PATHS IN VIRTUAL SPACES: DESIGNED AND PERCEIVED

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1. Introduction:

The present goal and effort of this thesis is part of a larger forthcoming investigation of the reciprocal influence between architecture and computer games fields. Given the fact that few analytical research investigations have been done on the structure of spatiality in computer games, this paper will examine a finer detail of this topic: paths. The literature on paths is vast in fields such as space planning, but there are limited approaches that study and analyze this particular topic in computer games. Even though the resulting research risks being too specific, it will hopefully provide useful details for works on the broader topic of spatiality in computer games. In addition, this study it will prove the importance of this spatial element for better observing cognitive player behavior, and will provide valuable knowledge to level designers, in particular, for maps and environment virtual space planning.

2. Designing and perceiving paths:

First, in this chapter, it will be stated the analytical definition of *paths* and of hodology, the science of paths studies. Following, the notion of paths in virtual space will be introduced through relevant research articles from the computer games studies.

As defined by Oxford Dictionary, the word path stand for "a way or track laid down for walking or made by continual treading, the direction in which a person or thing moves, a course of action or conduct". In this paper, the meaning of path will stand for all these three definitions. First, path/paths will be analyzed from a structural urban planning perspective; secondly from a narrative point of view with regard to the direction/orientation of the player in virtual space; and last, paths will be examined the course of action and conduct the player takes while facing with the notion of the first two. As hodology studies paths in various fields such as mathematics, computing science, neuroscience, psychology, philosophy, geography, this paper tries to accomplish an analytical model of paths in the virtual spaces of videogames.

"Spatiality is a main theme in computer games" as theorist Espen Aarseth claims in his article *Allegories of Space.* In this particular study, he states the importance of defining the meaning of space in computer games. He also raises the question of functionality and representation of space in videogames, and takes a stab at analyzing this topic:

"As spatial practice, computer games are both representations of space (a formal system of relations) and representational spaces (symbolic imagery with a primarily aesthetic purpose). […]
Instead, drawing on both Leirfall and Lefebvre, I will posit spatial representation in computer games as a reductive operation leading to a representation of space that is not in itself spatial, but symbolic and rule-base. The nature of space is not revealed in this operation, and the resulting product, while fabricating a spatial representation, in fact uses the reductions as a means to achieve the object of gameplay, since the difference between the spatial representation and real space is what makes gameplay by automatic rules possible. In real space, there would be no automatic rules, only social and physical laws" (1998, p.163).

The key words of Aarseth's theory are "representation of space", which provide a rules and relations based logical system, and "spatial representation", which stands for an inconsistent and non rule-

base system that has only social and physical laws. Partially agreeing with the presented general theoretical analysis of the virtual space, helps to set the grounds of the specific thesis topic for this paper: paths are designed as elements represented in the virtual space and are not in themselves spatial, but symbolic and ruled based.

To understand further the connotation that paths have as elements of virtual space, Michael Nitsche's model of spatial structures in game spaces was evaluated and applied to paths studies as a more specific theoretical analysis. Nitsche is more concerned to categorize types and virtual space with regard to their representation. He goes into detail explaining "what particular shape the architectural references take in the world of video game spaces" (2009, p.171):

"These structures arrange the spatial units in their own way: paths, edges, and regions, as well as the use of textures, vistas, and colors, define their appearance and functionality. Based on the connection between the   spatial logic and its implementation in game worlds, this chapter closes with an abstracted model for space-driven functionality. In many ways, this model is a large-scale version of the argument for evocative narrative elements in game space, one that projects them into larger terrains and levels" (2009, p.117).

First, Nitsche is classifying the different elements of virtual space structures and then he analysis in depth some of them. Few of the categories names are drawn directly from architectural and urban planning vocabulary.

In his attempt, Nitsche is building his virtual space structure on the Kevin Lynch's urban model. Referencing back to the urban structures presented from Lynch's book *The Image of the City* and taking a closer look at the urban model, it seams that a lot of the information presented can be translated into game studies and used to analyze paths in their virtual spaces. From an urban point of view, the term *path* is very well explained by Kevin Lynch:
"The paths, the network of habitual or potential lines of movement through the urban complex, are the most potent means by which the whole can be ordered. The key lines should have some singular quality which marks them off from the surrounding channels: a characteristic spatial quality, a special texture of a floor or façade, a particular lighting pattern, […] a typical detail or mode of planting" (1960, p. 96).

