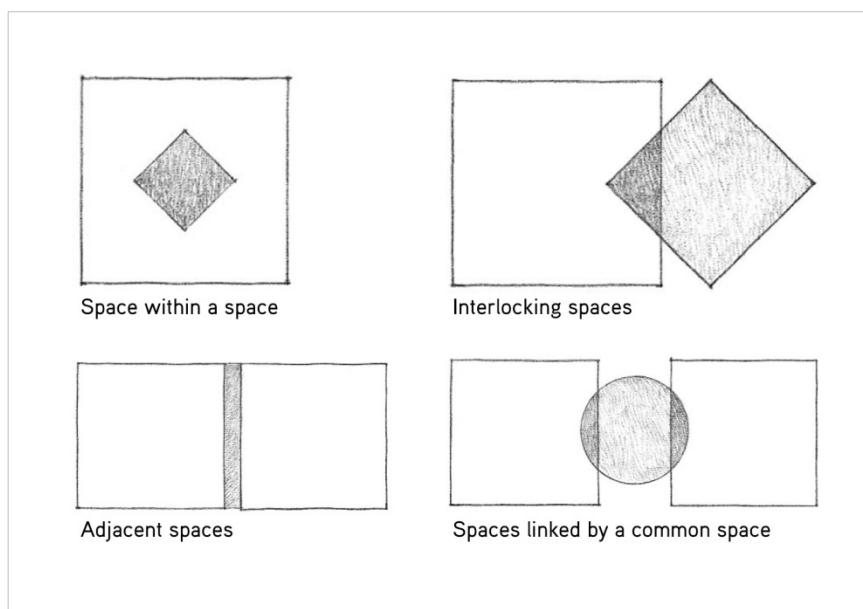
Source: Ching, F.D.K., 2007. *Architecture: Form, Space, and Order* 3rd ed., Hoboken, NJ: John Wiley & Sons, Inc.

Then he (Ching, 2007) defines *spatial organization* schemes that spaces can be organized and arranged (Figure 3.4):

i.   *Centralized organization*

ii.   *Linear organization*

iii.   *Radial organization*

iv.   *Clustered organization*

v.   *Grid organization*

Figure 3.4: Spatial organization schemes established by Ching.
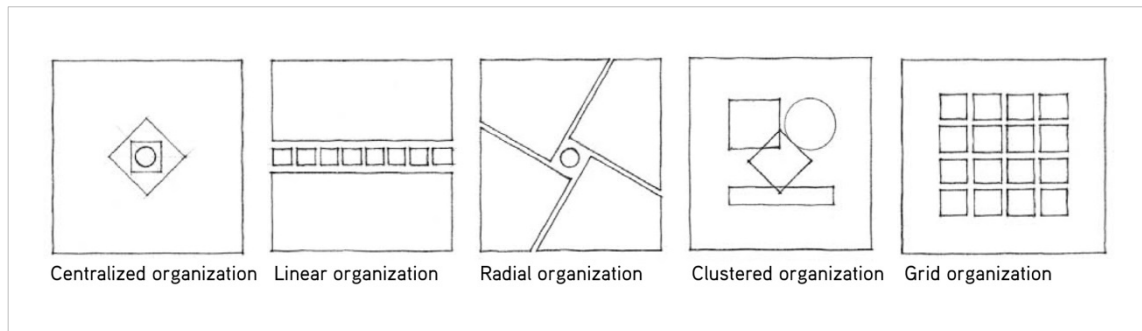
Centralized organization   Linear organization   Radial organization   Clustered organization   Grid organization

Source: Ching, F.D.K., 2007. *Architecture: Form, Space, and Order* 3rd ed., Hoboken, NJ: John Wiley & Sons, Inc.

Employed the geometric basis for the organization of forms and shapes, Ching (2007) introduces additional ordering principles (Figure 3.5):

i. *Axis*– "A line established by two points in space, about which forms and spaces can be arranged in a symmetrical or balanced manner"

ii. *Symmetry*– "The balanced distribution and arrangement of equivalent forms and spaces on opposite sides of a dividing line or plane, or about a center or axis"

iii. *Hierarchy*– "The articulation of the importance or significance of a form or space by its size, shape, or placement relative to the other forms and spaces of the organization"

iv. *Rhythm*– "A unifying movement characterized by a patterned repetition or alternation of formal elements or motifs in the same or a modified form"

v. *Datum*– "A line, plane, or volume that, by its continuity and regularity, serves to gather, measure, and organize a pattern of forms and spaces"

vi. *Transformation*– "The principle that an architectural concept, structure, or organization can be altered through a series of discrete manipulations and permutations in response to a specific context or set of conditions without a loss of identity or concept" (ibid., 339).

Figure 3.5: Ordering principles established by Ching.
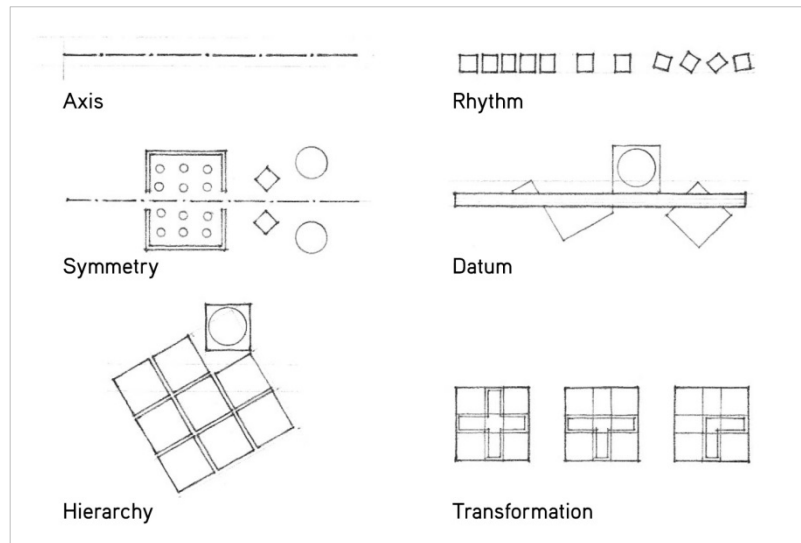
Source: Ching, F.D.K., 2007. *Architecture: Form, Space, and Order.*3rd ed., Hoboken, NJ: John Wiley & Sons, Inc.

Ching's principles and schemes are mostly focused on the formation and transformation of the spaces while Lynch's elements are related to the mental images that these forms evoke in the observer's mind. Figure 3.6 shows a Rome panorama from *Assassin's Creed: Brotherhood*, analyzed with Ching's ordering principles. Figure 3.7 shows the same panorama analyzed with Lynch's five cognitive mapping elements.

In the analysis and design of video game spaces, both approaches have its advantages, and their combination would be helpful (Nitsche, 2008). Ching's ordering principles focuses more on the geometrical information while Lynch's cognitive elements focuses mainly on perception and navigation. Ching's geometrical approach would be more helpful while modeling the 3D assets of a video game space, while Kevin Lynch's cognitive approach has more promises for the design of the evocative and immersive game spaces, which is going to be explored and experienced by an observer. Phenomenology of the video games gains importance once more, because with Norberg-Schulz's terminology, the acts and events *take place* in these virtual immersive *place*s, and addressed to the player's senses.

Figure 3.6: A video game space analyzed with Ching's ordering principles.

Source: Edited image credit: Ubisoft Montreal, 2011. *Assassin's Creed: Brotherhood.*

Figure 3.7: A video game space mapped with Lynch's cognitive elements.
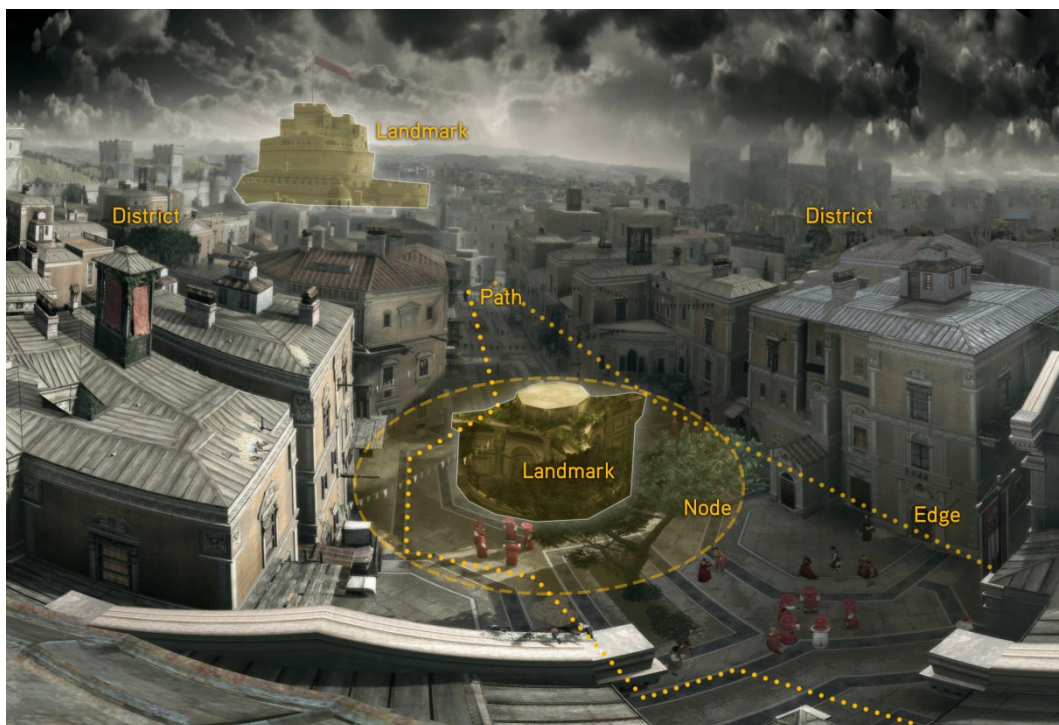
Source: Edited image credit: Ubisoft Montreal, 2011. *Assassin's Creed: Brotherhood.*

Nitsche argues that in addition to Norberg-Schulz's three ways of relation with physical spaces, namely *precision*, *complementation* and *symbolization*, game spaces can be encountered with *destruction* and *construction* of space due to their digital nature (Nitsche, 2008). Players can interact with spaces; create, manipulate, or destroy the digital spaces. Once more temporality of constructive and deconstructive actions gains importance, whether the effects of player are permanent or temporary, one-off or repeated or changed, happened in real-time or another modus, et cetera.

Virtual spaces are free from the limitations of physical spaces, but they have their own limitations. Therefore, while this architectural vocabulary might be useful for video game spaces due their shared qualities with physical world spaces, no single theory can hope an in-depth evaluation of video game spaces (Nitsche, 2008).

As a part of his evaluation of *functionality* of video game spaces, Nitsche proposes three spatial structure typologies and a model for content assembly.

    i.   *Tracks & Rails*–axes that have directional values and define a movement

    ii.   *Labyrinths and Mazes*–a complex track open to exploration with rather less visual cues

    iii.   *Arenas*–open structures with a surrounding enclosure

    iv.   *Driven by Space*–In space-driven model, narrative and possibilities of engagement are directly built into the way spatial structures are assembled.

Nitsche's model creates a typological classification for video game spaces. Although it regards the operational and functional values of spaces; elements like *nodes*, *districts* and *landmarks* are still missing from this model.

When it comes to narrative in cyberspace, Janet H. Murray's 1997 book *Hamlet on the Holodeck*[15] is one of the major works of the field. Murray discusses how the emerging

---

[15] First introduced on *Star Trek: The Next Generation* in 1987, a *holodeck* or a *holographic environment simulator* is a simulated reality facility installed abroad starships and space stations in the fictional *Star Trek* universe. Mostly providing entertainment for the crew, *holodecks* are also used for training simulations and recreating the scene of crime for forensic investigations. The title of Murray's book is a futuristic allusion that with developing digital technologies, holodecks replace the stage of plays and redefine our understanding of narrative.

digital technologies are reshaping the stories and what possibilities they promise for the future of narrative. While Murray discusses *agency*[16], she approaches the digital narrative spaces as *digital labyrinths*. She states that: "Electronic environments offer the pleasure of orienteering in two very different configurations, each of which carries its own narrative power: the solvable *maze* and the tangled *rhizome*" (Murray, 1997).

    i.   *Maze* – "The adventure maze embodies a classic fairy-tale narrative of danger and salvation"(Murray, 1997). Murray gives the example of a palace level from *Arabian Nights* here (ibid., 130). Such scheme can also be seen in most video games, including the series of *Prince of Persia*, where the main character the player operates walks through different rooms and courtyards of the palace, taking the hidden visual hints to navigate and proceed to the next level. Eventually, he defeats the enemies and saves the damsel-in-distress; the same pattern one would expect in a classic tale. Mazes have a goal-driven structure.

    ii.   *Rhizome*–Its name inspired by Deleuze and Guattari's conception of *rhizome*[17], this type of digital labyrinths does not have the linear progression of a book but open-ended. "Full of wordplay and indeterminate events, these labyrinths derive not from Greek rationalism but from poststructuralist literary theory and are unheroic and solutionless. […] they offer no end point and no way out" (ibid., 132).

Murray's division of digital environments is rather operational than visual. However, their operational structure would inevitably reveal itself in the visual language of the story spaces.

In narrative theory, spatiality is often underrated and treated as a static component of the story. Gabriel Zoran's 1984 study *Towards A Theory of Space in Narrative* is a quite

---

[16]*Agency* is the participation and interaction of the audience or the player in immersive narrative environments. In Murray's words, "Agency is the satisfying power to take meaningful action and see the results of our decisions and choices" (1997).

[17] A concept developed by Gilles Deleuze and Félix Guattari, *rhizome* is a model of ideas in which any point may be connected to another point (Deleuze & Guattari, 1987). Deleuze and Guattari oppose the tree-like model of ideas in which the connections follow a linear pattern, branching off at certain points; they propose a root-like model which is non-linear and non-hierarchical.

exceptional one, which aims to present a general model of the structuring of space within the narrative text (Zoran, 1984). Rather than accepting space as a static component of a narrative, Zoran (1984) embraces a spatiotemporal model in which two are entwined and presents the diagram shown in Figure 3.9 to illustrate the transformation of space into the temporal-verbal text, and explains:

> *"The different points of the verbal continuum may refer directly to points in space or to points in the continuum of events, relating to space through spacetime (the chronotopos). The text can refer to space and spacetime units which are large or small, complete or partial, and can structure them in any order and manner it chooses."*

Figure 3.8: Continuum of space-time in Zoran's work.
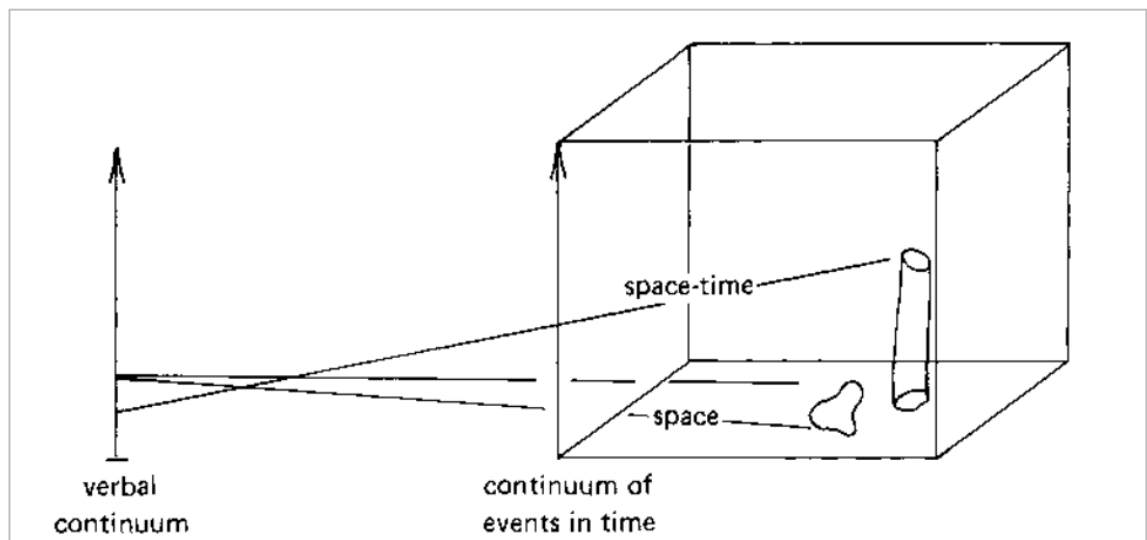
Source: Zoran, G. (1984). Towards A Theory of Space in Narrative. *Poetics Today*, 5(2), 309–335.

From the diagram he presents, Zoran's model distinguishes three different levels of the structuring of space for the written narratives:

i. *Topographical level –* "space as a static entity" (the bottom of the cube)
ii. *Chronotopic level –* "the structure imposed on space by events and movements" (projections of the interior on the bottom of the cube)
iii. *Textual level –* "the structure imposed on space by the fact that it is signified within the verbal text" (Zoran, 1984).

40

According to Zoran, these three levels belong to the reconstruction of the world and "they are always perceived together, one through the other" (ibid., 315-316).

The layered approach on spatiality of narratives interconnected with the temporality is a peculiar one in Zoran's model. However being created for written narratives in 1984, this model does not respond to any technologic and interactive aspects of video game spaces. Compared with Nitsche's study, it has been observed that both of them consider the story space as a reconstruction in the audience's mind, and regard the topographical qualities of the spatial component of a story. However, Zoran's model focuses on the dynamic relationship of space and time better than Nitsche's model, but lacks the way Nitsche's model corresponds to the interactivity and the stories and actions embedded in the spatial entities.

Both in academia and industry of video games, Ernest Adams -a game design consultant, author on game development, and a regular lecturer at the *Game Developers Conference*[18] series- is considered as one of the important authorities of the field of game design. In his influential book *Fundamentals of Game Design,* Adams (2010) lists the essential parts that level designers create as follows:

- *Space in which the game takes place*
- *Initial conditions of the level*
- *Set of challenges within the level*
- *Termination conditions of the level*
- *Interplay between gameplay and story*
- *Aesthetics and mood of the level*

Adams (ibid., 365-369) explains universal and genre-specific design principles for level designers, then emphasizes that "the layout of the space significantly affects the player's perception of the experience", and gives a list of seven common patterns of layouts for level design:

---

[18] The *Game Developers Conference* or *GDC* is the largest annual gathering of professional video game developers since 1988.

      i.   *Open layouts*

     ii.   *Linear layouts*

    iii.   *Parallel layouts*

    iv.   *Ring layouts*

     v.   *Network layouts*

    vi.   *Hub-and-spoke layouts*

   vii.   *Combinations of layouts*

Adams reminds that this list introduces the common patterns emerged over the years in simplified form, and the designers should not hesitate to create any layout the game needs (ibid., 365). It is peculiar that the list also gives hints about possible uses and genre tips for the level designers, as shown in Table 3.1.
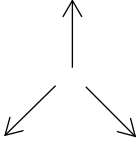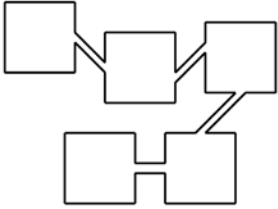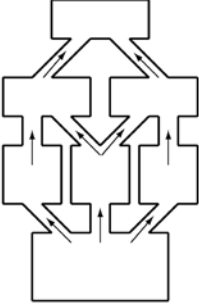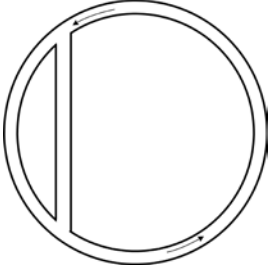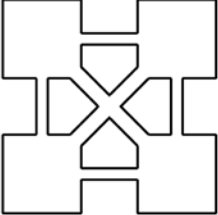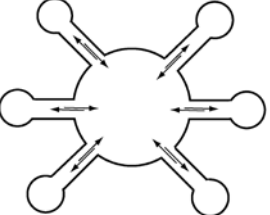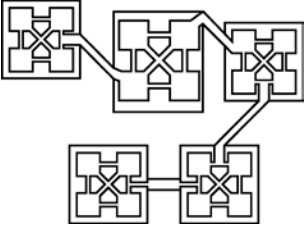
While providing a good source for combination of different elements, Adams' layouts cannot be considered complete since there are always new layout possibilities as he remarks. Therefore, a simple model which focuses on the main spatial elements, and leaves the combinations to the designers and observers would be preferred in this the scope of this thesis.

After examining all these existing models, it has been decided that a model for analyzing and creating video game spaces should focus on:

- Spatial structures
- Functionality
- Interaction
- Audiovisual inputs

This new model, developed in the next chapter, should also approach the video game environments as a spatiotemporal complex.

Table 3.1: Ernest Adams' list of common patterns in level layouts.

OPEN LAYOUTS

- Allow unconstrained movement
- Correspond to the outdoors
- Used in war games and role-playing games

LINEAR LAYOUTS

- Require player to move in a fixed sequence
- Player can move only to next or previous area
  Used traditionally in side-scrolling action games and rail-shooters

PARALLEL LAYOUTS

- Modern variant of linear layouts
- Variety of paths can go through the level
- Can reflect a foldback story structure

RING LAYOUTS

- Path returns to its starting point
- Oval tracks or twisting road-racing tracks are rings
- Used for racing games

NETWORK LAYOUTS

- Spaces connect to other spaces in different ways
- Give the player freedom to take any path
- Stories must be able to tolerate player experiencing events in any sequence

HUB-AND-SPOKE LAYOUTS

- Central hub is usually a safe zone
- Provides some choice of where to go
- Lock off some areas to control sequence a little

COMBINATIONS OF LAYOUTS

- Combines aspects of several layout types
- Role-playing games and adventure games often use combination layouts

Source: Adams, E. (2010). *Fundamentals of Game Design*. Berkeley: New Riders.

1.5. TIME IN VIDEO GAMES

The most common approach on time in narrative theory is to divide the temporal modes of narrative into two:

i. *Story Time* – the timeline in which the acts and events of the story take place
ii. *Discourse Time* – time passes by when the story is being told

Teresa Bridgeman (2007), who also uses the same separation, explains the distinction as follows:

> *"The essential distinction here is between the "story" as the basic sequence of events that can be abstracted from any narrative telling and the "discourse" as the presentation and reception of these events in linguistic form (in other words, the act of writing resulting in the written text and the act of reading that text)."*

When it comes to time in narrative theory, one might suspect that there is a silent agreement on the competence of Genette's work, which also separates the *story time* and *discourse time*[19]. First published in 1980 by French literary theorist Gérard Genette, *Narrative Discourse: An Essay in Method* is one of the most distinguished books of narrative theory. To analyze the syntax of narratives, Genette (1980) uses five main concepts:

i.   *Order* – the relation between the order of events happened in story time versus they are presented in the discourse time
ii. *Duration* – the relation between the duration of events happened in story time versus they are presented in the discourse time
iii. *Frequency* – the relation between how many time the events happened in story time versus how many time they are presented in the discourse time
iv. *Mood* – the mood created in the verbal representation of the story, depended on the distance and perspective of the narrator
v.   *Voice* – who narrates the story, and from where the story is narrated

---

[19] Gerard Genette states that the temporal duality is referred by German theoreticians "as the opposition between *erzählte Zeit* (story time) and *erzählzeit* (narrative time), is a typical characteristic not only of cinematic narrative but also of oral narrative […]" (Genette, 1980).

