

Advanced Game Theory Project

Influences of fictional elements in virtual environments

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Abstract

This paper will investigate the influences of fictional elements in virtual environments by applying theories related to level design and environmental storytelling (Carson, 2000). Using a practical setting we will analyze how these theories influence game experience. Furthermore we will study the relationship between rules and fiction by designing two different instances of the same environment featuring the same rules but with a different fictional representation. We will apply Juul's theory of *themable* games (Juul, 2005) in an effort to see if and how a different fictional representation influence rules.

To evaluate player experience in both environments we will combine player observation with a qualitative interview.

1. Introduction

In an effort to investigate how fictional elements affect player experience and performance in games, we will design an experiment where the players are put in one of two virtual environments to play an instance of a game. The primary goal for the experiment is to measure the importance of representation for learning and internalizing the rules of a game. The game goal will therefore in both instances be the same, to successfully navigate a maze and escape. The two mazes will be structurally identical. However the representation of the mazes will be different.

One maze will function as the ‘control-maze’ featuring a neutral representation that will neither add to or subtract from the player’s ability to internalize the space and learn the rules of the game. The second maze will feature designed landmarks and lighting effects that will cue the player in on the goal area as well as the optimal path through the maze. There will be a designed shortcut, which will allow the player to escape the maze faster. The representation of this shortcut will be different in the two mazes.

By taking a starting point in the techniques described in Don Carson’s article (Carson, 2000) and applying them to the first maze, we hope to investigate the influence of environmental storytelling on the player’s experience in a virtual environment.

The placement of landmarks in the maze will be inspired by the theories presented in articles from Alessandro Canossa (Canossa, *Designing Levels for Enhanced Player Experience, Weaving Experiences: Values, Modes, Styles and Personas*). We hope this will show that it is possible to optimize the internalization of the space and by extension the rules of the maze, by using the appropriate fictional elements.

For the experiment we will divide our participants in two groups. The two groups will play only one of the two levels, to ensure there will be no bias regarding the knowledge of one of the level when playing the other one. We intend to test how rules and fiction interact and how the representational layer in games communicate the system of rules to a player.

2. Theory Review

2.1 Environmental Storytelling

One of the aspects we want to analyze about fictional elements in level design is how they are integrated into the virtual environment and how they are interpreted by players. For this purpose we found the theories of Henry Jenkins (Jenkins, 2004) and Don Carson (Carson, 2000) about environmental storytelling relevant.

In his article Jenkins tries to find a middle ground in the narratology versus ludology debate by focusing on narrative spaces instead of stories. His argument is that game designers should not be seen as storytellers but rather narrative architects. Jenkins quotes a Gamasutra article written by Don Carson about environmental storytelling. Carson argues that “the story element is infused into the physical space a guest walks or rides through” (Carson, 2000) and he gives some hints on how to convey narrative through level design choices. Jenkins builds on that and points out that “game designers should study melodrama for a better understanding of how artefacts or spaces can contain affective potential or communicate significant narrative information” (Jenkins, 2004).

These theories work against the common ways of conveying narrative through cut scenes or text present in mostly every game with a strong narrative. Fictional elements can be implemented in level design in order to help give a meaning to the space and to what players are doing. Props, textures and so on can convey narrative through their representation, actions and their integration with the environment.

Another significant point raised by Carson is that the way spaces are constructed and structured also have to guide the player through the game and through the narrative the designers want to convey. This is a delicate problem in videogames since players can decide to behave in unexpected ways and their way of relating to the environment can be really unpredictable for the designer. How to guide and how to convey narrative through level design will be discussed later when we'll analyze our practical example.

Theme parks are one of the examples of how we can infuse a specific narrative into space. As argued by Carson level designers can learn a lot from theme parks and the way they have been constructed in relation to the theme they want to convey. Some theme parks like Disneyland not only try to use elements that belong to the universe of their movies but also create a story for the people visiting the attraction.

2.3 Rules and Fiction co-shaping player experience

For the purpose of this project we will use Juul's definitions of rule and fiction described in his book *Half-Real* (Juul, 2005). To ensure that the fiction is enhanced in one of the mazes we will apply the theories of Carson, Jenkins and Canossa.