It is helpful that another attempt of explaining paths in game environments has been done, and this paper will try to extend this study perimeters using the same resource (Lynch's model) while combining it with knowledge from the existing study (Nitsche model).

Lynch describes the paths as one of the main element for ordering the "whole". Could a game be designed starting from a path? To some extent it may, but there are games that do not intent to have avatars guided by paths and rather having a sense of freedom of movement, which in the end would be the "network of potential lines of movement". In the end, even if the entire game environment is accessible to the player's avatar, there are still preferred tracks and trails, which later they can become paths of movement. In two phrases, Lynch is pointing out not just the importance of paths, but also how they can be made more visible, recognizable, and distinctive. In many games, which represent realistic spaces, the elements described in the quote above are embodied into the virtual environment as part of the desired design. The spatial quality of a certain texture of a floor or façade, or of a particular lighting pattern, or a typical detail or mode of planting vegetation are guiding avatars in virtual environments as well as people in real world.

Translating into videogames studies the urban planning observation of Lynch, Nitsche highlights how the "virtual levels mirror the real world's spatial limitations" (Video Game Spaces, 2009, p.173). As

Nitsche findings are more oriented towards player experience and ways of designing of tracks and rails for most relevant player experience, his theories will be mentioned later in this paper.

To further develop the path-designing/perceiving model, case analyses on three particular games are completed. The three games are *Assassins Creed* (Ubisoft Montreal, 2007)*, Mirror's Edge* (Electronic Arts, 2008)*, and Flower* (Sony Computer Entertainment, 2009). The reasons why these games were selected are enumerated in the order of importance: features of game play, point of view, spatial structure, and aesthetics.

In this paper, the analysis of games is used to support with arguments the theoretical findings. Games are analyzed by fallowing Aarseth (Playing Research, 2003, p.2) recommendation for combining few procedures while gaining knowledge about them. The first phase of Aarseth analysis model is to study the design, rules and mechanics of the games, then fallow with observation of others playing; and finalize with reading the games reports and reviews and self-playing the game. Each phase offers its own information about the game and can be studied on its own, but for a better overview, this paper combines data from all stages. For the purpose of this paper research, Aarseth's game analysis model is more suitable than Mia Consalvo and Nathan Dutton's model of critical game analysis in which there are four areas considered for research: object inventory, interface study, interaction map, gameplay log (Game Analysis, 2006, p.1). Also, Konzack's *seven layers* game analysis model was reviewed with the intention of being use while researching and analyzing games for this paper, but studying the hardware, program code, functionality, and socio-culture would not have brought a substantial contribution to the proposed thesis. (Aarseth, 2003, p.2)

First, introducing Assassins Creed, a third person action-adventure video game developed by Ubisoft Montreal and published by Ubisoft. It was released worldwide in November 2007 on the PlayStation 3 and Xbox 360 video game consoles and in April 2008 for Windows. The game centers around use of a machine named the "Animus", which allows the viewing of the protagonist's genetic memories of his ancestors. Through this plot device, details emerge of a struggle between two groups, the Knights Templar and the Assassins, over an artifact known as a "Piece of Eden" and the game primarily takes place during the Third Crusade in the Holy Land. Its virtual environment built on a map resembling three metropolises. The towns of Acre, Damascus and Jerusalem were virtually constructed in cooperation with historians, and actually many of the modeled elements shown in the game still exist and can be seen in the real world cities. In addition, an empire encircles the three towns. On these maps, the player's avatar can walk, run, jump or ride through on horseback along the roads. Even though advertised as being a sand box type of environment, there is little deviation from the tracks when the avatar is horse back riding. On these maps invisible wall are placed along the paths, so the player has only the possibility of fallowing them.

The game Assassins' Creed has a new dimension to its navigational environment that is given by the vertical level orientation, in addition to the usual horizontal orientation designed and experienced by players in other videogames of similar genre. The design of the environment was developed with this spatial planning approach in mind. By adding the option of vertical axis of movement, the experience in Assassin's Creed gameplay makes the player to feel more in control of the game session's progression and outcome.