The first three concepts of Genette are closely related with the temporality of a narrative.

As cited by Wei et al. (2010), David Herman develops the concept of *fuzzy temporality* to expand Genette's study which is based on bivalent tempi [20]. The term fuzzy temporality takes inspiration from the concept of "fuzzy logic" which enables the variables to have a truth value that ranges between 0 and 1. According to Herman (2002), story events can be ordered in four ways:

- *Full ordering* – "it is possible to decide whether one [of two events] is earlier, later, or contemporaneous with the other."
- *Random ordering* – "all mathematically possible arrangements are equally probable."
- *Alternative or Multiple ordering* – one ordering is more probable than the other
- *Partial ordering* – some events "[…] some elements of the set can be uniquely sequenced relative to all others, some only relative to some others, and some relative to none."

The concept of *fuzzy temporality* is especially important in digital narratives, where the level of interaction is higher, and the players would like to have effect on the diegetic ordering of the game events.

There are also works focused on video game time. Similar to the prevailing method of approaching time as story time and discourse time duality, Wei et al. (2010) cite that Markku Eskelinen defines two tempi:

i. *User time* – the time spent by the player to perform actions
ii. *Event time* – the period of "happenings" of the game

---

[20]*Tempi* is used as plural of *tempus*, a temporal mode such as *story time* and *discourse time*.

However, both time frames of Eskelinen are based on a single time scheme, therefore, Genette's temporal categories are not effective here (ibid., 3).

Jesper Juul (2011)also adapts the temporal duality to video game time:

i. *Play time* – the real time spent by the player playing the game
ii. *Fictional time* – the time passing in the fictional world of a game during gameplay, a projection of the real play time.

Based on Juul's time frames, Michael Hitchens (2006) presents a new model for game time:

i.   *Playing Time*– the objective real world chronological time experienced by a player during and between play sessions
ii. *Game World Time*– chronological time within the game worlds
iii. *Engine Time*– the objective chronological *real world time in which a game engine executes*
iv. *Game Progress Time* – an abstract measure of time tracking movement towards game completion and allowing events to be related in terms of happening order.

As a part of their work for the *Game Ontology Project*[21], Jose P. Zagal and Michael Mateas propose four temporal frames:

i. *Real-world time* – established by the set of events taking place in the physical world around the player
ii. *Game world time* – established by the set of events taking place within the represented gameworld

---

[21] Lead by Michael Mateas, *The Game Ontology* projectaims to develop a design language to facilitate the design and analysis of video games. Website of the project at http://www.gameontology.org/ was unavailable when this thesis was written, but a mindmapping of their vocabulary work was available at: http://www.mindmeister.com/324669511/game-ontology-project.

iii. *Coordination time* – established by the set of events that coordinate the actions of multiple players (human or AI) and possibly in-game agents

iv. *Fictive Time* – established through the application of socio-cultural labels to a subset of events (e.g. Labeling the rounds in a game as "days" or "years").

Comparing these models, it has been decided that the models that mainly rely on the temporal duality of real time and fictive time –Eskelinen's and Juul's– do not correspond the temporality of video games profoundly. The models that use multiple time frames –works of Hitchens, and Zagal et Mateas– seem consistent in themselves. However, one might argue if they could be considered universal for video game times, since their temporal classifications are "somewhat arbitrary" and "are not clearly defined" (Wei et al., 2010). Hitchens describes his concept of playing time and Juul's play time "are not completely equivalent" (Hitchens, 2006). Therefore, before adapting an existing concept into another framework, each tempus should be redefined within the context of the new framework.

Genette's concepts of *order*, *duration* and *frequency* seems promising for a video game specific spatiotemporal model, but again, all the temporal frames need to be redefined and adapted for video games. Also, the aspect of agency, flexible operational time, and selective order of video game events needs to be added to the framework, which is going to be considered while developing the new framework in the next chapter.

4. DEVELOPMENT OF A FRAMEWORK

Architecture constitutes the *place* of video game events. The video game designers use elements of architecture to construct the virtual space in which the events of the interactive story take place. The requirement of space reveals that the player's experience and comprehension of the immersive game world to be vastly a problem of architectural design. Then what architectural characteristics do video game spaces have, how can the designers manipulate the spatial design process accordingly? How can architectural theory help to form a framework pursuing these characteristics?

In the previous chapter, vitality of a spatiotemporal approach on video game spaces was explained, and the background of the studies on this field was exemplified. Now, a complementary and hybrid framework has been developed with the help of these existing theories in this chapter. Furthermore, this framework has been visualized with distinct pictograms.

Without drawing a border line between the two, the framework considers the spatial and temporal characteristics of video games (see Table 4.1):

Spatial Characteristics:
  i.   Spatial Structures
  ii. Spatial Functionality
  iii. Interactive Structure
  iv. Sensuousness

Temporal Characteristics:
  i.   Sequence Order
  ii. Narrative Speed
  iii. Frequency
  iv. Storytelling

The player's experience of a video game, as explained in Chapter 2, is a reconstruction of the spatial and temporal phenomena manifested by the video game in the player's

perception (see Figure 2.1). This manifestation is revealed to two different subjects: to the *persona*[22] (pseudo-subject) and to the player (subject).

This thesis examines these revelations under three categories: [1] *Player revelation* is when something is revealed to the player only. Stamina level indicators and some level maps can be given as examples to player revelation. [2] *Character revelation* is when something that is revealed to the character only. When something that had been known by the player already is revealed to the character, character revelation happens. [3] *Mutual revelation* happens when something is revealed to both player and character. Bullet counter in many FPS games is an example of mutual revelation.

Figure 4.1 shows the user interface in Crysis 2. The player plays as Alcatraz, a supersoldier augmented with the Nanosuit. The energy level, mini-map and weapon specializations on the interface comes from the Nanosuit, seen by both Alcatraz and the player, therefore it is a *mutual revelation*. The message "Press F" is, however, an instruction for only the player, therefore it is a *player revelation*.

Figure 4.1: User interface in Crysis 2.

Source: Crytek, 2011. *Crysis 2*.

---

[22]*Avatar* or the in-game character.

Table 4.1: Spatial and temporal characteristics that affect narrative and gameplay experience.

SPATIAL		TEMPORAL	
SPATIAL STRUCTURES	Paths & Trails	SEQUENCE ORDER	Agent's Choice
	Zones & Platforms		Flashback
	Rhizomes & Networks		Flashforward
SPATIAL FUNCTIONALITY	Spatial Repulsion		Achrony
	Spatial Appeal	NARRATIVE SPEED	Scene
	Spatial Puzzle		Summary
INTERACTIVE STRUCTURE	Character Interaction		Stretch
	Object Interaction		Ellipsis
	Navigation		Pause
	Objectives & Challenges	FREQUENCY	Singular
SENSOUSNESS	Perspective (Camera)		Iterative
	Color		Repetitive
	Materiality		Multiple
	Sound	STORYTELLING	Linear
	Controls and Body Movement		Branching
	Interfaces		Foldback
			Emergent

4.1. SPATIAL CHARACTERISTICS

"The approaches to space in narrative theory are not as consistent as those to narrative time because of the lack of a rigorous model like Genette's" model in narrative time (Wei et al., 2010). Therefore, the proposed framework for spatial characteristics is a rather hybrid and combined work which has a fourfold structure. These four layers are listed as follows:

    i.   *Spatial Structures*
   ii.   *Spatial Functionality*
  iii.   *Interactive Structure*
  iv.   *Sensuousness*

Starting from the structure-only layer, each layer gets more interactive and perceptional elements involved than the layer before, creating a complete and evocative spatial environment when superposed in the end.

4.1.1. Spatial Structures

Spatial Structures are the first layer of the spatial characteristics. This layer is where the structural components of a video game are. Figure 4.2 shows the spatial structures on the sample level created to illustrate the framework of this thesis.

    i.   *Paths and Trails*
   ii.   *Zones & Platforms*
  iii.   *Rhizomes & Networks*

Figure 4.2: Spatial structures shown in the sample video game level.
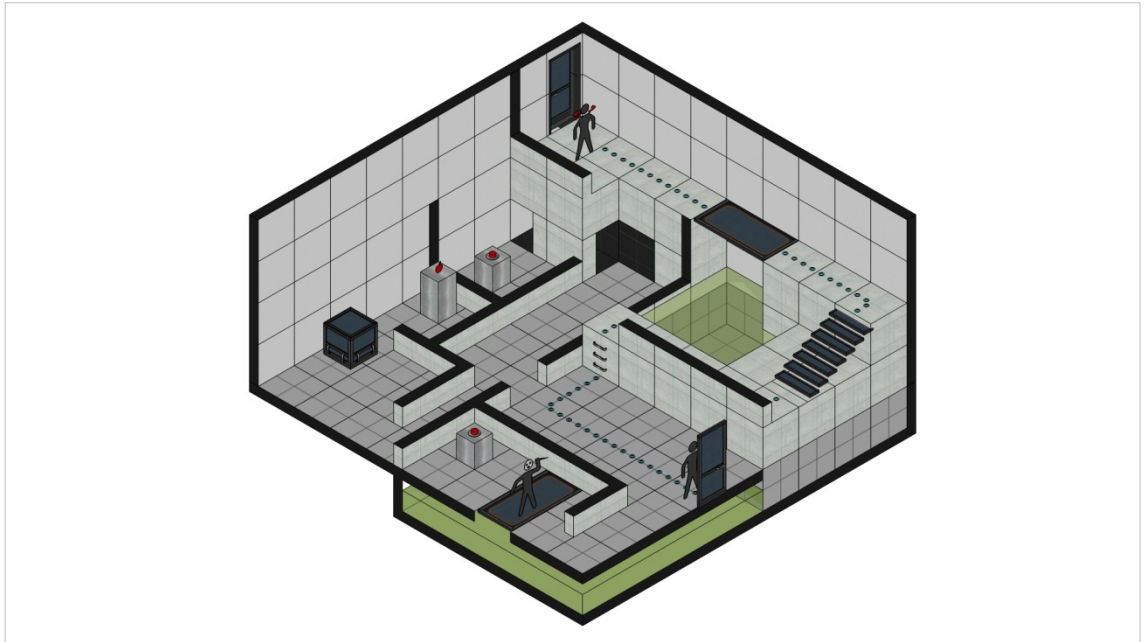
In Zoran's terminology, this first layer of *spatial structures* would be considered *topographical level*. While preparing a model for the characteristics of spatial structures, Kevin Lynch's elements of cognitive mapping, and Michael Nitsche's model were used as main references.

Nitsche's *tracks and rails*, Lynch's *paths*, *edges*, and the *nodes* alongside the *paths*, correspond to the *paths and trails*. *Rhizomes and networks* are similar to the concept of labyrinths and mazes in Nitsche, but they also embrace the operational configurations of *maze* and *rhizome* in Murray's work. *Zones and Platforms* differ from Nitsche's *arenas*, they not only might not be visually as open as an arena, but also has the distinctive characteristic identities of *districts* and *nodes* in Lynch's cognitive elements.

Paths and trails are linear axes that have directional values, as shown in Figure 4.3. *Paths and trails* can consist of the walking ways, race tracks, and even the floating paths that the player follows. Definition of a movement in the video game space, from point A to point B is the distinctive characteristic of paths and trails. Typologically they define a rather narrow and road-like space.

Figure 4.3: Paths and trails shown in the sample video game level.
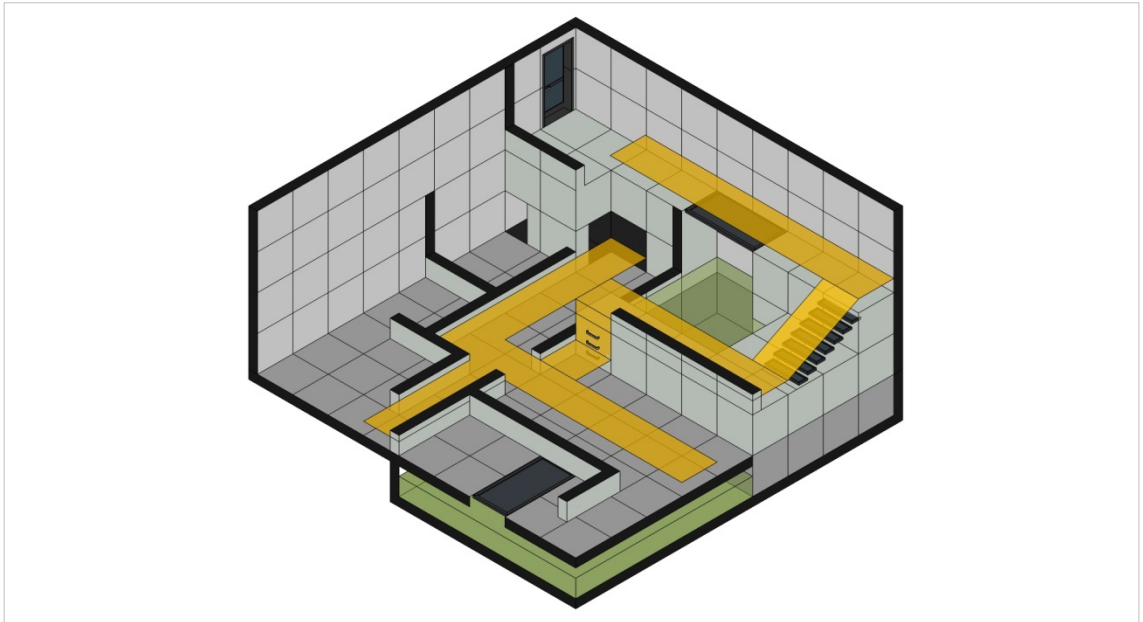
Zones and platforms are focal points that are identified by its characters. They are likely to be in the intersections of *paths and trails*. Being a place of an objective, a different mood, or a point that triggers a game event is the distinctive characteristic of *zones and platforms*. Typologically they define a rather large and often open space (see Figure 4.4).

Figure 4.4: Zones and platforms shown in the sample video game level.
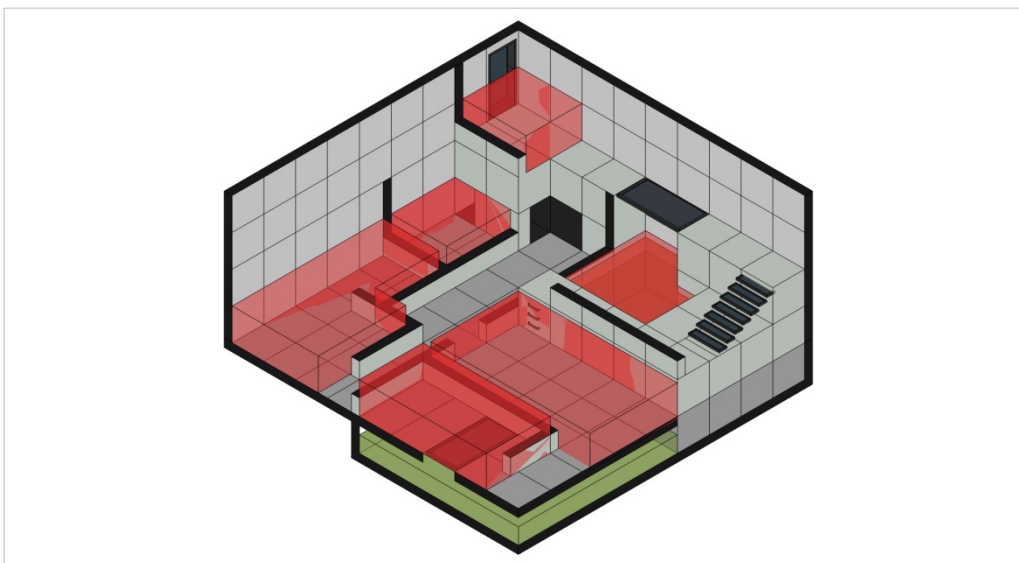
Rhizomes and networks are complex tracks that often consist of various combinations, intersections, and superposition of *paths & trails* and *zones & platforms*. They have a *maze* structure where the player walks through one place to another to achieve a predetermined goal, or a *rhizome* structure which is open-ended and player driven in emergent narratives (mostly in Massive Multiplayer Online games). Typologically they define a labyrinth-like complex place with less visual clues, which encourages the player to explore and experience the space in-depth (see Figure 4.5).

Figure 4.5: Rhizomes and networks shown in the sample video game level.
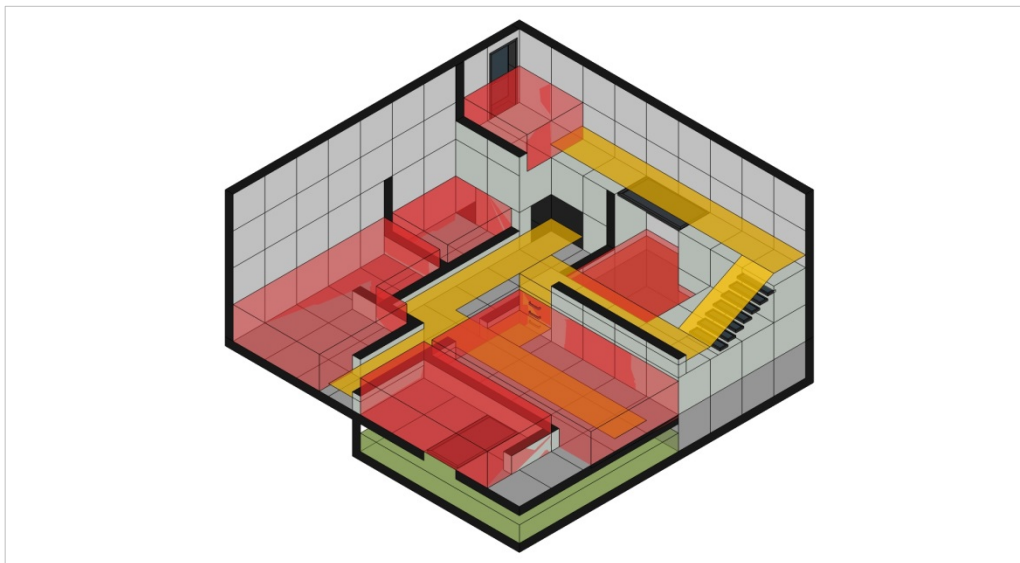
4.1.2. Spatial Functionality

Spatial Functionality is the second layer of the spatial characteristics. This layer is where the functional meaning of a video game space reveals. These functions can be enabled with meanings given to space and experiences of the player.

Being completely based on the players' cognition of the space and having its meaning through the players' reconstruction of the space in their mind, spaces essentially have three functional meanings for the players:

i. *Spatial Repulsion* makes the player keep away from that space. Zones with traps, enemies or harder navigation paths are the repulsive spaces.

ii. *Spatial Appeal* attracts the player to that space. Zones with objectives, bonuses or other valuable gameplay elements are appealing places.

iii. *Spatial Puzzle* is used to make the navigation through that space unclear for the player. Therefore, the players are prompted to explore the space, solve the spatial puzzle and complete their track through the level. Usually visual hints are used to help the players to disclose their path.

4.1.3. Interactive Structure

Interactive structure is the third layer of the spatial characteristics. This layer is where the player's interaction with the space starts. Player interacts with the objects and other characters in the space, receives objectives and navigates through the space.

Along with the second layer, this third layer shows how the design of space can directly affect both the ludic and narrative qualities of the video game. Interaction types are listed as follows:

i. *Character Interaction* – player's interaction with other players' *persona*s or non-playable characters (NPC) operated by the computer

ii. *Object Interaction* – player's interaction with the scripted or static objects in the game world

iii. *Navigation* – player's navigation in the game space

iv. *Objectives & Challenges* – the gameplay elements which describe the mission in the game

4.1.4. Sensuousness

Sensuousness is the fourth and the final layer of the spatial characteristics. In this layer, the players are inside the video game space via *avatars* or *personas*, and the

reconstruction of the game world in their mind is created with the audiovisual sensory inputs of the spatial setting.

All other spatial characteristics can be preliminarily discussed in the design process with conceptual representations. However, this final layer is related to the sensuous experience of the player, it cannot be fully understood without insideness. The elements of sensuousness are listed as follows:

i.   *Perspective and Camera*

ii.   *Materiality*

iii. *Color*

iv.   *Sound*

v.   *Controls & Body Movement*

vi.   *Interfaces*

These elements are considered to be components of the sensuous experience of the player.

4.2. TEMPORAL CHARACTERISTICS

In the previous chapter, while different theoretical approaches on the use of time in narratives were discussed, it has been observed that the relationship between *discursion time* and *story time* is a prominent one. However, it is also crucial that none of the existing approaches put emphasis on the effects of interactivity enough. In this thesis, this duality is renamed to *playing time* versus *story time* while paying attention at the fundamental differences that interactivity caused in the temporal dynamics with two additional temporal modes: *game progress time* and *user created time*.

The proposed temporal model used in the framework (see Figure 4.6) is created considering the models of Genette, Bridgeman, Herman, Eskelinen, Juul, Hitchens, and Zagal &Mateas, which is explained in Chapter 3.

i.   *Playing Time* – the real world time that passes when the game is played

ii. *Story Time* – the progression of the predetermined story timeline

iii. *Game Progress Time* – the separate progression of game goals

iv. *User Created Time (Impromptu)* – the montage of story world events created by the player

Figure 4.6: Narrative time frame for video games
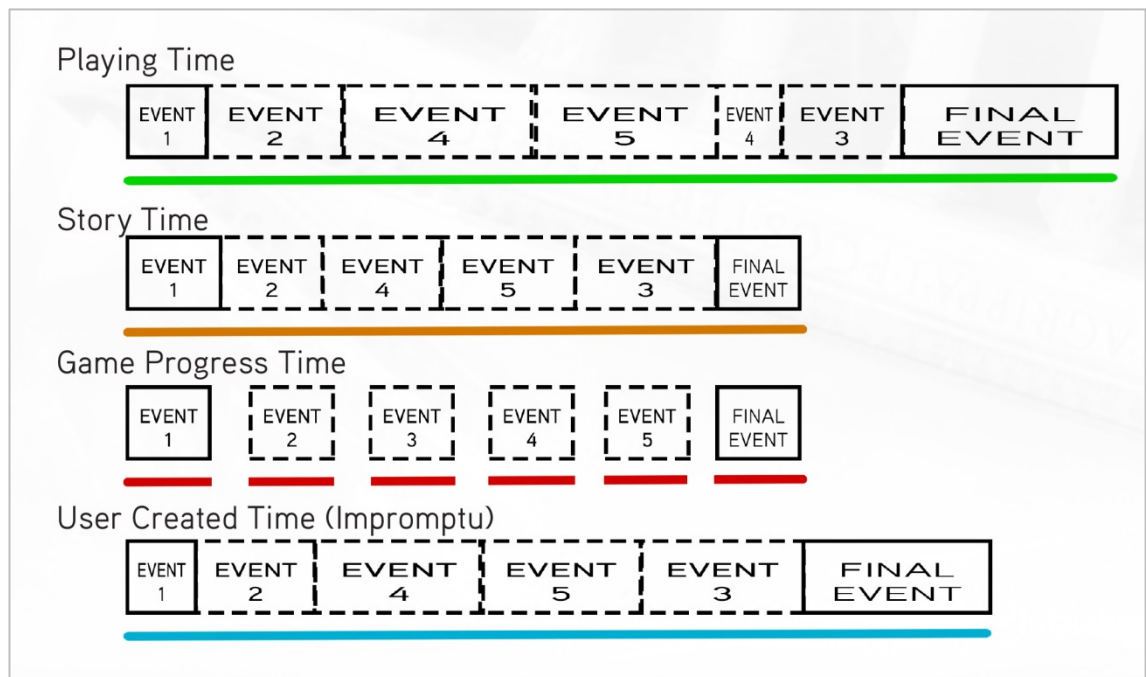
Based on this narrative time frame, temporal characteristics of a video game are listed as:

i.   *Sequence Order*

ii. *Narrative Speed*

iii. *Frequency*

iv. *Storytelling Structure*

First three characteristics are adapted from three of Genette's concepts of narratology: *Order*, *Duration* and *Frequency* (1988), examining a previous adaptation of the theory to digital game storytelling made by Wei et alii (2010).*Storytelling Structures* are taken from Ernest Adams' classification of story structures(2010).

4.2.1. Sequence Order

In Genette's narrative theory, *Order* stands for the chronological order of events in the story world (*story time*) compared to the order of the events narrated in the real world (*discursion time*). Respectively what is meant by *sequential order* in this thesis is the relation between the occurrence of events in *story time* and *game progress time* versus the order they are represented in the *playing time* and *impromptu*.

Manipulating how the story unfolds, temporal order strongly affects the mental reconstruction of the events in the player's mind. Therefore, order is a very fundamental element of the storytelling.

Sequential order can be classified as follows:

i.   *Agent's choice* – As discussed in the previous sections, *agency* stands for the interventions of the narrator-audience, in video games the players themselves, in the story time. Video games can give the players the flexibility of choosing the occurrence order of several events, as discussed under *Storytelling Structure*. Also, the player can choose to replay, pause and skip an event, or die several times and create a gap between *playing time* versus *story time* and *impromptu*. This effect of the player in the sequential order of events is called *agent's choice*.

ii. *Flashback*, or *analepsis,* is a temporal device which is used to unfold the events that happened in the past of the *story time*. If a flashback is narrated to the players directly,

iii. *Flash-forward*, or *prolepsis*, is when an action is represented in the narrative before its time. Similar to the flashbacks, flash-forwards can cause a *player revelation* or *mutual revelation*.

iv. *Achrony* is the temporal situation of the acts or events that do not have a specific temporal location in the *story time* or *game progress time*. They can be represented or played, when the player wishes; therefore, their temporal order in the story is decided in the *playing time* and can be represented on the *impromptu* in various orders.

4.2.2. Narrative Speed

Narrative speed is a concept derived from Genette's conception of *duration,* and concerns the comparison between the duration of the events in the game world (*story time* and *game progression time*) and the duration of the events presented in the real world (*playing time* and *impromptu*).

In all kinds of narratives, it is a must to use different narrative speeds as a temporal device. If every story was told real-time they would take forever to finish. Since there is no objective way of measuring the narrative speed, Bal (2009) proposes five speeds, relative to the duration of the events represented in the narrative. These narrative speeds are listed as:

  i.   *Scene* is the most common narrative speed in video games, in which acts or events takes the same duration in the *playing time* and the *story time*.

  ii.   *Summary* is when something that takes time to happen in the story world (*story time* and *game progress time*) is represented for a shorter duration in the *playing time* and *impromptu*.

  iii. *Stretch* is the opposite of *summary,* in which something that happens quickly in the story world (*story time* and *game progress time*) takes more time in the *playing time* and *impromptu*.

  iv.   *Ellipsis* happens when acts or events in the storyline (*story time*) is skipped in *playing time* and *impromptu*. The *ellipsis* does not necessarily effect *game progress time*.

  v.   *Pause* – Different than the pauses happen by the choice of the player when they want to take a break, *pause* is a narrative speed when the events of the storyline (*story time)* is paused in *playing time*. The *pause*s can be excluded from *game progression time* and player's *impromptu* since they have no operational value.

4.2.3. Frequency

Frequency is derived from Genette's concept of the same name and concerns the relationship of the number of times events happened in *story time* and number of times it was presented in *playing time*.

Taken from Genette's narrative theory, frequencies can be listed as:

i. *Singular* frequency occurs when an event occurs once in *story time* and be narrated once in *playing time*.

ii. *Iterative* frequency occurs when an event occurs multiple times in *story time* and is presented once in *playing time*.

iii. *Repetitive* frequency occurs when an event occurs once in *story time* and is presented multiple times in *playing time*.

iv. *Multiple* frequency occurs when an event occurs multiple times in *story time* and is presented multiple times in *playing time*.

4.2.4. Storytelling Structure

Storytelling structure of a video game is not only a temporal narrative order, but also a defining element of the gameplay. Depending on how linear the story is, the level of agency and interaction possibilities of the player changes. The framework endorses Ernest Adams' classification of storytelling engines:

i. *Linear* – the players cannot change the story, agency is limited, the challenges are part of the story

ii. *Branching* – provides different experience when different choices are made, offers more agency; the players have an immediate, deferred, or cumulative effect on the game

iii. *Foldback* – the story branches, but the branches fold back into a single inevitable event; a compromise between *linear* and *branching* stories, *foldback* stories offer more agency than the linear stories

iv.   *Emergent* – storytelling entirely depends on the player and the in-game actions without a predetermined or scripted event, agency is at the maximum level, not common in adventure video games (Adams, 2010a).

4.3. PICTOGRAPHIC VISUALIZATION

In the analytical framework, each spatial and temporal characteristic has three to six subcategories defining a typology or setting in the video games. These characteristics and subcategories are visualized with special pictograms designed for each title, as seen on Figure 4.7.

Figure 4.7: Pictograms designed for framework characteristics
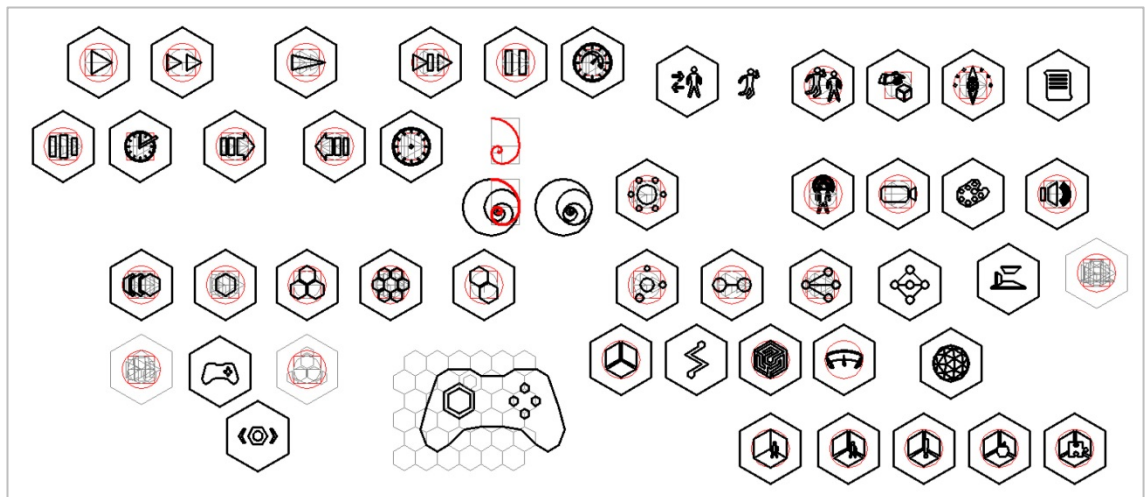
4.3.1. Design of the Pictograms

The pictograms of the framework are hexagonal icons, which have the same template for each characteristic to be represented with a particular symbol. Iconic quality of the pictograms makes the concepts easier to comprehend, recall and illustrate on video game analysis and design schemes.

Figure 4.8 shows in detail how the pictograms designed. The first illustration shows the construction lines of a hexagonal pictogram. Firstly, the main shape and proportions are

determined on this stage. The second illustration shows an empty hexagonal shield and highlights the circle that each pictogram's own illustration should be placed. The third illustration shows a red shield pictogram, which means it belongs to the main categories e.g. *interactive structure*. The fourth illustration shows a blue shield pictogram that belongs to the subcategories e.g. *object interaction*.

Figure 4.8: Development of the pictograms

The hexagonal outer shields of the pictograms enable various combinations to create patterns. These patterns can lead to further analytical reading on which combinations can be considered more successful or which certain combinations enable what kind of impressions, as shown in Figure 4.9, a screenshot from *THROWN* shown with the framework.

Figure 4.9: Hexagonal pictograms creating distinctive perceptional patterns.

The readings, insights and renditions of the framework can be applied to design process of video games and architecture. The pictographic framework itself also can be utilized as a tool in video game design.

4.3.2. The Pictographic Framework

Figure 4.10 shows the spatial and temporal frameworks explained and illustrated with the pictograms.

This framework and the proposed pictographic visualization has been applied to analysis of selected video games and used as a design tool for the sample level in the next chapter.

Figure 4.10: Pictograms of the framework
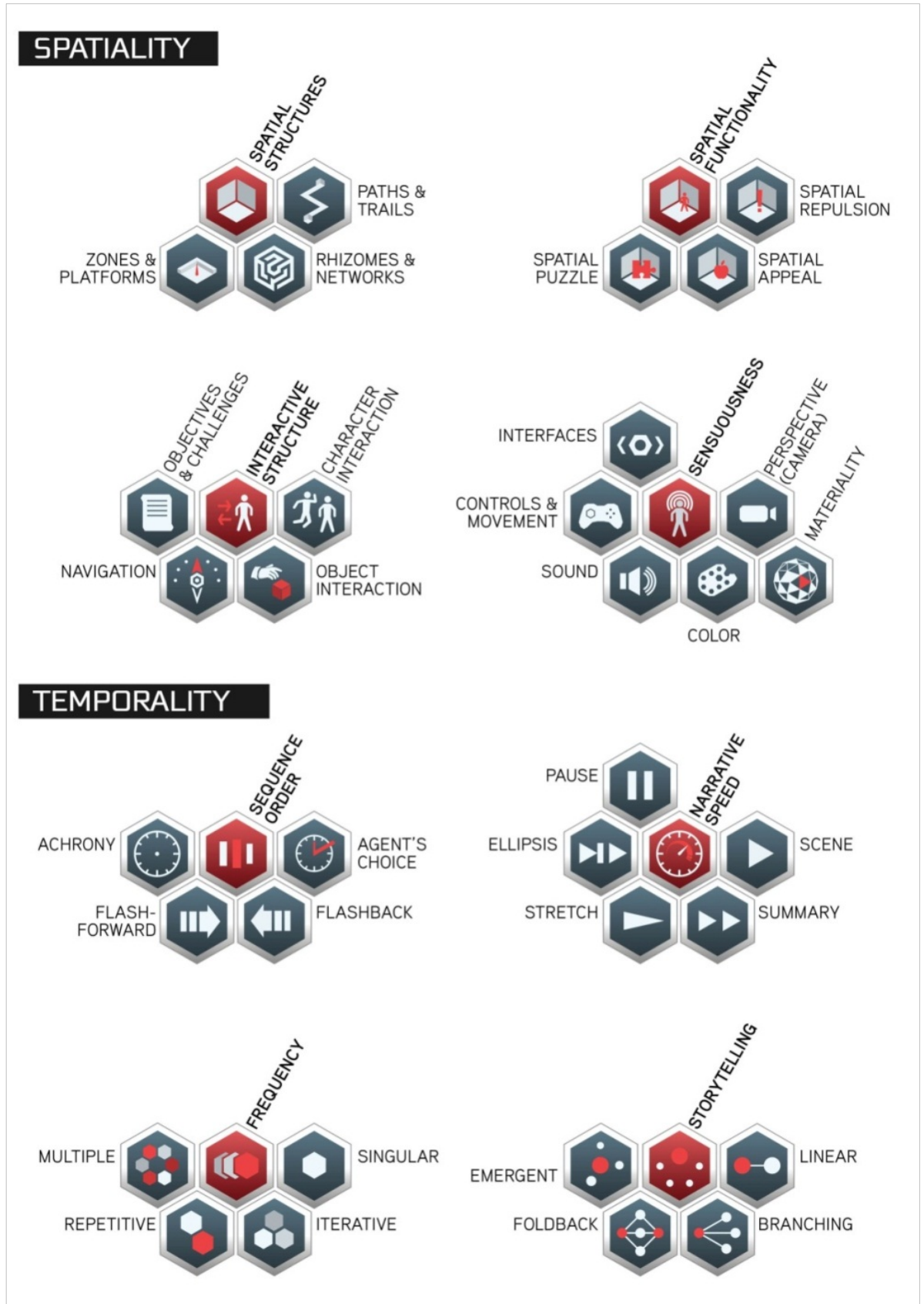
5. ELABORATION OF THE FRAMEWORK AND ANALYSIS OF CASE STUDIES

In this chapter, the characteristics and the categories of the framework developed in the previous chapter have been illustrated with examples from video games. Then, the selected two levels, *At Last We're Here* from *Prince of Persia: The Sands of Time and The Prince's Banquet* from *Assassin's Creed: Revelations*, has been analyzed using the framework. Finally, the framework has been used to design a level for *THROWN: Geworfen*, a video game which is being developed by the author.

5.1. ELABORATION OF THE DEVELOPED FRAMEWORK

In this section, the characteristics defined in the framework will be further elaborated with examples from video games. Most of the examples are selected from the *Prince of Persia* and *Assassin's Creed* series to cohere with the case studies analyzed in the next section.

SPATIAL STRUCTURES

Spatial structures define the environmental context of the video game space. As Nitsche explains, spatial structures can provide more reliable references for the player to locate, navigate and orientate themselves since the temporality of video games are flexible (2008). The movement and operational actions hinted by the *spatial structures* helps the plot to develop. Moreover, orientation and navigation of a video game space is also embedded in the typology of spatial structures.

PATHS & TRAILS

Paths and trails are typologically long, narrow and linear spaces that hint a movement in one or two directions. The movement enabled by *paths and trails* can happen in a

single, three or any of two-dimensional axes. Walking ways and race tracks are the paths and trails where the navigation is primarily on x and y axes. Figure 5.1 shows a chariot chase path from *Assassin's Creed: Revelations*.

Elevators are paths in which the primary motion is on z axis. Figure 5.5 shows a raising platform from *Prince of Persia: The Sands of Time*.

Floating paths that the player follows while flying are instances of paths and trails in which the navigation is on all three x, y, and z axes. Figure 5.2 shows a flying path from *Assassin's Creed II*, where the main character tests Leonardo da Vinci's flying machine in Venice in 1485.

Continuity of the movement is essential for paths and trails; therefore teleportation does not interrupt a path. Figure 5.3 shows a path from *Portal 2*, in which the spatial continuum is obtained with a portal between two different surfaces.

Figure 5.1: A chariot chase path from Assassin's Creed: Revelations.

Source: Ubisoft Montreal, 2012. *Assassin's Creed: Revelations*.

Figure 5.2: The floating path of the flying machine from Assassin's Creed II.

Source: Ubisoft Montreal, 2010. *Assassin's Creed II*. Retrieved
from: http://kotaku.com/5285165/assassins-creed-2-screenshots-take-flight/

Figure 5.3: Continuity of path is obtained with portals in Portal 2.
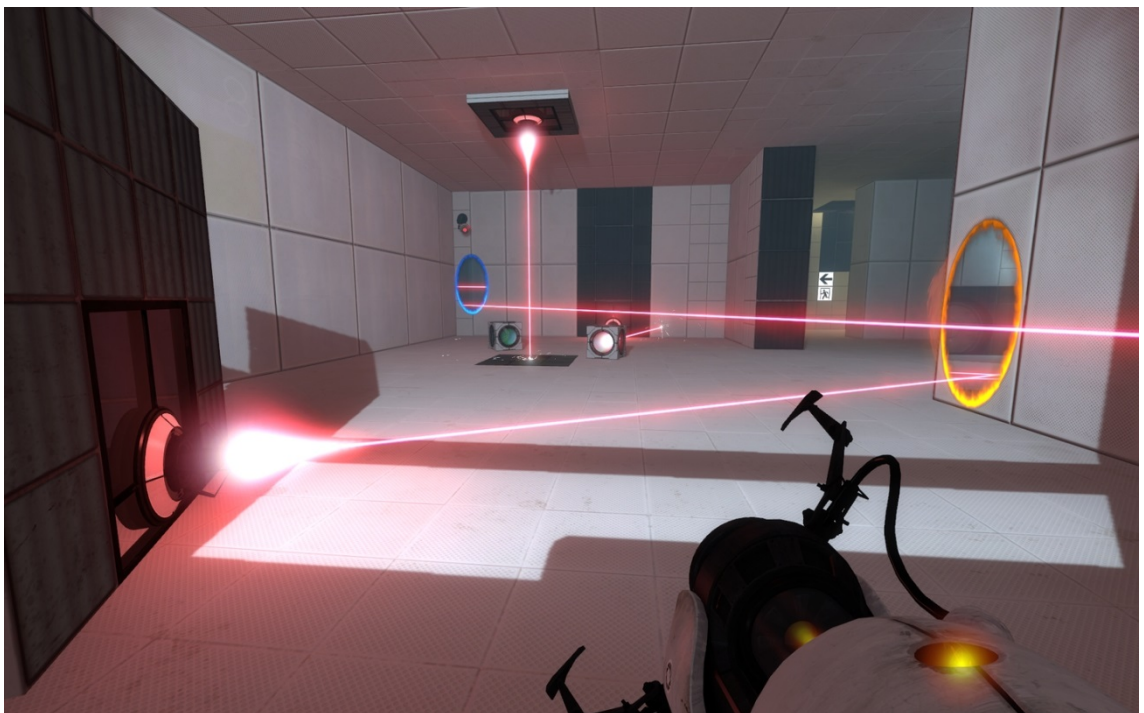
Source: Valve, 2011. *Portal 2*.

ZONES &
PLATFORMS

Zones and platforms are focal points which are usually in the intersections, or starting or end points of *paths and trails*. *Zones and platforms* have characteristics that put them forward and make them easily identifiable. They usually house an objective or mission in the gameplay.

During the analysis of various video games, two types of *zones and platforms* became prominent. The first type is large and open spaces, which are arena-like spaces. Movement in this type of *zones and platforms* are rather free; the player's field of vision is wide with less visual obstacles. Figure 5.4 shows the Roman Colosseum in *Assassin's Creed: Brotherhood*, which fits the arena-like definition.

Second type of *zones and platforms* are smaller yet distinct nodes, either by their visual properties or role in the gameplay or story. Opportune zones where the player takes cover and fends off the enemy waves in FPS games are examples of such *zones and platforms*. Movement in such smaller zones is rather limited, but the player's field of vision not necessarily gets affected by this.

In the level *A Secret Passage* of *Prince of Persia: The Sands of Time* Figure 5.5 shows the platform on which the Prince tries to solve a puzzle by moving the cranks to raise the platform that he is on. This platform's movement upwards defines a *path*, yet the platform itself is an example of *zones and platforms*.

In the mission *The Gulag* in *Call of Duty: Modern Warfare 2,* the Petropavlovsk Gulag, an old Russian prison is featured as a conflict zone. The player plays as a member of *Task Force 141* team, who infiltrated the building from the top. At one point, the player gets trapped in the steel armory cage in the middle of the panopticon prison, which can see all the cells yet exposed to fire from all angles. The armory cage in this mission, as seen in Figure 5.6, is an example of this second type of *zones and platforms*.

Figure 5.4: Roman Colosseum is an example of arena-like zones and platforms.

Source: Ubisoft Montreal, 2011. *Assassin's Creed: Brotherhood*.

Figure 5.5: The puzzle platform from Prince of Persia: The Sands of Time.

Source: Ubisoft Montreal & Mechner, 2003. *Prince of Persia: The Sands of Time*.

Figure 5.6: The platform in the middle of panopticon gulag in CoD: MW 2.

Source: Infinity Ward, 2009. *Call of Duty: Modern Warfare 2.*

 RHIZOMES & NETWORKS

Rhizomes and networks are labyrinth-like complex places with limited field of vision. The limitation of the visual clues incites the player to delve into the space and discloses the gameplay and narrative elements. As explained in the Chapter 4, *rhizomes and networks* can have a *maze* or *rhizome* structure.

Maze structure is like adjacent different zones linked by paths, where player walks through one zone to another to achieve the ultimate goal. In *Prince of Persia: The Sands of Time*, one of two major case studies of this thesis, the maze structure is very obvious. The *Prince* is trapped inside the *Palace of Azad*, and tries to reach the *Tower of Dawn* which is the highest tower of the palace, by completing levels in different rooms and courtyards of the palace. During the game, the tower is shown in cutscenes several times to remind the players that their quest is to reach the *Hourglass of Time* in the *Tower of Dawn*. Hence, the whole *Palace of Azad* is a maze, the *Tower of Dawn* being the final destination.

Another typology of *rhizomes and networks* is *rhizome* structure, in which the connections between different places are not linear, and the story structure is relatively open-ended. The kingdom of *Ahura* in *Prince of Persia [2008]* is an example of *rhizome* structure in video game spaces.

In *Prince of Persia [2008]*, the fictional kingdom of *Ahura* consists of four districts, each district having four peculiar locations as levels, and one of the *Corrupted*[23] as the level boss at the end of each district. Figure 5.7 shows a map of the kingdom of *Ahura*. The districts and their locations consist of many grounds, yards, halls and towers as seen in Figure 5.8. In order to defeat *Ahriman* and stop him from escaping the temple he has been sealed for many thousands of years, the *Prince* and his NPC companion *Elika* need to bring the light back all four districts, location by location, and defeat the *Corrupted* of each district. The order of playing these districts, locations and the boss fights is up to the player, and the locations are linked to each other. Moreover, the *Prince* and *Elika* can teleport between the locations once they bring the light back to these locations. Therefore, consisting of *paths and trails* and *zones and platforms*, the kingdom of *Ahura* is an example of *rhizomes and networks,* more precisely a *rhizome* typology in which different places are interconnected in any random order, and the player is free to choose where to go next.