Urban designers and architects think about spaces for almost the same reasons as game designers. Except from the interest in the physical construction of the objects within a space, game and level designers also are concerned with different functional and aesthetic values they can project through a space.

Starting to implement Lynch model of defining and designing paths into the analysis of the representational space in Assassins Creed, calls for the urban designer's precise statements:

"[…] a concentration of some special use or activity along their margins, a characteristic spatial quality, a special texture of floor or façade, a particular lighting pattern, a unique set of smells or sounds, a typical detail or mode of planting. […] These characters should be so applied as to give continuity to the path. If one or more of these qualities is employed consistently along the line, then the path may be imaged as a continuous, unified element. It may be a boulevard planting trees, a singular color or texture of pavement, or the classical continuity of bordering facades. The regularity may be a rhythmic one, a repetition of space openings, monuments, or corner drugstores" (The Image of the City, 1960, p.96).

Since Assassins's Creed game environment is rendered fallowing accurate historical data of the three cities urban planning as well as architecture, it is obvious that all the elements enumerated above by Lynch were implemented into the game virtual space. Would the implementation of these characteristics make the player react as in real world even though he/she is given the possibility of navigation on any surfaces? The answer is a mixture of yes and no since there are parts of the game where these characteristics are implemented to delineate a precise path that need to be fallowed, but the same elements are implemented in the parts of the game where the player has freedom of navigation aside from the projected path. Usually, when the avatar has the freedom of movement, the player fallows the path of missions, fallows the goal of the assigned tasks. So this explains how in sandbox virtual environment, there are still preferred paths preferred by players, paths that represent the shortest route to completing the assigned mission.

Going into the subtopic of this paper as how the paths are perceived in the game Assassins Creed, asked for empirical research that has been done particularly for this paper. Four subjects were observed while playing, than they answered a set of nine questions relevant to the topic of paths. In addition, same set of questions were asked to other subjects that have played the game, and has been posted on Assassins Creed forums. Collecting the data, a discrepancy was observed between the answerers to the questionnaire and players' ingame behavior. Most of the players answered that they always take the shortest trajectory to reach the mission place, the goal. While observing, 2 out of 4 players fallowed the roads towards the targeted place even though it was not the shortest route. The two players that took the option of navigating on the streets, actually interacted, to a high degree, with the Artificial Intelligence as they would interact in real life. Another interesting observation was that none of the players that were observed tried to jump from the margins of an elevated road while back riding on the horse. When asked why, they claimed that they actually did not felt that the horse could jump more than the obstacles found on the road. The ingame player behavior of the four subjects observed was mapped at times by their cognitive behavior, the actions which they are used to do in real life.

There were also other instances when player would rather chose the path of a road than to climb on the buildings and, never the less, the subjects observed played the game extensively before. In addition, there are times in the game when the player best solution for progressing is to fallow urban paths and use the architectural structures as they would in reality. A relevant example of the cognitive behavior implying ingame behavior is demonstrated by the actions the avatar takes when he/she has to pass through the guarded city gates: the recommended action is to blend into a group of monks and pass by the guards unnoticed. The image below serves as a visual reference to the particular ingame action described.

The list of visual characteristics enumerated from Kevin Lynch model earlier in the paper, is found in the visual aesthetics and user interface of this game maps. Exploring the

game environment as the real world, players encounter activities along the paths margins such as interacting with Artificial Intelligence characters. At times, players use the spatial and architectural characteristic qualities of items encountered along the paths as if they were objects from the real environment. Below is a visual example of a player using the lather to go up, rather than climb the wall of the building, which he/she has the freedom to do.

The spatial texture of floors and façades were stylized and rendered with the intention of being able to convey similar feelings as the texture or façade patterns on a real city street. Particular lighting pattern, such as shadowed or brightly lighten places, imply similar behavior for ingame and real life activities such as fallowing the brightly lighten places for navigation and hiding in the shadow.

In the first game presented, were reviled the two types of paths: the path designed and perceived in the virtual space as in real life; and the goal driven path, which respects less the laws of real world.