---

[23] In *Prince of Persia [2008],* the *Corrupted* are the most loyal and powerful followers of *Ahriman,* the *God of Darkness* and the main antagonist of the game. They lead the war between the light and darkness until *Ahriman* breaks free from the *Temple* he was sealed in by his brother *Ormazd,* the *God of Light,* thousands of years before the events of the game.

Figure 5.7: The map of the kingdom of Ahura in Prince of Persia [2008].

Source: Ubisoft Montreal, 2008. *Prince of Persia.*

Figure 5.8: Four main locations create a rhizome structure in PoP [2008].

Source: Ubisoft Montreal, 2008. *Prince of Persia.*

Assassin's Creed series are open-world games, which takes place in fictional historical versions of the real world cities. Cities of *AC* also consist of *zones and platforms*, and *paths and trails*. Moreover, when looked at these cities at a larger scale, one sees that the city itself matches the characteristics of *rhizomes and networks*, with their open-ended *rhizome* typology.

SPATIAL FUNCTIONALITY

Topographical and geometric properties of the video game space being defined by the *spatial structure* characteristics, *spatial functionality* includes the impression of the space on the player: functional and evocative meanings conveyed through the space. This layer's function in the narrative is to define the spatial affects, to alter the emotional experience, and to attribute meanings to the spaces to name a few. Its function in the gameplay induces to help to create navigation patterns, to shape the operational relationships, and to encourage the exploration of the spaces.

SPATIAL REPULSION

Spatial repulsion is the characteristic of the spaces that player keeps away from. This avoidance can be a temporary attitude, such as in the examples of waiting until the advantageous conditions to occur in a space. Contrarily, the repulsion may be persistent that makes the player avoid that place during the gameplay.

Places with high risk of falling to death, places that the player is unable to move, places with disproportional count of enemies are examples of repulsive spaces. In *Prince of Persia* series, the *Prince* can grab and hold onto ledges. However, if the players see cracks on ledges, they will predict that the ledge is about to shatter and collapse, so they choose a different way of navigation.

There are also dynamic traps such as booby trap spikes, and moving and spinning poles with blades in *Prince of Persia: The Sands of* Time. See the Prince trying to avoid the traps in Figure 5.20. When encountered with those, the player walks slowly, trying not to activate the booby traps, and waits for the spinning poles to move away to use the same path.

SPATIAL APPEAL

Spatial appeal is the opposite of repulsion, a characteristic which is shared by the locations of interests in video games. Appealing spaces are favorable places for the player.

Places of objectives, missions, and rewards are appealing spaces. For instance, in *Prince of Persia: The Sands of Time*, locations where you can find the sands of time to refill your sand tanks are appealing spaces. Additionally, the locations that player decides to be key nodes to finish a level, which could be considered *zones and platforms*, are also appealing places.

Similar to spatial repulsion, appeal of a space can be temporary or persistent. In *PoP: SoT*, when the traps move away from the *Prince*'s track, his path becomes *appealing*, then changes to *repulsive* again when they roll back to his path.

An example to persistent appealing places is the rooftops in *Assassin's Creed* series. The main characters, namely the *Assassins*, are able to perform freerunning[24] and use the variety of topographic and structural components of the environment creatively and efficiently. To move around to the city quickly and stealthily without conflicting with the guards of the city on the ground level, players mostly use rooftops.

---

[24] *Freerunning* or *parkour* is the sport of moving along a route, typically in a city, trying to get around or through various obstacles in the quickest and most efficient manner possible, as by jumping, climbing, or running. *Source:* Parkour. 2014. In *Dictionary.com*. Retrieved from: http://dictionary.reference.com/browse/parkour

Appeal can also be used as a gameplay element. Places that would normally go unnoticed can be given importance and appeal with implementing a mission or reward there. For instance, collecting eagle feathers from various points of the cities in *Assassin's Creed II* is a gameplay motif that rewards the player's exploration of the game space (see the second paragraph under *Achrony* and *Figure 5.23)*.

Reward object of the *spatial appeal* should not necessarily be exposed to the player, it can be promised verbally. The main motivation of *Portal* is a cake to be given to the main character if she completes all the test chambers (levels of *Portal*), which is promised by *GLaDOS*, the AI unit which controls the test chambers in *Portal*'s plot. At some places in the game, however, the player sees the now famous motto scratched on the wall: "The cake is a lie" (Valve Corporation, 2007).

SPATIAL PUZZLE

Spatial puzzles are the setting in which the player has to think creatively to find out a way of reaching a location or a spatial goal which seems unclear at the first sight. Utilizing the visual hints embedded in the space, and the gameplay elements that they have learned before in the game, such as the avatar's motion abilities and the mechanic rules of the environment, the players try to solve the *spatial puzzle* to proceed.

Spatial puzzles are very common in 3D action-adventure games that they can be the main gameplay mechanic of the video game. Designed by Jordan Mechner and first released in 1989, the original *Prince of Persia* was a platform game[25]. In 2001, Ubisoft Montreal teamed up with Jordan Mechner to revitalize the franchise of *PoP* (Mechner, 2007). Having such platformer DNA, it was inevitable for the new *PoP* trilogy to not to put spatial puzzles in its center. As explained under the title *rhizomes and networks*, main objective of *PoP: SoT* was to reach the *Hourglass* in the highest tower, by walking through all the other locations of the palace, and solving their puzzles to proceed. See

---

[25] *Platform game* or *platformer* is a type of computer game that is played by moving a figure on the screen through a series of obstacles and problems. *Source:* Platform game. 2014. In *Dictionary.com*. Retrieved from: http://dictionary.reference.com/browse/platform+game

Figrure 5.6 for a sample puzzle froom *PoP: SoT,* in which the *Prince* has to move the cranks in the right order to rotate and raise the platform that he is on. Figure 5.9 shows a very common puzzle motif in *PoP* series; the *Prince* has to move the box on the switch to make the gate open. The same symbol on the switch and the gate hints to the player that they must be related.

Figure 5.9: Moving a box to the switch to make it open.

Source: Ubisoft Montreal, 2003. *Prince of Persia: The Sands of Time*.

Belonging to a similar genre, and being developed by the same studio with the new *Prince of Persia* trilogy; *Assassin's Creed* series has some similarities to *PoP* series in gameplay mechanics. Starting with *Assassin's Creed II*, *Assassin's Tombs* were added to the game as optional achievements. The puzzle structure of Assassin's Tombs in *AC* series reminds of the puzzles of *PoP* series.

It is observed that the places of spatial puzzles mostly match with the structural characteristics of *zones and platforms*. In some instances, however, as seen in the Assassin's Tombs in *AC* series, they can be in *rhizomes and networks* organization as well.

INTERACTIVE STRUCTURE

In the first two layer of spatial characteristics, *structure* and *functionality*, the spatial setting is set, perceived and given functional meanings by the player. It is the third layer, *interactive structure*, where player starts to interact with the video game space. A

narrative is embedded in the space yet already; interactive structure is the layer that empowers the narrative, and makes *gameplay* possible given that three of the four defining elements of *game* are *challenge, rules* and *player interaction* as explained in Chapter 1. All elements of interactivity and *agency* are a part of the *interactive structure* of the video game spaces.

CHARACTER INTERACTION

Character interaction is the player's interaction with the other characters available in the game. Since the player's in-game character, the *avatar* or *persona*, is also a character representation, it is useful to divide the character interaction to three different categories. First type of character interaction is the interaction with real players, in other words in-game *personas* of the other real players. Such interaction needs a multiplayer game in which two or more real players are sharing the same game world in real time. Second type of character interaction is the interaction with AI characters, which are controlled by the computer via the artificial intelligence algorithms coded by the game designers. This type of interaction can also be divided into two types: Interaction with NPC[26] companion, and interaction with enemies.

The gameplay and narrative of *Assassin's Creed* series are highly dependent on character interaction, since it is an open-world game with a city simulation, responsive crowds, and many enemies and allies. In *Prince of Persia: The Sands of Time,* however, the gameplay is essentially based on the spatial puzzles rather than the character interactions. Only human characters the *Prince* interacts during the gameplay is the *Vizier,* who is the antagonist of the game, and *Farah* the NPC companion who helps the *Prince* to progress in the puzzles of the levels. The enemies of the game are not human anymore, since they had been transformed to sand creatures by the curse of the sands of time in the beginning of the game. Nevertheless, interaction with those zombie-like sand creatures is also considered *character interaction* in the developed framework since they display character qualities. Similarly, animals, zombies, ghosts, or any

---

[26] *NPC* or *non-playable characters* are the characters that are controlled by the artificial intelligence, and they are considered to be allies with or at least neutral towards the player. Hostile NPCs are often addressed as enemies or bosses.

animated entity that manifests the qualities of an alive being through artificial intelligence are considered to be characters.

OBJECT INTERACTION

Similar to *character interaction*, *object interaction* is the player's in-game interaction with the objects found in the game. These objects can be *static entities* which just have geometric and material qualities, and the physical rules of the game engine apply to them. The objects can also be *scripted entities*, which are coded by the designers to respond in a predetermined way to certain actions. Topographic elements such as rocks, trunks, etc. or dull objects like boxes, barrels, and crates are instances of static entities, although they might respond to the gravity and might get broken within the universal physical rules of the video game engine. On the other hand, weapons, vehicles, utility items found in the game world are scripted entities.

Interacting with cranks to activate a mechanism or trigger an action is a shared gameplay motif in *Prince of Persia* and *Assassin's Creed* series. These examples are *object interactions* with scripted objects. Another shared gameplay motif between *PoP* and *AC* is that the main characters grab the ledges, and move sidelong while hanging from the ledge. It shows that there is an object interaction with the ledges. However, the ledges are static entities, and they are not scripted by themselves. What makes the character to grab the edges is a script[27] which is defined in the universal physical rules of the level. Alternatively, the ledge itself can be scripted to enable climbing or grabbing.

The border between character interaction and object interaction is a very fine one. Mounts and animals are considered characters since their complex script manifests AI and resembles an actual being while the transportation vehicles are considered objects. Then how would one define a smart vehicle with a complex AI which almost shows an intelligent behavior, e.g. responds when the player calls it, such as the *Batmobile* in the

---

[27] Varying according to the engine and the script language used, the script basically defines the rule that if the player's distance to the edge is less than a set value, character plays the grab animation and gravity is disabled for the character as long as he or she is holding onto the ledge.

Batman or *J.A.R.V.I.S.* in the *Iron Man* series? From the approach of this thesis, the *Batmobile* and *J.A.R.V.I.S.* would be a considered as *characters* rather than *objects*.

The function of *character interaction* and *object interaction* in the narrative is to increase the level of agency, to enrich the story universe and to develop the stories further. They also create new operational possibilities and intensify the gameplay.

NAVIGATION

Navigation is one of the main components of an architectural experience in video game spaces. The players orientate themselves and disclose the game spaces with orientation. Similarly to the flowing *speed* of time is the basis mechanism of the temporal sequences, *navigation* is the basis mechanism of the spatial perception and continuity.

Navigation can be split into two categories: *guided* navigation and *unguided* navigation. In guided navigation, the player has a map or checkpoint indicators in the game world or on the interfaces. The unguided navigation, however, is closer to real life navigation without any given map or location indicators but solely relies on the visual clues of the environment itself.

In *Prince of Persia* [2008], the NPC companion *Elika* is able to perform magic to guide the way to the target location with a light ball shaped spell (see the second image in Figure 5.10), which is a guided navigation. In most of the FPS games, such as *Crysis 2*, the HUD of the player has a mini-map included guiding the navigation, which is a *mutual revelation* for both the *player* and the in-game character (*persona*). Alternatively, the navigation tools can be embedded in the game in a map form. In *PoP [2008]*, the kingdom of *Ahura*'s map (see Figure 5.7) is engraved on the courtyard of the *Temple of Light,* as seen in Figure 5.10. So the players can navigate themselves in the courtyard without opening the map interface.

The function of *navigation* in narrative is to define the location of the story and to increase the player's *agency* on the quest. In the gameplay, the orientation patterns of

the levels are shaped via navigation. Also, the main gameplay elements are located in the game space, and variety of gameplay is obtained with different navigation possibilities.

Figure 5.10: The engraved map of the kingdom of Ahura in PoP [08].
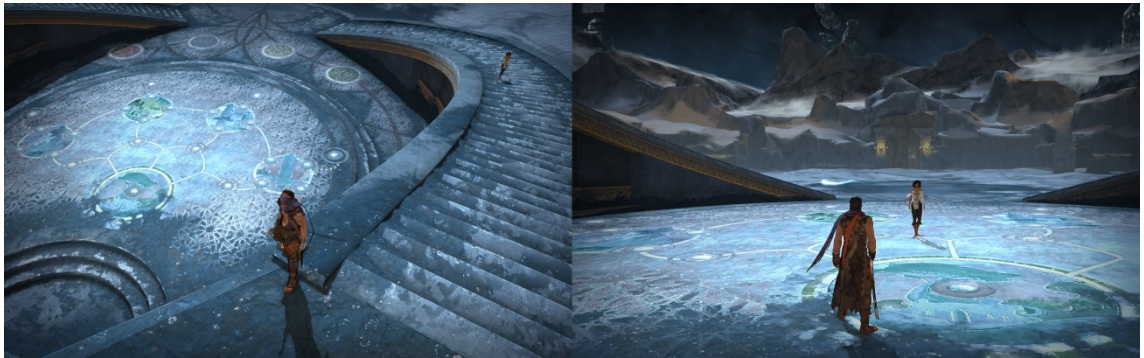
Source: Ubisoft Montreal, 2008. *Prince of Persia*.

OBJECTIVES &
CHALLENGES

Objectives and challenges define the two essential elements of a video game: *challenge* and *rules*.

Main role of *objectives and challenges* in the gameplay is to define the gameplay mechanics, create a variation in the gameplay and to create the navigation patterns of the levels. In the narrative, objectives and challenges help to create the plot, increase the level of *agency*, alter the emotional experience, and to attribute meanings to the spaces.

SENSUOUSNESS

Sensuousness is the fourth and the final layer of the spatial characteristics. As in the cinema example, suspension of disbelief is crucial in narratives. The perception of the video game should be convincing for the player's emotional experience and effective gameplay. Immersiveness and the level of realism in a video game profoundly depend on the characteristics of *sensuousness*.

The characteristic categories of sensuousness are given as a preliminary list in this framework. Each element can have its subcategories, e.g. interfaces can be a HUD[28] or pause level menu. These elements are open to be detailed, but it is out of the scope of this thesis.

PERSPECTIVE
& CAMERA

The aspect of *perspective* is an essential element of 3D adventure games, since the main visual input of the representational game space is conveyed through the perspective of a virtual camera.

As a gameplay element, perspective defines the player's field of vision and enables the emphatic insideness of the player. Perspective and camera also ensure the continuity of the space. First-person view can be the main element that the gameplay is based on, as seen in the example of FPS games such as *Call of Duty* series. Changing camera angles and perspectives in third-person view can also guide the player through the game space. In *Assassin's Creed* and *Prince of Persia* series, when a player enters to a puzzle space, such as the rooms of the palace and the *Assassin's Tombs*, the camera zooms out and the player gets an overview of the *spatial structures*. Figure 5.11 shows the viewpoints changed by the player in *PoP: SoT* to see the environment and to figure out the puzzle in the level. The first pane shows the default third-person camera that follows the player. The second pane shows the first-person view from the same spot. The third pane shows the alternative camera of an overall view. The fourth pane shows the default third-person camera angles being changed by the player via moving the mouse.

Role of perspective and camera in narrative is to define the agency level of the player, to alter the emotional experience, and to enrich the story universe.

---

[28] *HUD* or *Head-up display* takes its name from the graphic interface of the modern aircrafts and defines the health, live, navigation, weapon etc. indicator which is superimposed on the game's viewing pane.

Figure 5.11: Different camera modes in Prince of Persia: The Sands of Time.

Source: Ubisoft Montreal, 2003. *Prince of Persia: The Sands of Time*.

Figure 5.12: The color schemes of the different cities in Assassin's Creed.
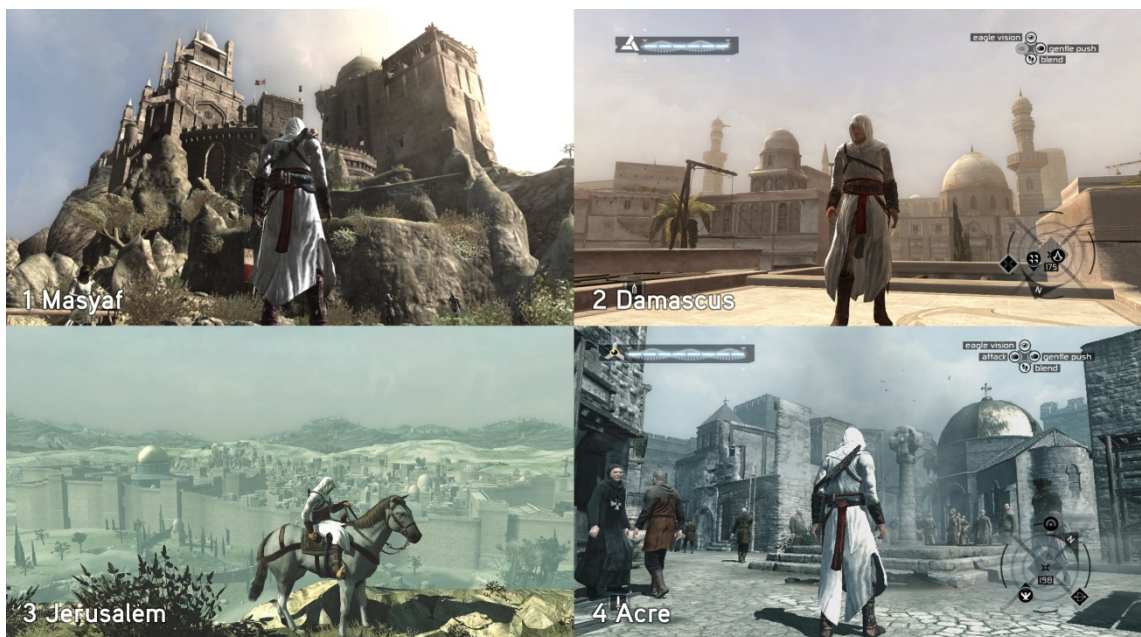
Source: Ubisoft Montreal, 2007. *Assassin's Creed.*

COLOR

Since the visuals are one of the essential components of a video game, as the name hints, color schemes of a video game setting speak a lot about the spatiality, temporality and narrative.

In *Assassin's Creed* series, characteristic moods of the medieval cities are reflected with the color filter. As seen in Figure 5.12, Masyaf, the base of the *Assassin Order* has neutral colors. Damascus, a wealthy city being ruled by the Saracens, has a warm color filter. The green color scheme gives a calm mood to the holy city of Jerusalem. The poor city of Acre, where the public is suffering from the plague and the Knights Hospitaller, has a darker color scheme.

Derived from cinema, flashbacks can be shown in sepia or desaturated color schemes in video games.

Colors can also give an idea about the physical condition of the in-game character. In most FPS games, the screen turns to red when the player takes a hit, and blacks out if the player dies or faints.

MATERIALITY

Together with *color*, *materiality* sets the mood, alters the emotional experience, increases the level of reality, enriches the story universe and, defines the chronologic context, and increases the effect of synesthesia[29].

Materiality and *color* also affect the gameplay by showing the hostility of the environment, emphasizing some elements to guide the player through the objectives and challenges of the game, and helping to create the navigational patterns.

---

[29] In this context, the term *synesthesia* is used to describe the sensation of senses other than the sense of sight, such as a tactile feeling or a smell evoked by the visuals of the video game

Figure 5.13 shows the changing colors and materiality in *PoP [2008]*. In the first pane, *Ahriman*, the *God of Darkness*, is breaking free from the temple in which he had been prisoned for thousands of years. The effect of darkness taking over the kingdom of *Ahura* is reflected on the materiality of the environment. In the second pane, Ahriman has been sealed again. The light of *Ormazd* prevails and the kingdom flourishes once more, as hinted by the warmer color scheme and materiality.

Figure 5.13: The effect of the change of materiality and colors in PoP [2008].

Source: Ubisoft Montreal, 2008. *Prince of Persia*.

Prince of Persia: Warrior Within is the sequel of *Prince of Persia: The Sands of Time* in the *SoT* trilogy. Cursed for breaking the *Hourglass* and releasing the *Sands of Time* in the events of the first game, the Prince journeys to the mystical *Island of Time*, where the *Sands of Time* and the other relics of time are created in ancient time. He travels back in time to those ancient times before the *Sands of Time* were created via the *Time Portal* in the *Island of Time*. Then he tries to prevent the sands of time to be created; because if there are no sands of time, he would not be cursed for releasing them. Figure 5.14 shows the ruins of the *Island of Time* [1 and 2] turning back to its days of glory [3 and 4] as the *Prince* goes back in time.

Figure 5.14: The changing materiality of the Island of Time in past and present.

Source: Ubisoft Montreal, 2004. *Prince of Persia: Warrior Within.*

If the video game is settled on a physically existing place, the designers make a research on the architecture and materiality of that place, and try to reflect a carefully stylized version of the place in the video game. *Assassin's Creed: Revelations* takes place in Constantinople in 1511. In order to ensure a consistent Constantinople, the designers of the game visited Istanbul, made researches, and took many pictures as reference[30]. Figure 5.15 shows the materiality difference in the concept arts of *Bayezid District*, where the middle class lives, and the *Imperial District*.

---

[30] Gameinformer.com. 2011. *Assassin's Creed Revelations: Scouting Istanbul*. Retrieved from: http://www.gameinformer.com/b/features/archive/2011/05/20/assassin-39-s-creed-revelations-scouting-istanbul.aspx

Figure 5.15: Materiality comparison of Beyazid District and the Imperial District.

Source: http://www.oliviermartin-art.com/assassins-creed-iii-revelations/

🔊 SOUND

The second component of the audiovisual inputs of a video game is *sound*. *Sound* is seen in three primary forms in video games: musical soundtracks, ambient sounds, and character voices. *Sound* is not only utilized as a verbal storytelling tool, but it also sets the mood, increases the level of reality, and enrich the story universe in video game narrative. As a gameplay element, *sound* gives hints about the environment, shows the hostility of the level, and conveys the reactions for acts or events.

CONTROLS & BODY MOVEMENT

A player's experience in a video game space is closely related with his *persona* or *avatar*'s movement abilities, and the control scheme that the player uses to create this link between the physical and virtual worlds.

In many video games, first moments of the game events are actually a tutorial for the player to get used to the controls and understand the movement capabilities of his in-game character. For instance, a leapable distance for *Assassin's Creed* might be an obstacle in another action adventure or FPS game.

In the *AC* series, from the first *Assassin's Creed* to *Assassin's Creed: Revelations*, four main body parts, [1] head, [2] attack hand, [3] empty hand, and [4] legs, of the in-game characters are controlled by four certain buttons, along with other controls. For instance, to taunt an enemy in a fight, to call a horse, or to activate eagle vision, the player uses the head action key. Figure 5.16 shows PC controls of *Assassin's Creed* and Xbox controls of *Assassin's Creed: Revelations*.

Figure 5.16: Configuration of PC controls of AC versus Xbox controls of AC:R.
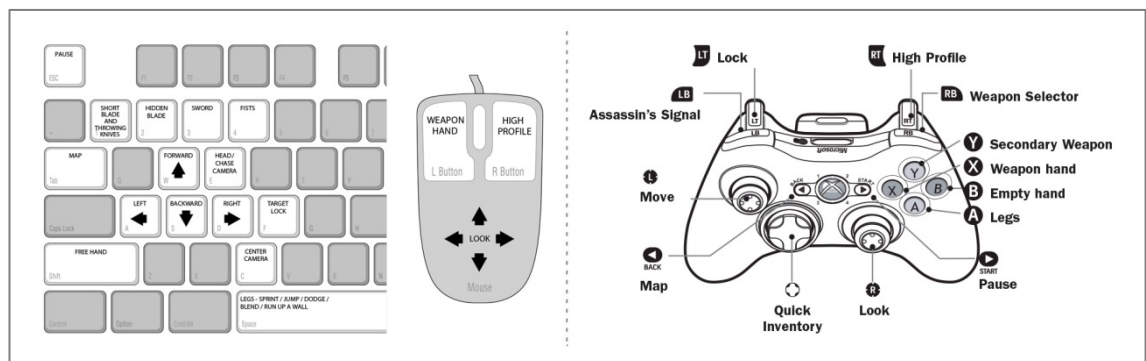
Source: Ubisoft Montreal, 2007. *Assassin's Creed*. & Ubisoft Montreal, 2012. Assassin's Creed: Revelations.

 INTERFACES

Interfaces are primarily gameplay elements, and they just provide some information for narrative. As for the gameplay, the camera angles, controls and configuration of the game, and many of the gameplay information (such as mini-map for navigation, health level, controls, tools, possible moves, prompts, objectives, etc.) are conveyed through interfaces. Interfaces can be *revealed mutually*, or to the *player* only.

In *Assassin's Creed* series, there is also a HUD interface supposed to be the courtesy of the *Animus* (see Figure 5.17); which shows a mini-map, synch bar, quick inventory and controls. However, the creative director of the series, Patrice Désilets explains that[31] this interface was made optional to turn on or turn off. Because, for an authentic experience of being an Assassin in the medieval ages; the players should turn off the HUD interface, and rely on their senses and memory for navigation, controls, remaining health of the character, and the notoriety level in the crowds.

Figure 5.17: HUD interface of Assassin's Creed: Brotherhood.

Source: Ubisoft Montreal, 2011. *Assassin's Creed: Brotherhood.*

---

[31] Patrice Désilets (personal communication, November 2, 2013)

SEQUENCE ORDER

Sequence order is not only a narrative tool, but also can be a gameplay mechanic if interpreted profoundly by the game designer. For instance, the possibility of manipulating the time with *flashbacks* constitutes the basis of the gameplay in *Prince of Persia: The Sands of Time*.

AGENT'S CHOICE

In interactive narratives, the control of the events seems to be in the hands of the players. As a matter of fact, games with stories (such as action-adventures and first-person shooters) have a starting point and one (or more with alternatives) predefined endings. Nonetheless, linear and very dictating plots can bore the players. Therefore, the game developers tend to make the players choose the sequential order of various events.

Agent choice's affect is better observed in the open world games, where player can roam freely, choose to bring forward or postpone the game's objectives to their heart's content. In recent open world video game examples, starting points of the missions are highlighted, so the player knows where they need to interact to trigger the mission start.

Figure 5.18 shows the *Grand Theft Auto: Vice City*'s main character, Thomas "Tommy" Vercetti, in the Vercetti Estate walking towards to the living room. Interacting the pink circle by stepping through it will start the *Mission 22: Bar Brawl* with a cutscene introducing the upcoming plot. The player has the freedom to start the mission, or to free roam in the Starfish Island and complete other tasks first. These kinds of story checkpoints are very common in the contemporary action adventure games, such as *Assassin's Creed II*.

Figure 5.18: Starting point of the Mission 22: Bar Brawl from GTA Vice City

Source: Rockstar Games, 2002. *Grand Theft Auto: Vice City*.

 FLASHBACK

Flashbacks usually occur in the middle of the game, to unfold the back story of an event or a character. This unfolding can be on *player revelation* or *mutual revelation* level. That said, in some examples, such as *Prince of Persia: The Sands of Time*, the entire story can be a flashback itself.

A strong implementation of partial flashbacks into the storyline can be observed in *Call of Duty 4: Modern Warfare*. The game takes place in a fictional 2011 during the World War 3. The story focuses on the team of special forces soldiers serving for Special Air Service of British Army (SAS) commanded by *Captain John Price: 22nd SAS Regiment*. The antagonist of the plot is *Imran Zakhaev*, a *Russian Ultranationalist* and the leader of the uprisings in Russia and the Arabian Peninsula. After completing the twelfth mission *Safehouse* in Northern Azerbaijan in 2011, players play the next two missions, *All Ghilled Up* and *One Shot, One Kill*, as a flashback which takes place in Pripyat, Ukraine in 1996 winter as seen in Figure 5.19.

All Ghilled Up and *One Shot, One Kill* are chronologically the first and the second missions in the storyline; however, they are revealed to players as thirteenth and

fourteenth missions. In these two missions, authorized by the British government, *Captain MacMillian* and then-Lieutenant *John Price* attempt to assassinate *Imran Zakhaev*, who is attempting to sell radioactive fuel rods, remained from the Chernobyl disaster in 1986 to the *Russian Ultranationalists*. *Lt. Price* snipes *Zakhaev* from the top floor of a hotel in his left shoulder, which fails to kill him but leaves him one-armed (Infinity Ward, 2007). Thus, it is explained to the player that the vendetta between *Zakhaev* and *Captain Price* is an old one and almost a personal issue.

Figure 5.19: Starting the mission "One Shot, One Kill" in Pripyat, Ukraine 1996, Call of Duty 4: Modern Warfare

Source: Infinity Ward, 2007. *Call of Duty 4: Modern Warfare*.

In *Prince of Persia: The Sands of Time*, in the other hand, the entire story is a flashback. The game starts with an introduction cinematic in which the *Prince* is narrating a story (Ubisoft Montreal & Mechner, 2003) as follows:

> *"Most people think time is like a river that flows swift and sure in one direction. But I have seen the face of time, and I can tell you: they are wrong. Time is an ocean in a storm. You may wonder who I am or why I say this. Sit down and I will tell you a tale like none you have ever heard."*

Players do not know to whom he tells the story until the end, therefore, we enact the entire story in the role of *Prince* in a flashback as the *Prince* tells his past adventure, sometimes commenting and narrating over our in-game actions. Jordan Mechner (2010, pp. 115-116), the creator of the original *Prince of Persia* and the designer of the *Prince of Persia: The Sands of Time* explains their design decision as follows:

> *"One of the classiest aspects of the 1940* Thief of Baghdad *(another source of inspiration for the original Prince of Persia) is that it starts out with the hero telling his story to a mysterious woman in flashback. As he finishes his tale, we realize that the villain has been listening behind a curtain the whole time. Nesting stories within stories in this fashion is a signature device of the* 1001 Nights - *the collection of medieval Islamic folk tales that is the* ur-*source material for* Thief of Baghdad *and* Prince of Persia.

> *To our knowledge, voice-over narration as a framing device had yet to be tried in a video game. We decided to push the device to its limit by making the entire game a flashback, narrated by the hero in the past tense. [...]So, we open the game with the Prince telling his story, in flashback, to a person we don't see. Only at the end of the game is it revealed who this person is. The narration had to be crafted to work on two levels: It must make sense both the first time through the game, and then in retrospect, when the player knows who the Prince is actually telling his story to and why."*

Both in *Call of Duty 4: Modern Warfare* and *Prince of Persia: The Sands of Time*, flashbacks are interactive, which means they are enacted by the player. In many examples, however, flashbacks can be done in noninteractive forms such as cutscenes, in-game artifacts, pre-scripted dialogues, etc. As cited by Reynolds (2013, p.56) Juul states, "an interactive flashback leads to the time machine problem: the player's actions in the past may suddenly render the present impossible. This is the reason why time in games is almost always chronological" (2011).

In *Prince of Persia: The Sands of Time*, however, this time machine problem is solved with the sands of time. At the beginning of the game, the *Prince* obtains the *Dagger of Time*, an artifact which enables its holder to rewind or slowdown the time when its tanks are filled with the sands of time. When the player makes an illegal move such as dying on a trap or jumping to his death, they can rewind back to their last advantageous position, without interrupting the *story time*, *game progression time* or *impromptu*. As

seen in Figure 5.20, the *Prince* [1] is caught to a spike trap in the level *The Drawbridge* [2]. Then he rewinds the time with his dagger, using the sands of time [3], and passes the traps by performing a wallrun [4].

The creative director of *Prince of Persia: The Sands of Time* team calls this coping mechanism *justification* (Désilets, 2013). When there are no sands left in the dagger and the *Prince* makes an illegal move, the game justifies the time machine problem making use of the very voice-over narration that the game settles on. If the *Prince* is dead, the game pauses with a game over screen, and the narrator *Prince* hastily corrects himself: "Wait, what did I just say? That didn't happen. Let me back up a bit." Then the story continues from the last checkpoint (Mechner, 2007).

Figure 5.20: The Prince trying to avoid the traps in the level "The Drawbridge"

Source: Ubisoft Montreal & Mechner, 2003. *Prince of Persia: The Sands of Time*.

Assassin's Creed series is another example to video games in which the most of the game storyline happens in a flashback. In *Assassin's Creed*, a fictional device called

Animus allows the characters to revisit their ancestors' memories which are fictionally encoded in their DNA (Ubisoft Montreal, 2007). Figure 5.21 shows *Desmond Miles*, the main character visiting the fictional city of Monteriggioni, Italy as his ancestor *Ezio Auditore da Firenze* in 1476 via *Animus*, and as himself in real life in 2012 in story time.

Figure 5.21: The character is able to revisit his ancestor's memories with Animus.

Source: Ubisoft Montreal, 2010. *Assassin's Creed II*. & Ubisoft Montreal, 2011. *Assassin's Creed: Brotherhood*.

Being developed by the same creative team as *Price of Persia: The Sands of Time*, *Assassin's Creed* series justifies the time machine problem of the interactive flashback via the mechanism that the game settles on: the *Animus*. The character's interaction with the *Animus* relies on his synchronization with his ancestors. If he does something they did not do in the past, such as dying, killing a civilian, the character simply desynchronizes from the memory and starts replaying the memory from the last checkpoint.

 FLASH-FORWARD

Flash-forwards are not as common as the *flashbacks* as a temporal manipulation mechanism in video game narratives. Wei et al. cites that (2010, p.5) a 2002 study which analyzed 130 video games resulted that %6 of the investigated games use flashbacks, where only %2 use flash-forwards (Brand, Knight, & Majewski, 2013).

Figure 5.22: The Prince foreseeing how to solve a puzzle in the level "The Drawbridge"

Source: Ubisoft Montreal & Mechner, 2003. *Prince of Persia: The Sands of Time*.

Prince of Persia: Sands of Time is a game based on spatial puzzles, players need to open doors and lower the bridges by activating certain mechanism with your movement abilities to proceed to the next level. The magical *sands of time* and *the dagger of time* enable the Prince to use *the power of prophecy* and see visions on the save game points.

At the beginning of some levels, he sees visions of the future in which he takes a quick glimpse at the key points of the current level. It is a *mutual revelation* for both *Prince* and the player. The tips in visions do not spoil the game as the player has not seen the puzzle yet, but the player may recall the moments when they see it. Figure 5.22 shows the *Prince* seeing a vision of how to activate a mechanism under the influence of *the power of prophecy*, and then activating the mechanism in operational *story time* the same way. When players see the vision at the beginning of the level *The Drawbridge*, we do not even know where the shown fence gate is. When players discover the gate, we see that it is shut down, but there is a narrow gap caused by the rocks on the floor. Being slimmer than the *Prince*, *Farah* the NPC companion can crawl under the gate and activate the mechanism next-door.

In *Assassin's Creed III*, *Minerva*, a member of the *First Civilization* shows visions of future to *Desmond*, called *calculations*, and tries to convince him not to activate the *Eye*, a device constructed by the *First Civilization* which would activate a *global aurora borealis* to shield the Earth from the fatal solar radiation caused by the coronal mass ejection on 21 December 2012. In the calculations, *Desmond* sees that if he activates the *Eye* by sacrificing his own life, the Earth will be saved from the disaster, but *Juno's* digitized consciousness (another *First Civilization* member whose who is looking for vengeance from the humanity) would be free. If he would not activate the *Eye*, however, *Juno's* consciousness would stay imprisoned but the cataclysm would destroy the most of the humanity. Then the survivors would restart the civilization; *Desmond* would be the leader of them, and his messages would be misinterpreted after his death, rendering him as a prophet or deity. After seeing both future scenarios as flash-forwards in these calculations, *Desmond* decides that the humanity deserves to live and try its chance to struggle with *Juno,* and sacrifices his life to activate the *Eye* (Ubisoft Montreal, 2012).

In these two examples from *Prince of Persia: The Sands of Time* and *Assassin's Creed III*, flash-forwards occur in non-interactive forms, such as cutscenes and scripted dialogues, as opposed to the flashbacks in the same series.

ACHRONY

Achronic events usually appear as side missions in video games. The side missions are used to extend the duration of gameplay, increase the challenge, create a variety in the gameplay and give second options to the players who want to take a break from the main storyline. If the side missions are achronic, they do not conflict with the events of the main storyline, no matter in which order these events occur.

For example in *Assassin's Creed II*, the main character *Ezio*'s younger brother *Petruccio* asks him to collect him eagle feathers from the rooftops in a mission, in 1476. When *Ezio* asks what he is going to do with them, he just says it is a secret (Ubisoft Montreal, 2010). After *Petruccio*'s unexpected death, collecting the feathers become an achronic side mission, which will have no effect on the main story progression. Game rewards 50 feathers with *Condottiero War Hammer*, a weapon which the character can use in his fights, and 100 feathers are rewarded with the *Auditore Cape* apparel. Both items are optional, can be achieved any time in the storyline, or might not be obtained at all. As seen on Figure 5.23, players can collect the total of 100 feathers any time in the story time, which spans from 1476 to 1499.

The creative director of the series, Patrice Désilets says that[32] they were happy that most of the players keep collecting feathers, which shows that they managed to create an emotional link between the character and the player.
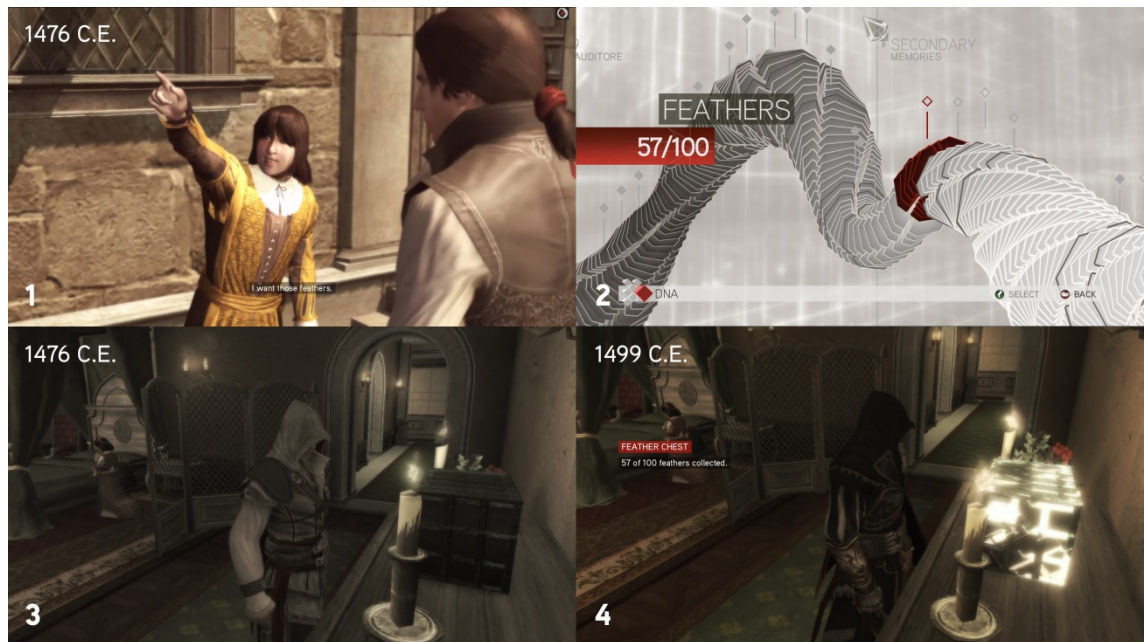
NARRATIVE SPEED

Manipulating how the story unfolds, temporal order strongly affects the mental reconstruction of the events in the player's mind, therefore, is a very fundamental element of the storytelling.

---

[32] Patrice Désilets (personal communication, November 2, 2013)

Figure 5.23: Ezio collects eagle feathers for his brother Petruccio, for 23 years.

Source: Ubisoft Montreal, 2010. *Assassin's Creed II.*

▶ SCENE

In first-person shooters and action-adventure games, almost all the action sequences happen in *scene* speed. When a player shoots something down, chases something, races from point A to point B etc., they usually play in the scene narrative speed.

⏩ SUMMARY

Summary is best observed in real-time strategy games, such as *Civilization* and *Age of Empires* series, in which the player plays as the ruler or the god of a nation. While a unit like barracks is built within seconds in the game, it actually represents weeks or months in the justified story time. Figure 5.24 shows the night *Ezio* spends with his love interest in *Assassin's Creed II*, where we see the night turning to day with a nice panaromic view of 15th century Florence, from outside the *Casa di Vespucci* within eight seconds.

**Figure 5.24: Ezio spending a romantic night with Cristina Vespucci.**

Source: Ubisoft Montreal, 2010. *Assassin's Creed II.*

 STRETCH

Stretch also became popular in film industry thanks to the high-speed cameras and CGI. A very common example of *stretch* is "bullet time", which gained popularity with the *Matrix* movies, and used as the main gameplay mechanism in *Max Payne* series.

Figure 5.25: An example of "stretch", or "bullet time", from Max Payne 3.
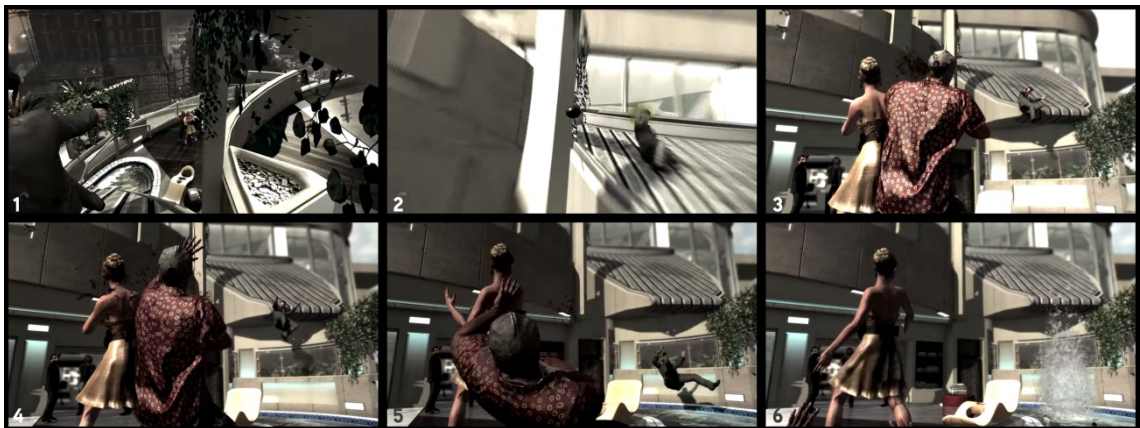
Source: Rockstar Games, 2012. *Max Payne 3.*

In video games, stretch is not only a visual effect but a gameplay element because of the video games' interactive nature. Figure 5.25 shows *Max Payne* shooting an enemy in the head while sliding from a roof. If stretch was not used, the player most porbably would not be able to aim accurately. Same mechanism is also used in *Call of Duty: Modern Warfare* series and *Fallout 3*, which allows the player to aim at different targets within a few seconds. In other examples, such as *Prince of Persia* and *Assassin's Creed,* stretch is used to aesthetize a combat scene like a dance choreography by making use of the slow motion.

ELLIPSIS

Similar to *summary*, *ellipsis* is a tempus that speeds up the narrative. The difference is, in *summary* the progression in the story time is shown quickly, while in *ellipsis,* some events are being skipped, and the story continues from a farther point. In both *ellipsis* and *summary*, filling the temporal gap is left to the player's imagination.

Ellipsis also happens to be a part of a spatial navigation device, when the character teleports from one location to another.

Figure 5.26: Haytham Kenway's journey to the New World from London.

Source: Ubisoft Montreal, 2013. *Assassin's Creed III*.

In *Assassin's Creed III*, *Haytham Kenway*'s journey from Britain to the New World takes 72 days, while players only play the events of days 2, 28, 33 and 72. The day numbers are shown on the screen at the starting of that day's events in a journal like fashion (see Figure 5.26). On the dawn of Day 72, players see Boston Harbor on the horizon.

⏸ PAUSE

A pause occurs commonly when a new mission is starting, and the objectives of the new mission are being explained to the player as shown in Figure 5.27 in *Assassin's Creed: Brotherhood*.

*Pause*s are also used when the player is introduced to a new spatial setting, such as a map being shown. In *Prince of Persia: Sands of Time* trilogy, and successorly *Assassin's Creed* series, when the player encounters a platforming puzzle, a *pause* happens and a quick overview of the level is shown to the player in a cut-scene as a *player revelation*. In *Assassin's Creed II* and the following titles, the *Animus* has a database of information on the game locations. When the character sees a location for the first time, the player can optionally press on Tab key (on PC), which *pauses* the game and shows the entry in the *Animus* database as a *player revelation*[33] (Figure 5.28).

Figure 5.27: Objectives appear on the screen before every mission.

Source: Ubisoft Montreal, 2011. *Assassin's Creed: Brotherhood*.

---

[33] What is seen in *Assassin's Creed* series during the ancestor memories is actually what *Desmond* sees in *Animus* interface. If we only consider *Ezio* as the character, this is a *player revelation*. But considering that Desmond is also a character, some of the *player revelations* in *AC* are actually *mutual revelations*.