In the second game, the path towards the goal is built more realistically and resembles with the model of a factual urban path.   This consideration is taken upon the observation of the constant architectural structures use combined with the use of color theories in using color accents on a monochromatic environment; those are the major elements that provide continuity to the path of avatar's mission. Mirror's Edge is presented as a first person action adventure game made by ENKI and Digital Illusions CE, and was published on November 2008 to Play-station 3 and Xbox 360. The PC version was published in January 2009. The game has stylized graphics of a minimalist realistic world represented by a white cityscape with highlighted colored items serving for navigation clues. It is different from most other first person perspectives games. The game shows a wide row of control: as sliding under barriers, tumbler, climb on the wall, long and high acrobatic jump and publishers would sale it as great freedom of movements. The game is a virtual parkour at high altitude. The story settings have been put in the frames of a "big brother" world where all communication is greatly under the surveillance of the totalitarian regime. There is a network of a runners, including the head figure, Faith, who deliver messages secretly to the totalitarian system's opposition group member, while they avoid the government's surveillance.

Compared to Assassin's Creed, Mirror's Edge presents an environment with less freedom for movement as the path towards the goal is highlighted with an accent color in the white virtual city. The axes of movement still appear to remain vertical and horizontal, as the player has to solve the puzzle of

progressing through the path in optimal time. As a side note, when comparing the two stories of the games, Mirror's Edge stands out as being less of a fighting game. The path Faith fallows in the game resembles Nitsche's definition of tracks and rails, which "aim for movement simulation and the overall game space's visceral impact" (Video Game Spaces, 2009, 173).
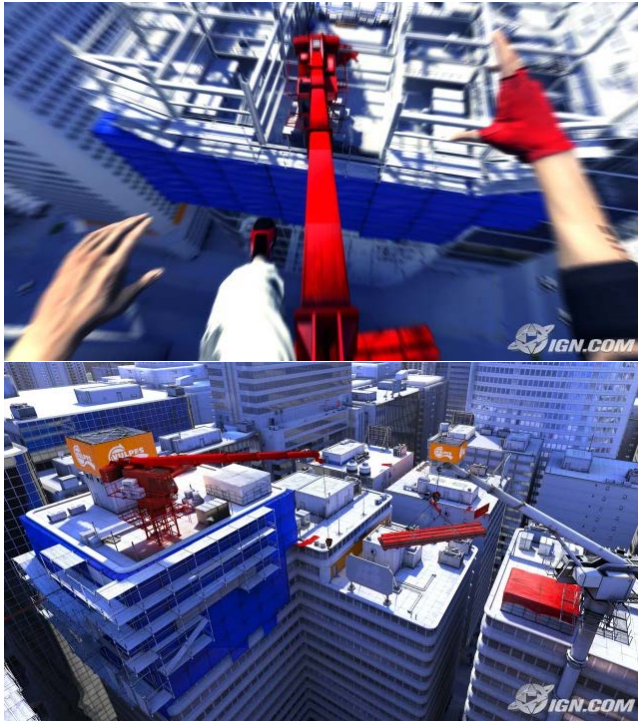
Never the less, DICE stretched out the concept of race in this game and released a new version in February 2009 named Mirror's Edge DLC, in which the level design is minimalism at its supreme as is composed of floating geometrical shapes somewhere above an ocean. It could feel like running through a surreal painting. It seams as if the release of Mirror's Edge DLC has been purposely done to emphasize the aesthetical/visual coding of paths, in this case color coding
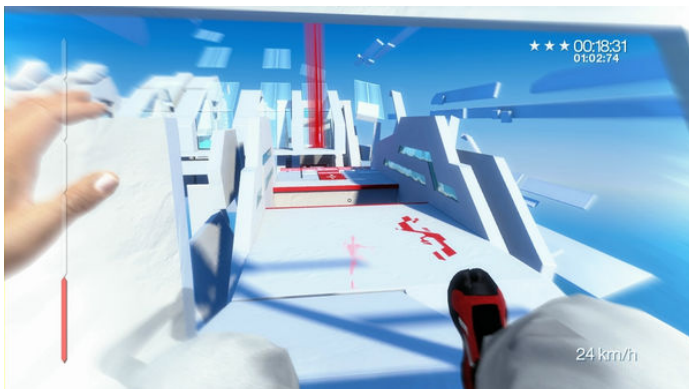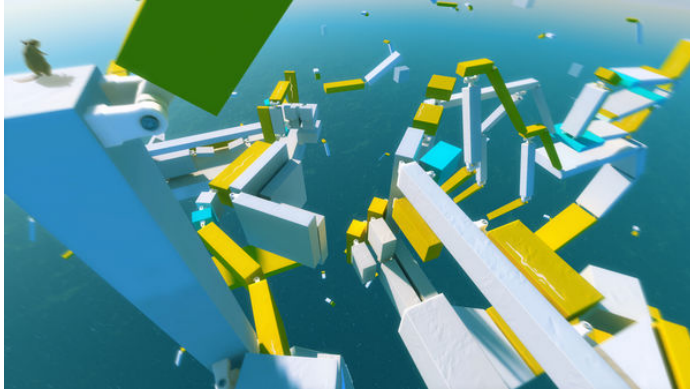
From the visual hierarchy of the streets of Kevin Lynch mentioned earlier, the images above are striped down to bare functional hierarchy as the skeleton of the level. The line of motion has clarity of direction (The Image of the City, 1960, p. 96).