Figure 5.28: Ezio sees the Arch of Constantin, with a database notification.
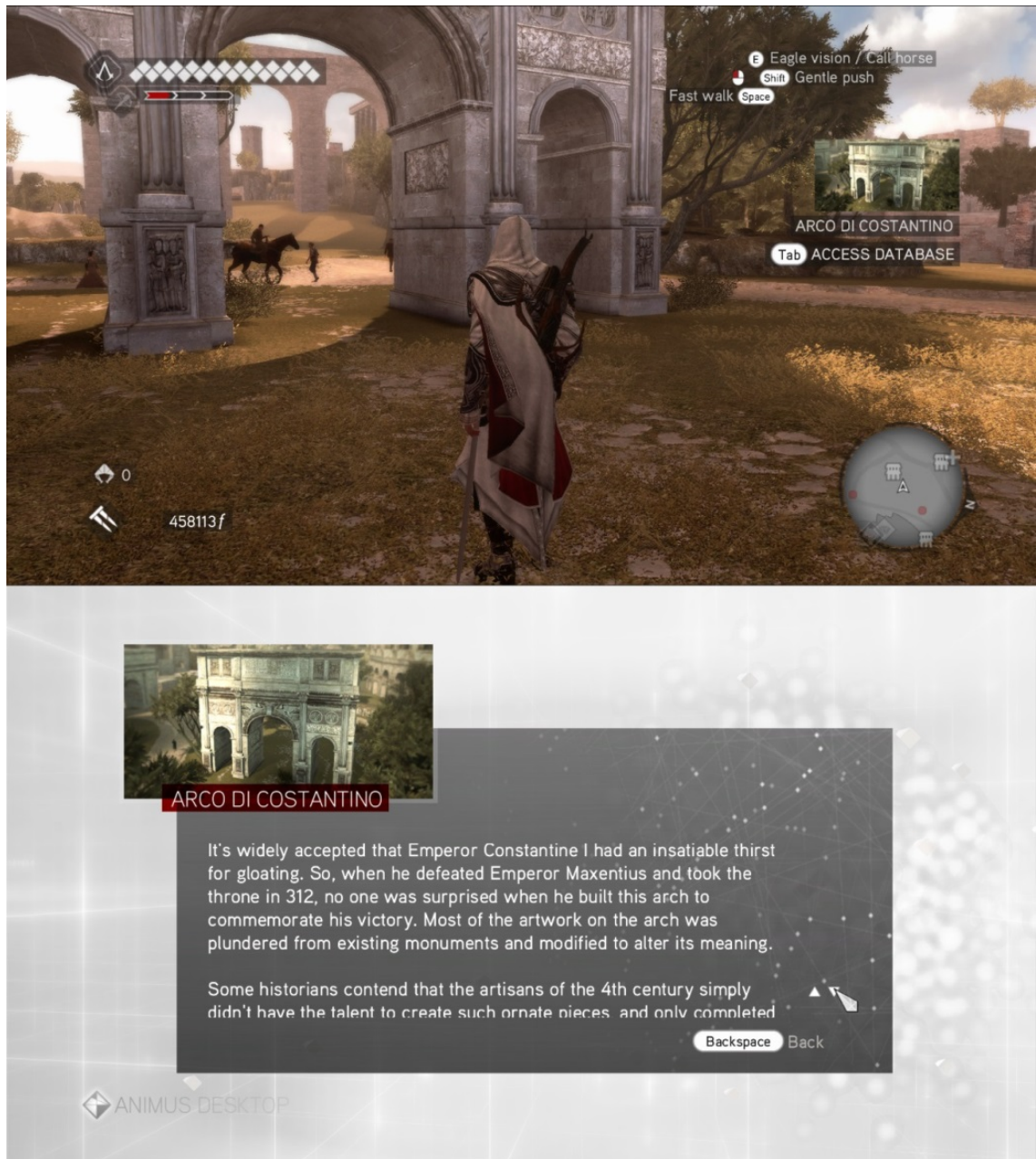
Source: Ubisoft Montreal, 2011. *Assassin's Creed: Brotherhood.*

FREQUENCY

Frequency improves the narrative power of the video games, and also is used as a tool to manipulate the gameplay.

SINGULAR

Singular temporality is very common in video games. All the key events and cut-scenes which happen only once in the game are singular. However, an event that is *singular* in *story time* and *impromptu* might not be *singular* in *playing time* if the player repeats the level.

ITERATIVE

Iteration is useful to give a succinct idea about a recurring event in the story. For example, in *Assassin's Creed II*, after his father and brothers are executed iniquitously in Florence, *Ezio* takes shelter in *Villa Auditore* owned by his uncle *Mario Auditore* in Monteriggioni. Seeking for revenge, *Ezio* is taught how to fight and defend himself by Mario and the mercenaries in *Villa Auditore*'s courtyard. It is also a tutorial for the player to learn the combat moves and get used to the controls. After the player's tutorial to each fight move is completed, an *ellipsis* happens and implies that *Ezio* has been training there for many days.

REPETITIVE

Interactive *repetition* mostly happens when the player fails a level or mission. Then the player continues from the last checkpoint and repeats everything. Alternatively, the player might choose to repeat a mission, as *agent's choice* to score higher, try something different, etc. These types of repetitions are excluded from the *story time* since they are meant never to happen. Another type of interactive repetition is a

combination of fail and player's choice: the ability to reverse time. As explained before, in *Prince of Persia: The Sands of Time*, rewinding is both a temporal device and a gameplay mechanic. If the players die or decide to undo their last steps in the game, they can rewind the time.

In video games, also non-interactive repetitions are inevitable in environments and the Artificial Intelligence units. Crowds and vendors who use the same animations and lines in the loop in *Assassin's Creed* series are a good example of it.

MULTIPLE

In *Assassin's Creed III*, *Hatyham Kenway*'s journey from Britain to the New World takes 72 days in story time, while players only play four days of it. At the night of each day, *Haytham* goes back to his cabin, examines the *Grand Temple Key* and writes to his journal. Players assume that it is a *multiple* event, and *Haytham* had been keeping a journal for 72 days (see Figure 5.29).

Figure 5.29: Haytham writing to his journal in his cabin on Day 28.

Source: Ubisoft Montreal, 2013. *Assassin's Creed III*.

STORYTELLING

Different types of storytelling structures are seen in the narrative of all video games. They create a variety in the narrative and increase agency. They also provide alternative gameplays and increase player interactivity.

LINEAR   BRANCHING   FOLDBACK   EMERGENT

Linear is the most common storytelling structure. According to Adams, it is the emotionally most powerful one (Adams, 2010b). *Prince of Persia: The Sands of Time* has a linear story. *Branching* storytelling requires different results for different decisions of the player, therefore, requires multiple endings. *Silent Hill 2*, for instance, was revolutionary for its time with its six different endings, based on the actions of the player. Many games, including *Prince of Persia: Warrior Within* and *Far Cry 3*, also featured multiple endings. They had branching elements in their storytelling structure, but they cannot be considered fully branching. *Foldback* storytelling is between linear and branching, it gives the player to choose between different options, but all possibilities fold back to one inevitable key event. *The Walking Dead* had foldback elements with an addition of some branching opportunities. *Emergent* storytelling requires a vast game space with indefinite possibilities. Today, MMO games such as *World of Warcraft* and *League of Legends* enable a level of emergent storytelling, owing to the agency and participation of multiple players in the same storyline. Developing open world games, such as *Grand Theft Auto 5*, and *Watch Dogs*, which was to be released when this thesis was printed, might increase the level of emergent storytelling by virtue of the possibility of multiplayer participation while playing in the story mode.

The framework is evaluated and illustrated with examples. Table 5.1 and Table 5.2 show a summary of the spatial and temporal characteristics of the developed framework.

Table 5.1: Summary of the spatial characteristics of the framework.

Category	Characteristic	Function in game narrative	Function in gameplay	Examples cited
SPATIAL STRUCTURES	PATHS & TRAILS	Affects the story structure.	Affects motions and operations; Defines the orientation in the space	Prince of Persia: The Sands of Time (2003); Assassin's Creed II (2010); Portal 2 (2011); Assassin's Creed: Revelations (2012)
SPATIAL STRUCTURES	ZONES & PLATFORMS			
SPATIAL STRUCTURES	RHIZOMES & NETWORKS			
SPATIAL FUNCTIONALITY	SPATIAL REPULSION	Define the spatial effects, Alters the emotional experience, Attributes meanings to the spaces	Helps to create navigation patterns; Shapes the operational relationships; Encourages the exploration of the spaces	Prince of Persia: The Sands of Time (2003); Portal (2007); Assassin's Creed II (2010)
SPATIAL FUNCTIONALITY	SPATIAL APPEAL			
SPATIAL FUNCTIONALITY	SPATIAL PUZZLE			
INTERACTIVE STRUCTURE	CHARACTER INTERACTION	Increases the level of agency; Enriches the story universe	Creates new operational possibilities	Prince of Persia: The Sands of Time (2003); Assassin's Creed (2007)
INTERACTIVE STRUCTURE	OBJECT INTERACTION	Develops the stories	Intensifies the gameplay	Prince of Persia series; Assassin's Creed series
INTERACTIVE STRUCTURE	NAVIGATION	Defines the location of the story; Increases the player's agency	Shapes the orientation patterns of the levels; Locates the gameplay elements in the game space; Creates variety in gameplay	Prince of Persia (2008); Crysis 2 (2011)
INTERACTIVE STRUCTURE	OBJECTIVES & CHALLENGES	Helps to create the plot; Increases the level of agency; Alters the emotional experience; Attributes meanings to the spaces	Defines the gameplay rules and mechanics; Creates variation in the gameplay; Creates the navigation patterns	-
SENSOUSNESS	PERSPECTIVE & CAMERA	Defines the agency level of the player; Alters the emotional experience; Enrich the story universe	Enables emphatic insideness; Defines the player's field of vision; Ensures the continuity of the space; Guides the player through the game space	Call of Duty series; Prince of Persia: The Sands of Time (2003); Assassin's Creed II (2010)
SENSOUSNESS	COLOR	Sets the mood; Alters the emotional experience; Increases the level of reality; Enrich the story universe; Defines the chronologic context; Increases the effect of synesthesia	Shows the hostility of the environment; Guides the player through challenges; Creates the navigation patterns	Prince of Persia: The Sands of Time (2003); Prince of Persia: Warrior Within (2004); Assassin's Creed (2007); Prince of Persia (2008); Assassin's Creed: Revelations (2012)
SENSOUSNESS	MATERIALITY		Gives hints about the environment; Shows the hostility of the environment; Guides the player; Keeps the player interested	-
SENSOUSNESS	SOUND	Sets the mood; Alters the emotional experience; Increases the level of reality; Enrich the story universe; Verbal storytelling		
SENSOUSNESS	CONTROLS & BODY MOVEMENT	Increases the level of agency; Provides interactivity	Creates the link between the player and the in-game character; Defines allowed motions and actions	Assassin's Creed (2007); Assassin's Creed: Revelations (2012)
SENSOUSNESS	INTERFACES	Provides information	Sets the camera angles; Helps to customize controls and configuration; Provides essential gameplay information	Assassin's Creed: Brotherhood

Table 5.2: Summary of the temporal characteristics of the framework.

Characteristic	Main forms in games	Function in game narrative	Function in gameplay	Examples cited
SEQUENCE ORDER — AGENT'S CHOICE	Choosing between various objectives	Increases the player's agency	Increases player interaction	Grand Theft Auto: Vice City (2002); Assassin's Creed II (2010)
SEQUENCE ORDER — FLASHBACK	Dialogue, Cutscene, Subtitles, Screen caption, In-game texts, Direct cut	Provides information; Creates variety in narrative; Expressive storytelling	Gameplay mechanic	Prince of Persia: The Sands of Time (2003); Call of Duty 4: Modern Warfare (2007); Assassin's Creed series
SEQUENCE ORDER — FLASH-FORWARD	Dialogue, Cutscene, Subtitles, Screen caption, Direct cut	Provides information; Creates variety in narrative; Expressive storytelling	Gameplay mechanic	Prince of Persia: The Sands of Time (2003); Assassin's Creed III (2013)
SEQUENCE ORDER — ACHRONY	Choosing the order of side missions; Skips	Develops the story; Increases agency	Providses side missions; Alternative gameplay elements	Assassin's Creed II (2010)
NARRATIVE SPEED — SCENE	Realtime mode	Increases the level of reality; Immersive storytelling	Increases the level of reality; Immersive gameplay	-
NARRATIVE SPEED — SUMMARY	Cutscene, Voice-over, Subtitle, Direct cut	Succint storytelling	Keeps the player interested	Assassin's Creed II (2010)
NARRATIVE SPEED — STRETCH	Cutscene, Slow motion	Creates variety in narrative	Gameplay mechanic	Prince of Persia series; Assassin's Creed series; Fallout 3 (2008); Max Payne 3 (2012)
NARRATIVE SPEED — ELLIPSIS	Cutscene, Voice-over, Subtitle, Direct cut	Succint storytelling	Keeps the player interested	Assassin's Creed II (2010)
NARRATIVE SPEED — PAUSE	Tutorial, Cutscene, Pause menu	-	Helps to customize controls and configuration; Provides essential gameplay information; Pauses the game	Assassin's Creed: Brotherhood (2011)
FREQUENCY — SINGULAR	Event happens once	Strong narrative	Keeps the player interested	-
FREQUENCY — ITERATIVE	Recurring events shown once	Strong narrative	Keeps the player interested	Assassin's Creed II (2010)
FREQUENCY — REPETITIVE	Repetition after illegal move or death; Replaying the game	Creates variety in narrative	Practices a gameplay motif; Progresses the player's skills	Prince of Persia: The Sands of Time (2003); Assassin's Creed series
FREQUENCY — MULTIPLE	Repeating gameplay motif	Creates variety in narrative	Practices a gameplay motif; Progresses the player's skills	Assassin's Creed III (2013)
STORYTELLING — LINEAR	There is only one single story and the player's effect on the plot is limited	Strong narrative		Prince of Persia: The Sands of Time (2003)
STORYTELLING — BRANCHING	Player's different choices develops the plot in different directions	Develops the story; Creates variety in narrative	Increases the player interaction	Silent Hill 2 (2001); Prince of Persia: Warrior Within (2004); Far Cry 3 (2013)
STORYTELLING — FOLDBACK	Player's agency changes the direction of thestory, but they fall back to inevitable key events	Expressive storytelling; Increases the player's agency	Provides alternative gameplays	The Walking Dead (2012)
STORYTELLING — EMERGENT	The player's agency can emerge unlimited storytelling possibilities			World of Warcraft (2004); League of Legends (2009); Grand Theft Auto 5 (2013); Watch Dogs (2014)

5.2. ANALYSIS OF SELECTED CASE STUDIES

In this section, two levels have been analyzed as case studies using the framework, namely *At Last We're Here* from *Prince of Persia: The Sands of Time* and *The Prince's Banquet* from *Assassin's Creed: Revelations*.

In the second chapter, architecture's creation of the spatiotemporal context was classified in three categories as: the existing architecture being implemented in a story, and fiction creating its own architecture. The first one makes a call for the history and mythology; the second one takes its roots from the existing knowledge of architecture and creates a utopia, eutopia or dystopia. The same rule also applies for the diegetic dimension of the narratives as well. The story can follow the patterns of existing stories, create its own utopic realm, or focus on the act of creating a story which is called metafiction.

Prince of Persia series is an example to historical and mythical video games. The story takes place in the ancient Middle East, making use of the Middle Eastern myths and stories. The creator of the series also says "1001 Nights - the collection of medieval Islamic folk tales that is the ur-source material for *Prince of Persia*" (Mechner, 2007). In the story of *PoP*, there are magical items like the *hourglass* and *the dagger of time*, royal people, a heroic protagonist who acquires the magical items to fight for the good, a cunning antagonist, and a damsel in distress who needs to be saved.

Assassin's Creed series brings together the mythology and the dystopia in a world of alternative reality. The story starts with the *First Civilization*, those who came before the humans, had advanced in technology, and genetically crafted the humans from their DNA as an inferior slave race. Then they extinct because of a natural disaster in 75,000 BC (Ubisoft Montreal, 2012). This truth has been kept secret and embedded in the motifs of religion and mythology for thousands of years by two enemy factions: Assasssins and Templars. The Templars believe that the eternal peace can only be obtained by the *New World Order*, the ultimate supervision and control of the Templars. The Assassins, on the other hand, believe that such peace can be attained using free will, they fight for free will, and there arises an eternal and unending war between Assassins

and Templars. In the 20th century, humankind was finally able to construct an operational virtual reality machine called *Animus*, which allows them to relive the memories of their ancestors in the historical settings, and they start to investigate the truth about humankind's creation. Designed with the motto "history is our playground," the video game manipulates the human history, retells some myths and stories, and implants an alternative creation story to the humankind, which creates its own past utopia for the epoch of the *First Civilization*.

Prince of Persia: The Sands of Time is an action-adventure game that takes place in a closed ancient Persian palace, and the ultimate aim of the game is to reach the highest tower of the palace. On the other hands, *Assassin's Creed: Revelations* is an open-world game, and includes a simulation of the city of Constantinople in 1511. Both games are in historical fiction genre as explained above. In Prince of Persia: The Sands of Time, manipulation of the time with the magical sand powers is not only a narrative element but also a gameplay dynamic, the Prince can rewind or slowdown the time. In *Assassin's Creed: Revelations*, most of the story takes place in a flashback as a narrative element. The primary in-game character *Desmond* is reliving the memories of the secondary in-game character *Ezio* via the *Animus*. The players enact the historical events and can repeat the memories, but time cannot be manipulated in the gameplay. As a result, levels from these two games selected because of the difference in their spatial and temporal characteristics.

5.2.1. Prince of Persia: The Sands of Time, At Last We're Here

King Sharaman, the Persian king, conquers a kingdom in India with the inside help of the Maharajah's *Vizier*. The son of *Sharaman*, the *Prince*, seeking for a trophy for their victory in his first war, goes to investigate the treasures of the palace. He finds the *Sands of Time*, the *Hourglass* and the *Dagger of Time*. He asks his father to keep the dagger. The Persians collect all the spoils of war; including many treasures, slaves, concubines, and the Maharajah's daughter *Farah*. They visit the ally Persian kingdom of *Azad*, and gift the Sands of Time and Hourglass to the Sultan of Azad, wishing the friendship of their kingdoms endure as long as time itself. All the *Vizier* who once betrayed the Maharajah wants is the Sands of Time to become an immortal god and

have control over the time. He tricks the Prince to open the Hourglass with his dagger. When he does, the Sands of Time gets released; a sandstorm starts to destroy the kingdom and every living thing turns into sand creatures. Only the *Prince*, the *Vizier* and *Farah* remains unchanged since they carry the relics of time: the *dagger*, the *staff* and the *medallion of time*. Scattered by the sand storm, the *Prince* and *Farah* team up to find the *Hourglass*, which is moved to the *Tower of Dawn*, the highest tower of the palace of Azad, and use the dagger to return the *Sands of Time* to the *Hourglass*.The *Prince* and *Farah* fight with the sand creatures, walk through many puzzling and trapped rooms of the palace, and make their way to the Hourglass. In the level *At Last We're Here*, the *Prince* and *Farah* is at the entrance of the Tower of Dawn.

Figure 5.33 shows the operational map of the level. Table 5.3 and Table 5.4 show the analysis of this level with the framework. Figure 5.34 and Figure 5.35 show the thumbnails from the video analysis.

Figure 5.30: Operational map of the level "At Last We're Here".

Table 5.3: Analysis of the spatial characteristics of the level "At Last We're Here" from Prince of Persia: The Sands of Time with the framework.

SPATIAL STRUCTURES	The main setting of the level is the courtyard linked to the Tower of Dawn with a bridge. The courtyard is an example of ZONES AND PLATFORMS. The linking bridge and the stairs are an example of PATHS AND TRAILS. The raising platform in the Tower of Dawn also matches with ZONES AND PLATFORMS. When combined, the general layout of the Palace of Azad has the typology of RHIZOMES AND NETWORKS.
SPATIAL FUNCTIONALITY	SPATIAL REPULSION is not very strong in this level's locations. Locations of the buttons that activate the gates have SPATIAL APPEAL. The gameplay and level structure is primarily based on SPATIAL PUZZLE. The Prince has to activate certain mechanisms in a logical order to open the gates and proceed to the next location.
INTERACTIVE STRUCTURE	Only CHARACTER INTERACTION with a human is with Farah. The second instance of CHARACTER INTERACTION happens when the Prince fights with the sand creatures. Grabbed ledges, elevating platforms, buttons, gates, and the box dragged to activate the gates are the OBJECT INTERACTIONS. Main goal of the NAVIGATION throughout the game is to reach the Hourglass in the chamber on the top floor of the Tower of Dawn, which is at last clearly visible in this level. OBJECTIVE of the level is to reach the Tower of Dawn. The CHALLENGE is the puzzles, and the sand creatures who attack to the Prince and Farah on their way to the Tower of Dawn.
SENSOUSNESS	The game enables the player to change between three different PERSPECTIVE AND CAMERA modes: Third-person view, first-person view, and alternative overall view. COLORS and MATERIALITY of the level set a mood and represent the environment in the ancient Persia. Environmental colors are warm and bright, in contrary with the pastel and cold color of the sand creatures. The Magic Fountains that Prince can never be sure if they are real or he just dreams of them, are emphasised with their contrast to the color scheme of the rest of the game. They have cold and bright colors with illumination in an arabesque blue and dark environment. Use of SOUND in verbal narration, soundtrack and ambiance sets the mood and provides an immersive narrative experience. Voiceovers of the Prince narrating the story is an essential element in this game, since the game starts with Prince telling a story to someone who is revealed at the end of the game. BODY MOVEMENT abilities of the Prince was quite wide and innovative in its age, with his freerunning skills. CONTROLS consist of movement controls, combat controls and magical sand powers. INTERFACES consist of a HUD, on which the health, available Sand Tanks, and rewind duration meter are shown. There is also a pause menu in which Prince asks, "Do you wish me to leave before finishing my story?" if you quit the game.

Table 5.4: Analysis of the temporal characteristics of the level "At Last We're Here" from Prince of Persia: The Sands of Time with the framework.

SEQUENCE ORDER	FLASHBACK is used as a gameplay mechanic in Prince of Persia: The Sands of Time. The Prince can rewind time if he makes an illegal movement. FLASH-FORWARDS are seen as visions at the save game points, where the Prince sees a foresight of the upcoming level. ACHRONY and AGENT'S CHOICE is not available in this game, since there is a very LINEAR and direct storytelling.
NARRATIVE SPEED	Most of the narrative, navigation and combat actions of the game happen in SCENE speed. SUMMARY happens in the visions at the save game points. STRETCH is used to aesthetize a combat movements in slow motion. Also, the Prince can slow down the time with magical sand powers, this way he can move faster than the mechanisms in the game or fight the enemies effectively. Therefore, the game uses STRETCH as a gameplay mechanic, rather than a cosmetic property. ELLIPSIS happens when players skip a cutscene. PAUSE happens when the player pauses the game to customize settings, to take a break.
FREQUENCY	Most of the events of the game happen in SINGULAR frequency. REPETITION happens when the player rewinds the time, or dies and restarts the level. A major REPETITION will happen in the final of the game, where Prince rewinds all the events of the game.
STORYTELLING	The gameplay during this level is primarily LINEAR.

Figure 5.31: Thumbnails from the video analysis of the level "At Last We're Here" from Prince of Persia: The Sands of Time with the framework, part 1

Figure 5.32: Thumbnails from the video analysis of the level "At Last We're Here" from Prince of Persia: The Sands of Time with the framework, part 2

5.2.2. Assassin's Creed: Revelations, The Prince's Banquet

The company of *Abstergo*, the corporation branch of the *Templar Order*, invents the *Animus*: a fictional virtual reality simulator that allows people to revisit their ancestors' memories which are fictionally encoded in their DNA. *Abstergo* is looking for the artifacts called *Apples of Eden*; which, in fact, is an advanced scientific device constructed by the *First Civilization*, stores their advanced technologic knowledge and capable of controlling the human minds. The *Templar Order* has the record that the last human who has seen the *Apple of Eden* they are looking for is *Altaïr* who lived in 1191, in Masyaf, Syria, and happens to be a member of the *Assassin Order*, the enemy faction to *Templar Order* since the beginning of the civilization.

The primary in-game character *Desmond Miles* is a descendant of *Altaïr*. Thus, he was kidnapped by *Abstergo* to relive *Altaïr*'s memories and show them the location of the *Apple of Eden*. This is the plot of the first *Assassin's Creed* game. When the Templars are done with *Desmond*, they decide to kill him (Ubisoft Montreal, 2007), at which point luckily modern branch of the Assassins help him to escape, and the events of *Assassin's Creed II* starts.

They take *Desmond* to the hideout of the Assassins in Florence, and reveal that he has another important Assassin in his bloodline: *Ezio Auditore da Firenze*. Assassins advise *Desmond* to relive *Ezio*'s memories that he can be trained as an Assassin in a short time (Ubisoft Montreal, 2010). In *Assassin's Creed: Brotherhood*, Desmond keeps reliving *Ezio*'s memories when he becomes a *Master Assassin* and rebuilds the *Assassin Brotherhood* in Rome. However, too much exposure to the *Animus* starts showing ill effects on Desmond (Ubisoft Montreal, 2011). Eventually, *Desmond* fells into a coma and his friends keep him in *Animus* to keep his mental state stable.

Here starts the events of *Assassin's Creed: Revelations*. *Animus* is unable to support *Desmond* and puts him in the *Black Room*, the safe mode of the *Animus*. Here, *Desmond* learns that his consciousness and the memories of his ancestors are all mixed up and *Animus* is what still keeps his consciousness intact. *Desmond* has to experience all the

genetic memories with nothing left to observe, in order to separate the fragmented layers of his mind from the lives of his ancestors and leave the *Animus*.

In the remaining memories, Ezio is in his early fifties, and leaves Italy on the on the trail of the Assassin Mentor *Altaïr*, who supposedly left invaluable knowledge in a library beneath the Assassin fortress in Masyaf, Syria. In Masyaf, he finds that the library is locked only to be unlocked by the *Memory Seals* of *Altaïr,* the keys which he finds out to be hidden in Constantinople. He travels to Constantinople in 1511, welcomed by the Ottoman Assassins, Ezio keeps searching for the keys of Masyaf library (Ubisoft Montreal, 2011).

At the beginning of the memory sequence[34] *The Prince's Banquet,* Yusuf Tazim, the leader of the Ottoman Assassins, tells Ezio that the Prince Suleiman is back from his hajj. He is celebrating it by organizing a public banquet in Topkapi Palace, and the Assassins received the information that Templars are planning to assassinate him in the banquet. Assassins will stealthily attend the event and protect the Prince from any possible attacks. Ezio thinks that it can be a way to communicate with Suleiman for his investigation of the *Masyaf Keys* and offers to help them.

They race on the rooftops from the Hippodrome to the Topkapi Palace. There, they see that Italian minstrels are hired as entertainers. The Assassins knock them out and hide their bodies, don their outfits, and infiltrate the banquet without looking suspicious to the guards. While in the courtyards, *Ezio* uses his *Eagle Vision*[35] to detect the Templars and distracts the crowds by playing lute while the Assassins take down the suspects. At the end of the memory sequence, Janissaries spot one of the dead bodies and alert everyone the Assassins are there. Taking the advantage of the chaos, a Templar attempts to kill Suleiman and gets killed by *Ezio* with the broken fingerboard of his lute. Thankful for his help, Prince Suleiman tells *Ezio* to see him after he changes his outfits.

---

[34] *Levels* are called *memory sequences* in *Assassin's Creed*, since they are relived memories in *Animus*.

[35] *Eagle vision* is an advanced skill of sixth sense which is usually seen in the descendants of the *First Civilization*, which allows one to identify whether people are friends or foes or intuitively figure out how to utilize the objects.

Figure 5.30 shows the operational map of the level. Table 5.5 and Table 5.6 show the analysis of this level with the framework. Figure 5.31 and Figure 5.32 show the thumbnails from the video analysis.

Figure 5.33: Operational map of the level "The Prince's Banquet" from Assassin's Creed: Revelations
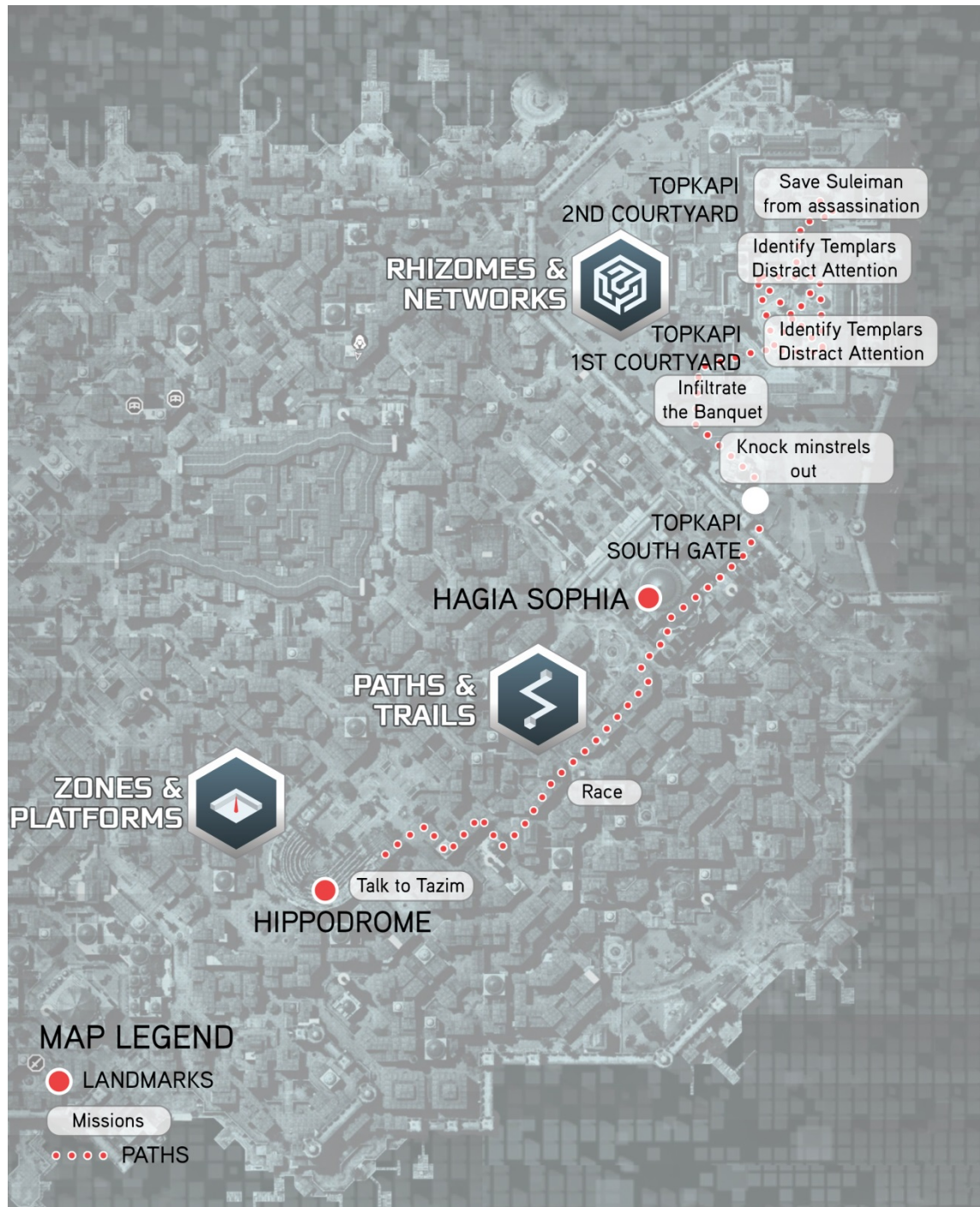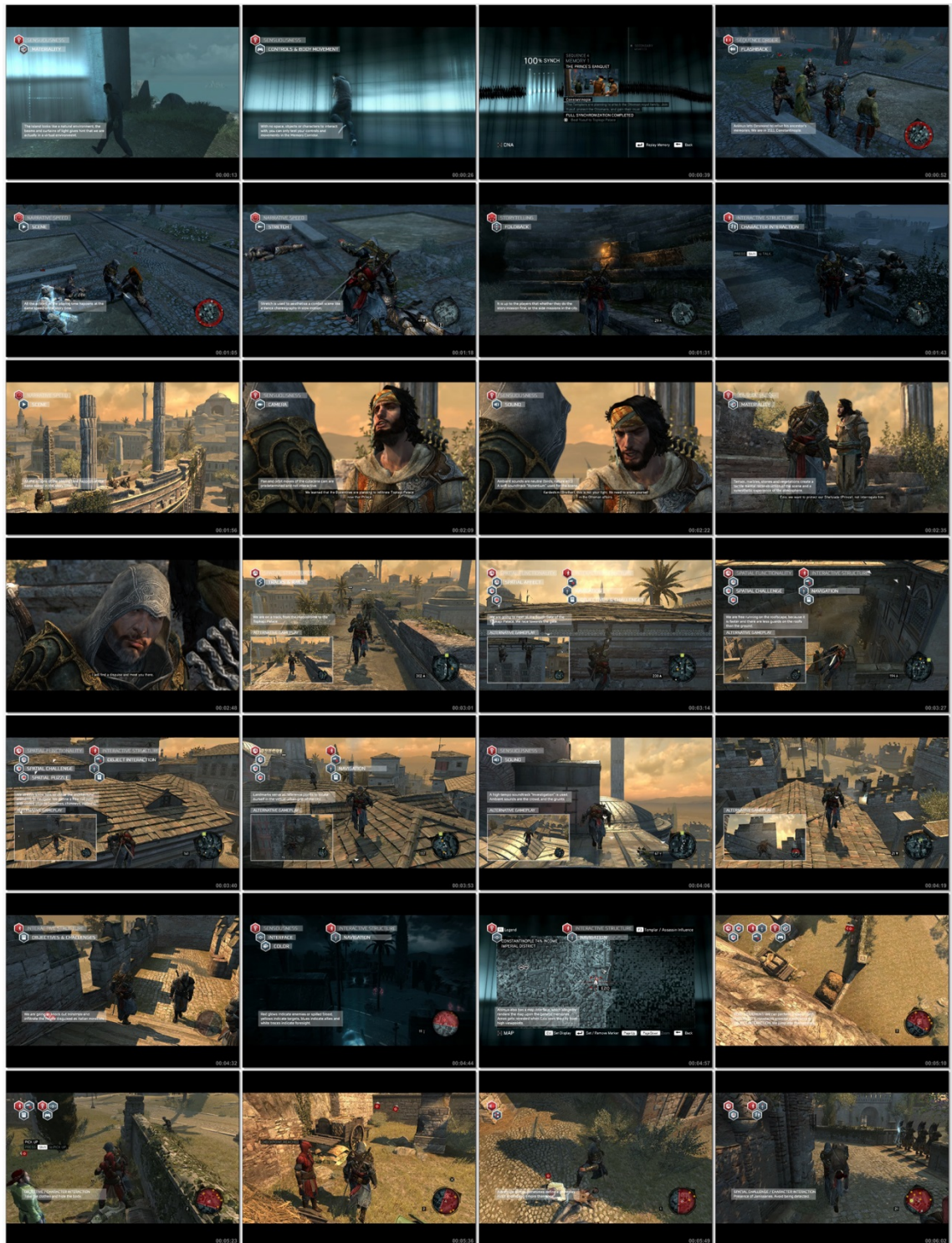
Table 5.5: Analysis of the spatial characteristics of the level "The Prince's Banquet" from Assassin's Creed: Revelations with the framework

|	
SPATIAL STRUCTURES	The level starts with Ezio and Ottoman Assassins racing from the Hippodrome of Constantinople to the South Gate of the Topkapi Palace. The Hippodrome is an example of ZONES AND PLATFORMS with its arena-like structure. The race to the palace follows a path on the rooftops of Constantinople, which matches PATHS AND TRAILS typology. The closed compound of Topkapi matches the definition of RHIZOMES AND NETWORKS, consisting of courtyards and gardens which are ZONES. In larger scale, the city of Constantinople itself is an example of RHIZOMES AND NETWORKS, containing many PATHS AND TRAILS and ZONES AND PLATFORMS.
SPATIAL FUNCTIONALITY	During the race to Topkapi, Ezio and Assassins use the rooftops because of its SPATIAL APPEAL. While knocking out minstrels, Assassins avoid being seen by the Janissaries. Therefore, the front of the Janissaries create SPATIAL REPULSION. There is no intense SPATIAL PUZZLE in this level, yet the path Ezio chooses during the race, utilizing the chimneys, roofs, and ziplines can be considered a minor spatial puzzle to be solved.
INTERACTIVE STRUCTURE	All fights with the soldiers, talks and races with the other Assassin's, knocking out the minstrels, blending in the crowds, identifying the Templars, saving Prince Suleiman from the assassination, and the conversation with Suleiman are CHARACTER INTERACTION. Grabbing the buildings while freerunning, using weapons, performing a leap of faith to haystacks, and playing the lute are OBJECT INTERACTION. Racing to Topkapi, locating the minstrels, avoiding being seen by the Janissaries, and locating the Templars are NAVIGATION actions. OBJECTIVES of the level: The Templars are planning to assassinate Prince Suleiman on the banquet he organizes to celebrate his return from his hajj. Ezio should infiltrate the palace, don the outfits of Italian minstrels to look unsuspicious, locate the Templars, distract the crowd while the Assassins take the Templars down, and kill the Templar who attacks Suleiman in the end. CHALLENGES are to beat Yusuf on the race to Topkapi, and remain undetected by the Templars while knocking out the Italian Minstrels.
SENSOUSNESS	Primary PERSPECTIVE during the gameplay is third person view, changing to predetermined CAMERAS during the cutscenes. Use of COLOR is very prominent in Eagle Vision, which shows the enemies, allies, and objectives highlighted with certain colors. MATERIALITY change is best observed between the ancestor memories in Constantinople (natural, old and physical), and the Memory Corridor of the Animus menu (digital and immaterial). Use of SOUND in verbal narration, soundtrack and ambiance sets the mood and provides an immersive narrative experience. BODY MOVEMENT range of Ezio is quite wide, he can perform freerunning, perform leap of faith from heights if there is a soft spot like a haystack to land to name a few. CONTROLS are based on the Head – Armed Hand – Empty Hand – Legs tetrad, each being controlled by a button. Actions have high profile and low profile options (e.g. walking vs. running, jumping vs. performing a leap of faith). INTERFACES are provided by the Animus, shows objectives, the mini-map, synch level, controls, and weapons on the HUD. The last three is turned off in the demo.

Table 5.6: Analysis of the temporal characteristics of the level "The Prince's Banquet" from Assassin's Creed: Revelations with the framework.

SEQUENCE ORDER	The player is free to choose when to play a memory of Ezio, it is up to the AGENT'S CHOICE. The story itself takes place in a FLASHBACK, since Desmond is reliving the memories of his ancestor Ezio through the Animus. Side missions in the city, for example, the fight before talking to Yusuf Tazim is an ACHRONIC event.
NARRATIVE SPEED	Most of the story events and gameplay happens in SCENE speed. When Ezio kills a guard with a combo movement, STRETCH is used to aesthetize the combat scenes like dance choreography in slow motion. ELLIPSIS is used after Ezio talks with Yusuf Tazim, after getting the minstrels' clothes to wait for the banquet, and when Ezio says he will talk to Suleiman after changing the minstrel outfits. PAUSE happens when a new objective is explained, or when the player pauses the game to reach the inventory, to customize settings, to take a break.
FREQUENCY	Most of the events of the game happen in SINGULAR frequency. REPETITION happens when the player is desynchronized and has to repeat the memory. MULTIPLE frequency is seen during the repeating gameplay motif of knocking out the minstrels, locating the Templars, and distracting the crowd with the lute while the Assassins take the Templars down.
STORYTELLING	The gameplay during this level is primarily LINEAR. Throughout the game, some FOLDBACK storytelling elements can also be seen.

Figure 5.34: Thumbnails from the video analysis of the level "The Prince's Banquet" from Assassin's Creed: Revelations with the framework, part 1

Figure 5.35: Thumbnails from the video analysis of the level "The Prince's Banquet" from Assassin's Creed: Revelations with the framework, part 2
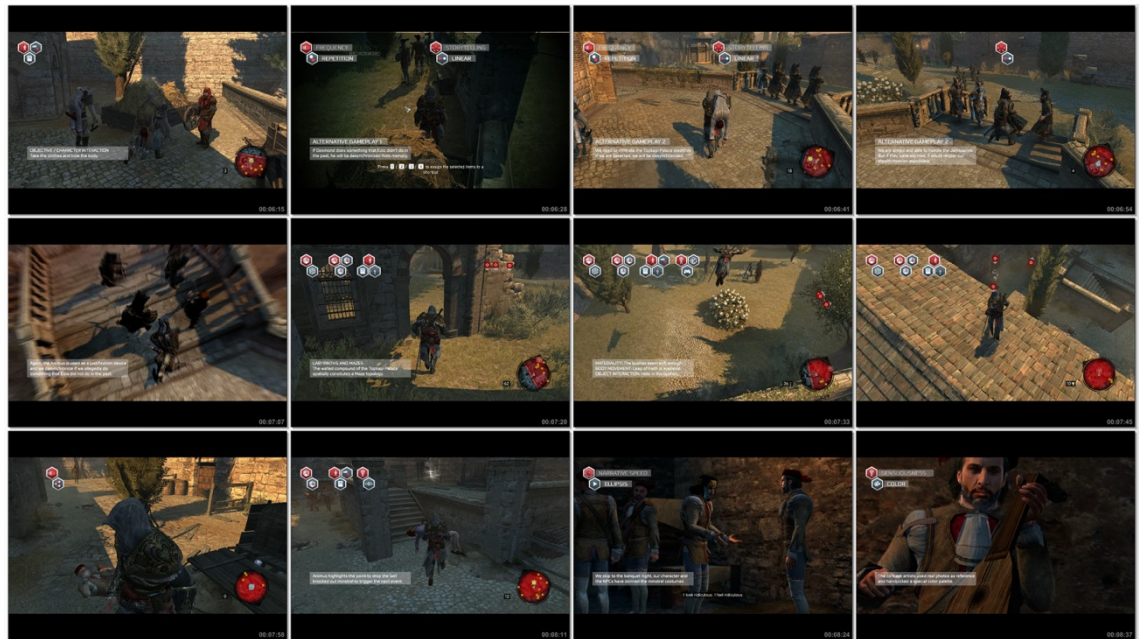
5.3. USE OF THE FRAMEWORK IN VIDEO GAME DESIGN

The framework has been used as an analysis tool so far. However, the framework is intended to be not only an analysis framework but also a design tool. To illustrate what would it look like to use the framework as a design and representation tool, a sample level was designed for the *THROWN* video game project of the author. Some visualizations of the level were used in Chapter 4 to explain spatial structures (see Figure 4.2 to 4.5). Figure 5.36 shows the spatial characteristics of the framework applied to the sample level with pictograms on the design phase.

Figure 5.36: Spatial functionality shown in the sample video game level.
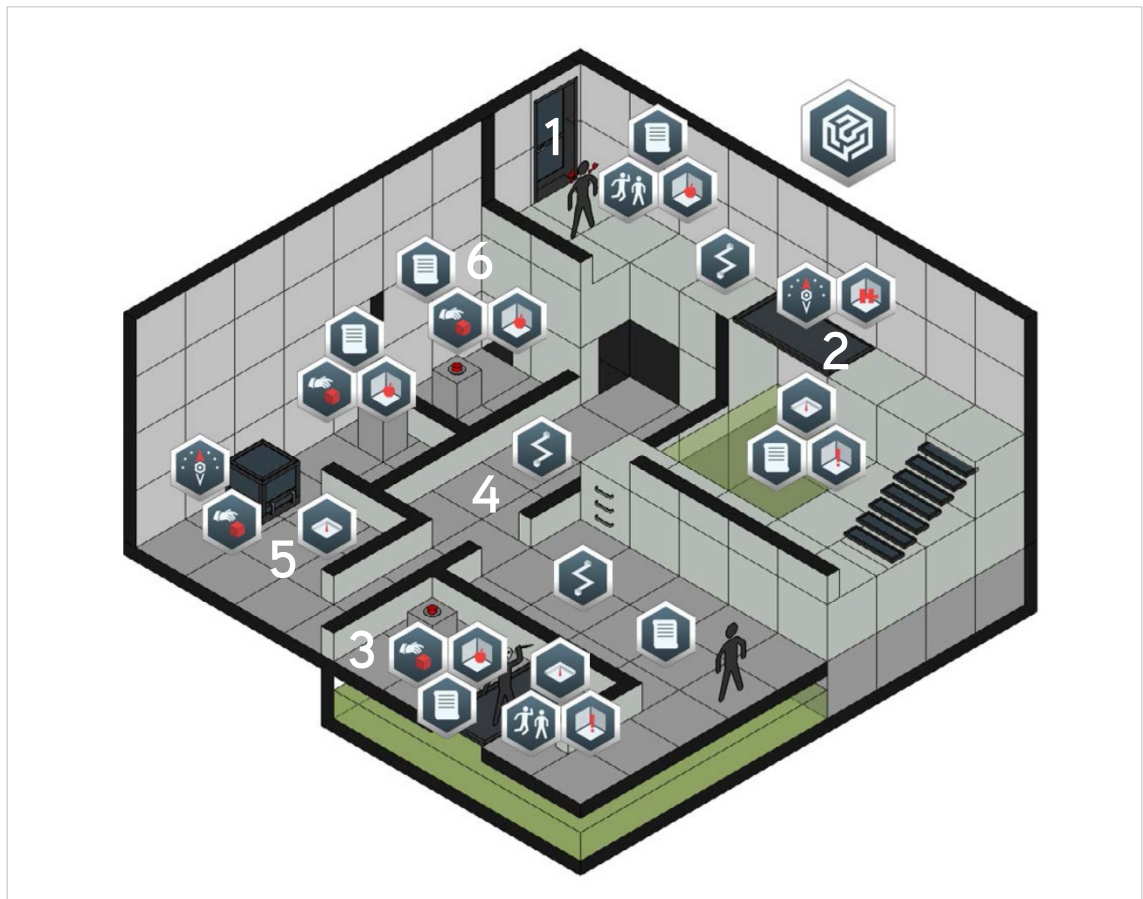

The objective of this level is to escape the chamber from the *exit door* [1] up the stairs. The door is not reachable because of the gap between the platforms. From the endless pool, it seems that the chamber is settled on a deep reservoir or sea. The player needs to

raise the *bridge lift* [2] to create a bridge to the exit door. There is a sign on the wall, telling, "Lifts are operated remotely from the operator rooms." The switch which activates the lift is in the *Operator Room I* [3]. There is a hostile guard in the *Operator Room I* and the in-game character are unarmed. However, he stands on a mossy lift which looks similar to the lift which the persona needs to activate. There must be other operator rooms, which activate the lift on which the guard stands. There is a corridor ahead [4]. On the left end of it, there is a hidden room [5] with a bonus item in it. The persona needs to move a box out of his way to reach the item. On the right end, there is another hidden room, which is the *Operator Room II [6]*. The sign on *Operator Room II* verifies that the switch "Activates the Sea Lift in *Operator Room I*".