Introducing the third game: Flower. The game is still viewed from a first person perspective point of view, but is categorized in a total different genre than the first two. It is a PlayStation 3 game available on the PlayStation Network. It was developed by ThatGameCompany and published by Sony Computer Entertainment on February 2009. Jenova Chen, one of the game's designers stated that the game was intended to be "a portal that would allow you to be embraced by nature." Each level takes place in a different flower's dream; the flowers are placed on the windowsill of a dull city apartment. As the player progresses through the game, the apartment and city gradually becomes more vibrant and colorful, until total nature rebirth and the cityscape is replaced by a vibrant field with mountains in the background when reaching the completion point. The player, in the place of the wind avatar gathers and than guides flower petals at the beginning through fields and later through the city. The main mechanic of floating is completed by tilting the motion-sensitive controller left and right and than by pressing any button on the controller would give a speed boost. The aim is to guide the petals close to other flowers, which are glowing, in the field and completing the different tasks of not touching the rusty electrical structures in one level, or touching the metal scaffolds triggering an explosion of color that spreads throughout the game environment. Flower utilizes the Six-axis motion controls in the PlayStation 3 controller, and it is used to guide the flowers' petals around the map and in the representation of the game space.

The game brings a new dimension to determining the path towards a goal: tactile feedback felt in the controller. The controller rumbles when the player steers the accumulated flying flower petals close to a row of glowing flowers from which player can accumulate more petals. The aesthetics, visual as well as audio, convey a serene environment and nature progressively awakens to life. The path is elegantly revealed through the visual of lighten flowers spread or packed in groups on the surroundings landscape.

Architecture and Design are mostly perceived by people as the appearance of a building façade or the form of an object rather than for their usability. Actually, the regular every day architectural user misses on the essentials of its spatial planning, structure and design: the usability, the carefully intended design of the space or form that communicates a particular performance to their consumers. Similar values would have also a level design, values that essentially include level orientation. "Both disciplines suggest specific uses of space and point to the value of spatial structuring, but they do not suggest any precise spatial format" (Nistche,Video Game Spaces, 2009, p.172).

Another important aspect of videogames' paths is their narrative potential of two features: setting and action. Both have been argued earlier as the first, referencing to settings, stands for the structure on which some of the settings are built, and second, mentioned earlier as the paths towards the assigned goal the player needs to achieve. As mentioned by Marie-Laure Ryan in her article *Beyond Myth and Metaphor* (2001, p.1)*, setting, action, character are the three traditional components of narrative. She argues that action is left to the user, but the above games analyzed in this paper prove that paths can be designed to manipulate player behavior as planned actions. This topic will need in depth analysis and research, which the scope of this paper does not permit.

3. Conclusion

Tackling a specific part/component of a game will contribute to a methodical overall analysis. Studying and conceiving a model to analyze paths, on their own, will provide grateful information about certain players behaviors and furthermore contributes to a more thorough analysis of the spatial structures when insights from each area are gathered.

Further works: does the definition of paths stated above would provide the similar feedback if applied on multiplayer games? It will be crucial to find out if the model would be applicable to games of different genre.

Of course, paths can be studied on their own and they can provide useful information about players' behavior in the structured game environments, but the scope of this text is to provide analytical

research data argument by few use cases. Later, the analyses will be combined with information from each area of videogames spatial structures, aiming towards a more comprehensive analytical overview of architectural discipline implication and importance into videogames.

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