In order to escape the level, the players need to figure out this puzzle with the visual and spatial hints, and the signs on the walls. They should find the *Operator Room II* without being seen by the guard, activate the *sea lift* to throw the enemy to the sea, go to the *Operator Room I*, activate the *bridge lift,* climb the stairs, and exit the room. Optionally they can collect the bonus item in the hidden room at any point in the level.

Figure 5.37 shows the elements of sensuousness in the sample level. Figure 5.38 and Figure 5.39 shows the thumbnails from the video analysis of the level with the spatial characteristics of the framework.

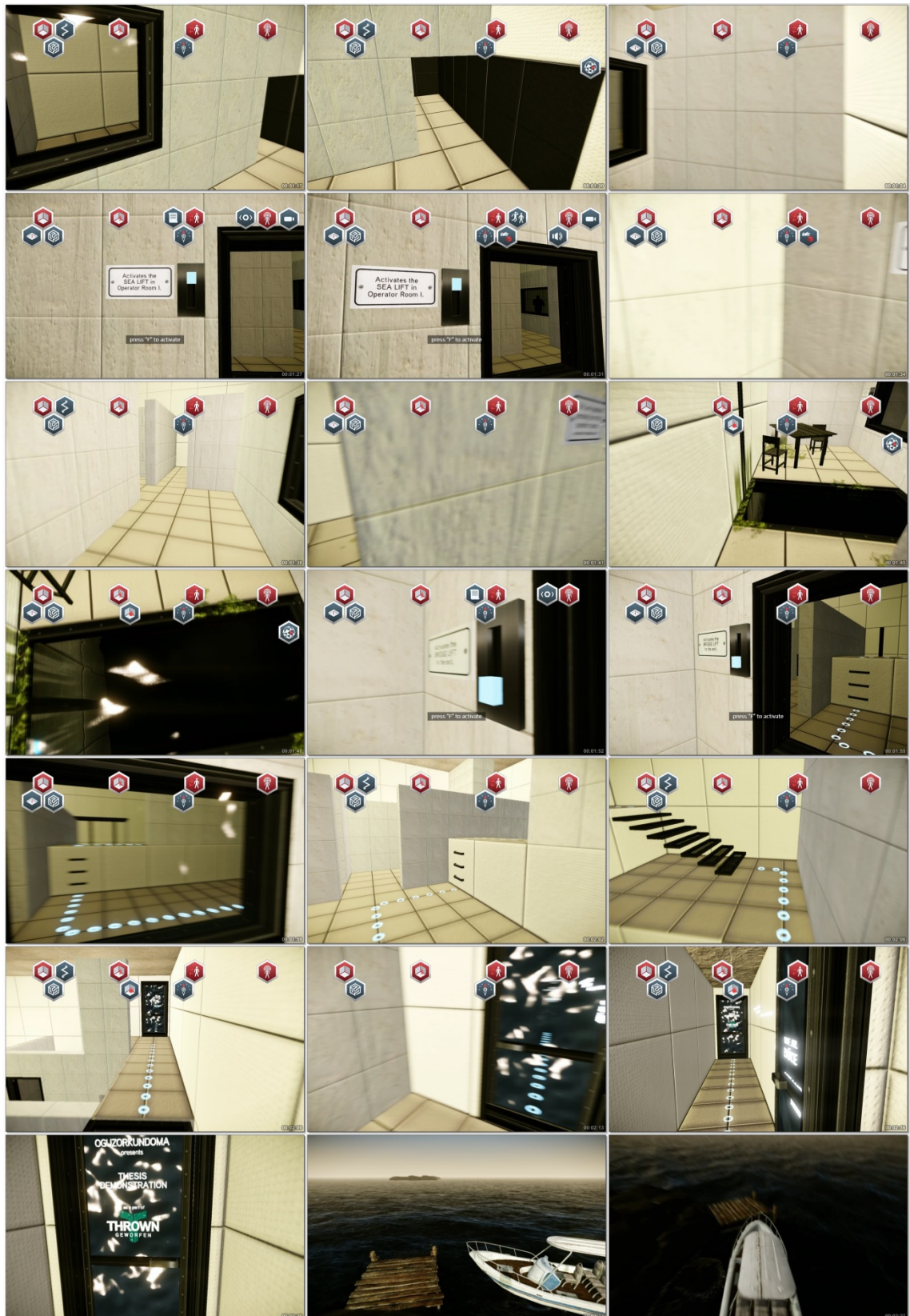**Figure 5.37: Elements of sensuousness shown in the sample video game level.**
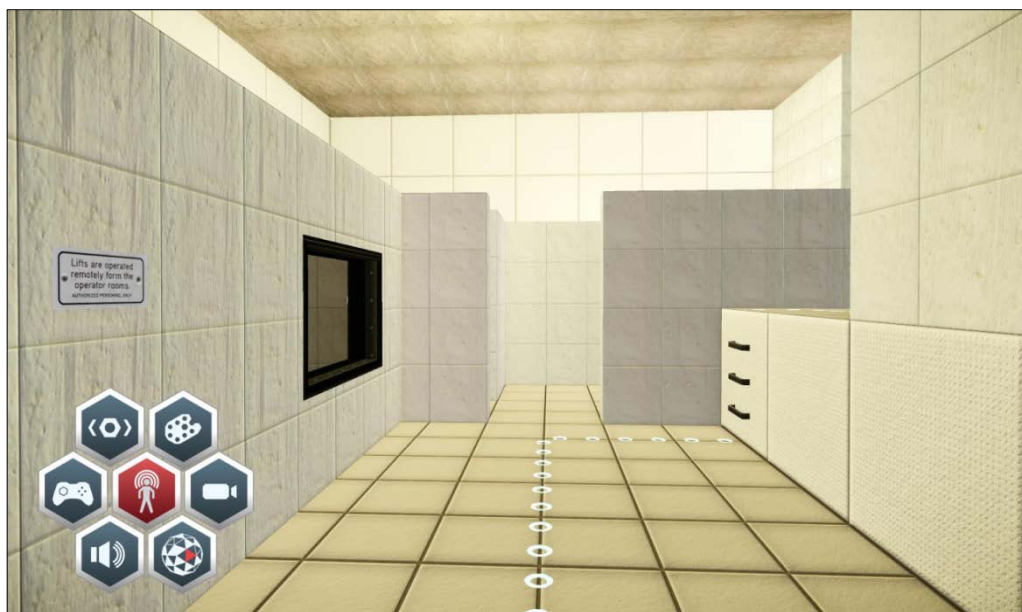
Figure 5.38: Thumbnails from the video analysis of the level designed with the framework for THROWN, part 1
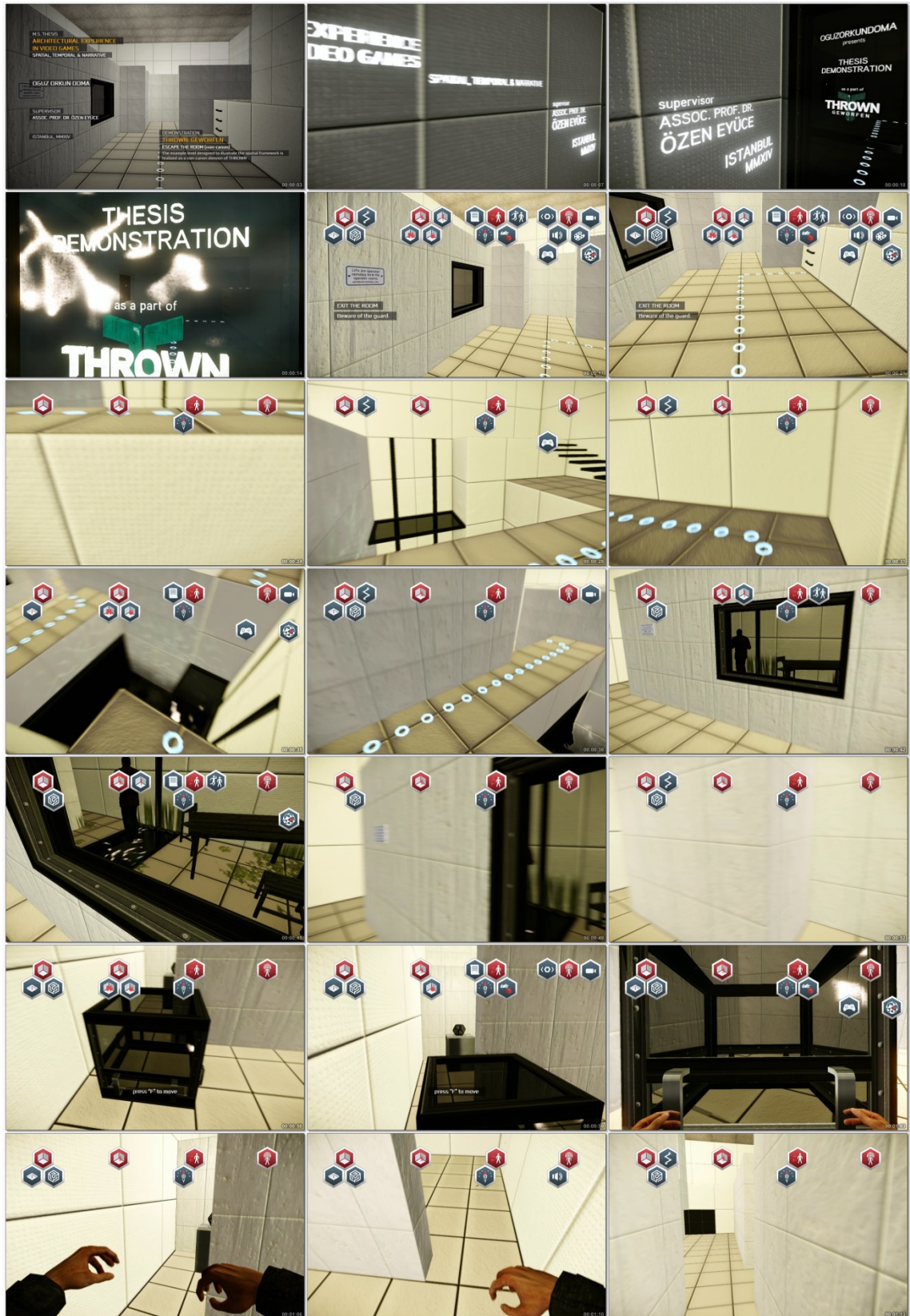
Figure 5.39: Thumbnails from the video analysis of the level designed with the framework for THROWN, part 2

6. CONCLUSION

Video games bring many disciplines together. Architecture is a leading one of those many disciplines work together to construct the fictional space opportunities of the video games.

Space is the shared field of interest of architecture and video games; thus, it is useful to make a definition of the space. Space can be defined as the *milieu* in which the life takes place. The definition of space requires a living inside it, and a being to experience it. Therefore, the space is defined by experience and perception. From this perspective, a definition of architecture might be the design and production of space, which does not limit the architecture to the act of building.

Video games tell stories not only to be listened or watched, but also to be lived, perceived and experienced by people. Being based on human experience, fundamental bases of a video game is *space and time*, which work as a spatiotemporal complex in video games. Thus, the design of video game is a question of designing space and time. Telling their stories embedded in the designed environment; architecture and video games, in a way, walk arm in arm.

Role of architecture in video games has been discussed throughout the thesis. Another question is what architects can learn from the video games. How can the insights of the developed framework inspire the architects to shape the future of spatial environments with developing digital technologies?

This thesis attempted to propose an analytical framework for the spatial and temporal characteristics in video games. The temporal characteristics in this study are essentially based on the narrative theory; they require a level of manipulation of time which seems to be out of the humankind's abilities for now. The spatial characteristics, on the other hand, take their roots from the theory of architecture, perception, and phenomenology. In this perspective, the framework considers spatial structures to consist of zones as nodes, paths connecting the nodes, and a resulting network created by these nodes and

paths. These structures have symbolic and functional meanings, and can be perceived as repulsive, appealing, or puzzling by the observer. All the interactions with and within the spaces are embedded to be disclosed by the observers. The atmosphere of the space is also enhanced with sensuous elements, such as color, light, materiality, sound, smells[36], etc. Approaching the architecture from this perspective of designing a space of emotional and operational experience might reveal new perspectives that are otherwise goes unnoticed with functional approaches. In this scope, the spatial part of this framework can be adapted to a design and mapping tool for teleological spaces and memory spaces, such as the Jewish Museum Berlin by Daniel Liebeskind.

In the proposed framework, s*patial functionality* and *interactive structure* turn the static *spatial structures* into a dynamic component. With the *sensuousness* inputs, the game space is experienced immersively via personas. *Storytelling structure* adjusts the level of the player's agency in the plot. *Sequence order*, *narrative speed* and *frequency* create expressive storytelling and variety in narrative.

The next question is how this framework can be useful for video game designers. The framework was intended to be both an analysis and design tool. In the scope of this thesis, due to the time limitations, the framework was applied on single levels as case studies. If games are analyzed as a whole, and the pictographic pattern outputs of the analysis of different games are compared, the framework can illustrate repeating narrative and gameplay motifs visually. Such output can provide feedback for the designers. Shared motifs and patterns in the video games that are considered popular or successful can be analyzed, although the new designs will not be a mere recollection of these patterns, the patterns to be used as a reference in video game design such as the *pattern language* of Christopher Alexander.

Alternatively, as seen in the example of *THROWN*, the framework can be used in the design process as a tool to visualize spatial characteristics of a space to emphasize the narrative and gameplay elements better.

---

[36] Smells are unfortunately not available in video games due technologic limitations.

The sensuousness category of the framework just names the sensuous components of the spatial experience; these categories need to be further elaborated with the help of various disciplines, including cinema and architecture. Also, Genette's narrative theory is insufficient to analyze the complex and flexible temporality of the video games. In this thesis, four temporal modes were introduced to stabilize and adapt Genette's model. However, the temporal structure of video games requires a brand new conception of narrative time.

The analysis videos, as seen in Chapter 5, show the pictograms being used as an interface. For future studies, the framework can be developed to be a complete design and visualization tool, supported by software.

The feedback of video games on the visual and representational language of architecture could also be a good field of research based upon this thesis.

REFERENCES

Books

Aarseth, E., 2007. Allegories of Space: The Question of Spatiality in Computer Games. In F. Von Borries, S. P. Walz, & M. Böttger, eds. *Space Time Play: Computer Games, Architecture and Urbanism*. Basel: Birkhauser, pp. 44–47.

Adams, E., 2010. *Fundamentals of Game Design*, Berkeley: New Riders.

Bal, M., 2009. *Narratology: Introduction to the Theory of Narrative* 3rd ed., Toronto: University of Toronto Press.

Baudrillard, J., 1999. *Simulacra and Simulation*, Michigan: Michigan University Press.

Bergson, H., 1998. *Creative Evolution*, New York: Dover Publications.

Bergson, H., 1999. *Duration and Simultaneity: Bergson and the Einsteinian Universe*, Manchester: Clinamen.

Bergson, H., 2001. *Time and Free Will: An Essay on the Immediate Data of Consciousness*, New York: Dover Publications.

Bernet, R., Welton, D. & Zavota, G., 2005. *Edmund Husserl*, New York: Routledge. Available at: http://books.google.com/books?id=FMuiZJ9RTzAC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false.

Von Borries, F., Walz, S.P. & Böttger, M., 2007. *Space Time Play: Computer Games, Architecture and Urbanism* F. Von Borries, S. P. Walz, & M. Böttger, eds., Basel: Birkhauser.

Bridgeman, T., 2007. Time and space. In D. Herman, ed. *The Cambridge Companion to Narrative*. Cambridge, MA: Cambridge University Press, pp. 52–65.

Calvino, I., 1974. *Invisible Cities*, Orlando, FL: Harcourt Brace & Company.

Ching, F.D.K., 2007. *Architecture: Form, Space, and Order* 3rd ed., Hoboken, NJ: John Wiley & Sons, Inc.

Deleuze, G., 1986. *Foucault*, London: Althone.

Deleuze, G. & Guattari, F., 1987. *A Thousand Plateaus: Capitalism and Schizophrenia*, Minneapolis: University of Minnesota Press.

Genette, G., 1988. *Narrative Discourse Revisited*, New York: Cornell University Press.

Genette, G., 1980. *Narrative Discourse: An Essay in Method*, Ithaca, NY: Cornell University Press.

Groat, L. & Wang, D., 2013. *Architectural Research Methods*, New York: Wiley-Blackwell.

Heidegger, M., 1996. *Being and Time*, New York: State University of New York P ress.

Heidegger, M., 2001. *Poetry, Language, Thought*, New York: Harper & Row.

Herman, D., 2002. *Story Logic: Problems and Possibilities of Narrative*, Lincoln, NE: University of Nebraska Press.

Jenkins, H., 2004. Game Design as Narrative Architecture. In N. Wardrip-Fruin & P. Harrigan, eds. *First person : New media as story, performance, and game*. Cambridge: MIT Press, pp. 118–130.

Juul, J., 2011. *Half-Real: Video Games between Real Rules and Fictional Worlds*, Cambridge, MA: MIT Press.

Lefebvre, H., 1991. *The Production of Space* 1st ed., Oxford, UK: Wiley-Blackwell.

Lynch, K., 1960. *The Image of the City*, Cambridge, MA: MIT Press.

Mechner, J., 2007. The sands of time: crafting a video game story. In P. Harrigan & W. Wardrip-Fruin, eds. *Second Person: Role-Playing and Story in Games and Playable Media*. Cambridge: MIT Press, pp. 111–120.

Murray, J., 1997. *Hamlet on Holodeck: The Future of Narrative in Cyberspace*, Cambridge, MA: MIT Press.

Nitsche, M., 2008. *Video Game Spaces: Image, Play, and Structure in 3D Worlds*, Cambridge, MA: MIT Press.

Norberg-Schulz, C., 1980. *Genius Loci: Towards a Phenomenology of Architecture*, New York: Rizzoli. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Genius+Loci:+T owards+a+Phenomenology+of+Architecture#0 [Accessed December 18, 2012].

Pérez-Gómez, A., 2006. The Space of Architecture: Meaning as Presence and Representation. In A. Holl, Steven; Pallasmaa, Juhani; Pérez-Gómez, ed. *Questions of Perception: Phenomenology of Architecture*. San Fransisco, CA: William Stout Publishers, pp. 8–25.

Petzet, H.W., 1993. *Encounters and Dialogues with Martin Heidegger*, Chicago, IL: University of Chicago Press.

Quirk, T., 1990. *Bergson and American Culture*, Chapel Hill, NC: University of North Carolina Press.

Safranski, R., 2008. *Heidegger: Bir Alman Üstat*, Istanbul: Kabalci.

Sharr, A., 2007. *Heidegger for Architects*, New York: Routledge.

Wagner, N., 2010. *Turning Back Time: Duration, Simultaneity, and the Timeless in Fitzgerald and Fincher's Benjamin Button*. Georgia State University. Available at: http://digitalarchive.gsu.edu/cgi/viewcontent.cgi?article=1101&context=english_theses.

Wolf, M.J.P., 2008. *The Video Game Explosion*, London: Greenwood Press.

Wolf, M.J.P. & Perron, B., 2003. *The Video Game Theory Reader*, New York: Routledge.

Zoran, G., 1984. Towards A Theory of Space in Narrative. *Poetics Today*, 5(2), pp.309–335.

Journals

Marrati, P., 2005. Time, Life, Concepts: The Newness of Bergson. *MLN*, 120(5), pp.1099–1111. Available at: http://www.jstor.org/discover/10.2307/3840699?uid=3739936&uid=2&uid=4&uid=3739256&sid=21102193565851.

Wei, H., Bizzocchi, J. & Calvert, T., 2010. Time and Space in Digital Game Storytelling. *International Journal of Computer Games Technology*, 2010, pp.1–23. Available at: http://www.hindawi.com/journals/ijcgt/2010/897217/ [Accessed December 18, 2012].

Other Publications

Brand, J.E., Knight, S. & Majewski, J., 2013. The diverse worlds of computer games: a content analysis of spaces, populations, styles and narratives. In *Proceedings of the Digital Games Research Association Conference (DIGRA '03)*. Utrecht, Netherlands. Available at: http://www.digra.org/wp-content/uploads/digital-library/05150.06387.pdf.

Désilets, P., 2013. The Link between Video Games and Literature: Assassin's Creed. *Istanbul Tanpınar Literature Festival 2013*.

Gaudiosi, J., 2012. New Reports Forecast Global Video Game Industry Will Reach $82 Billion By 2017. *Forbes*. Available at: http://www.forbes.com/sites/johngaudiosi/2012/07/18/new-reports-forecasts-global-video-game-industry-will-reach-82-billion-by-2017/ [Accessed January 10, 2013].

Hitchens, M., 2006. Time and computer games or "No, that"s not what happened'. In *3rd Australasian Conference on Interactive Entertainment*. pp. 44–51.

Infinity Ward, 2007. Call of Duty 4: Modern Warfare.

Moss, K.R., 2008. *The Power of Timelessness and the Contemporary Influence of Modern Thought*. Georgia State University. Available at: http://digitalarchive.gsu.edu/cgi/viewcontent.cgi?article=1031&context=english_diss.

Ubisoft Montreal, 2007. Assassin's Creed.

Ubisoft Montreal, 2010. Assassin's Creed II.

Ubisoft Montreal, 2012. Assassin's Creed III.

Ubisoft Montreal, 2011. Assassin's Creed: Brotherhood.

Ubisoft Montreal & Mechner, J., 2003. Prince of Persia: The Sands of Time.

Valve Corporation, 2007. Portal.

Smith, D.W., 2011. Phenomenology. *Stanford Encyclopedia of Philosophy*. Available at: http://plato.stanford.edu/entries/phenomenology/ [Accessed December 10, 2012].