Jesper Juul defines rules and fiction in games as two elements that co-shape the player experience. Expanding on the concept of Magic Circle used by Salen & Zimmerman (Salen & Zimmermann, 2004, p. 95), Juul argues that games project a fictional world where the rules define a subset called "game space" in which the game is played.

Building on his separation of rules and fiction, Juul argues that fiction cues the player into understanding the rules and that the fiction of any game can be replaced with something else. Juul puts forward his claim that a game can be changed from one setting to another and that players can control wooden figures rather than humanoid characters.

Every game has a set of rules that defines how the inputs of the player are interpreted. The same set of rules determines the outcome of such interaction. Juul argues that fiction can cue the understanding of the rules. In a puzzle, players may be helped in understanding how they should interact with some game objects thanks to their visual representation that may convey certain affordances.

The interpretation of fictional elements by players is something we are going to test with our experiment. We want to study how players give their own interpretation of fictional elements in virtual environments by applying the theories suggested by Carson and Jenkins.

Player experience rise from the interaction between the game and the player and such interaction is not merely about giving inputs to the system through a controller. We argue that interaction also involves an interpretation that goes back and forth between the player and the game which makes players internalize the virtual environments and its rules.

When players create meaning they are also cued in understanding how the fiction relates to specific rules. That said, it can happen that a personal interpretation of a fictional element raise some expectations that are not fulfilled by the rules, therefore giving the player a sense of incoherence. For example if the fictional representation of an object indicates that it can be broken by shooting at it, the same should happen for other objects with the same representation because players *expect* to be able to break them like he or she did before.

3. Design of the virtual environments

In order to combine our theoretical background with a practical aspect and to test our claims we decided to design two levels. Because of the limited time frame available for this project we chose the Unreal Engine 3 (Epic, 2003-present) which allowed us to re-skin existing props instead of modeling them from the ground up. The goal was to have the same set of rules for both environments but with a different fictional representation that could investigate some of the points discussed above about fiction and rules.

For this purpose we chose to create a maze where players have to find the exit after starting from the initial position. The maze features, among some dead ends paths, a engaging area, a hazardous area, a shortcut, a blocked path and the exit. We initially planned to also have a cave in the maze, in order to implement some environmental storytelling, but unfortunately we didn't have the right props available in the Unreal Editor to do that.



Figure 1



Figure 2

In the first version of the maze, the hazardous area (Figure 1 and 2) has been designed as an area where we did not want players to go because it contained a trap that leads to the player's death. Instead of saying explicitly with textual feedback that they should not go there, we designed the path to the place in order to convey danger and to cue players into constructing a logical narrative explaining why they died in there.

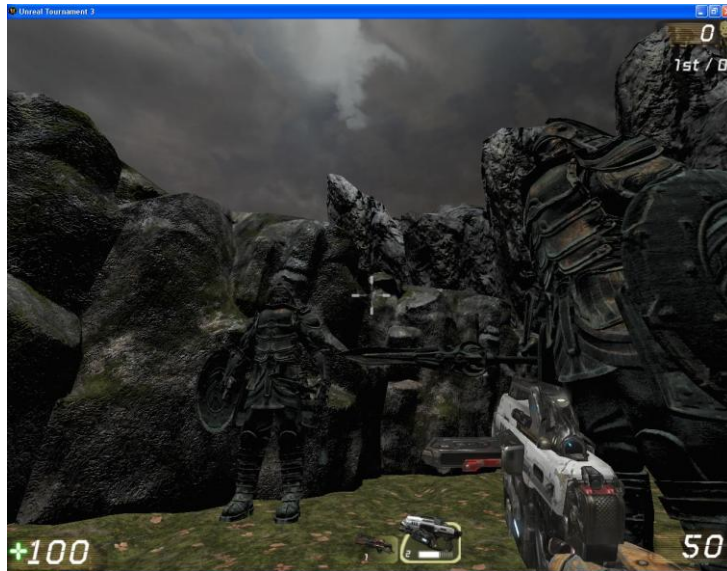


Figure 3

The path starts with two statues pointing swords against the players (Figure 3), trying to convey the idea of trying to block the path. The following section has different rocks and ground in order to signal a change in the environment, and a red light pervade the atmosphere. Those choices were inspired by the “cause-and-effect” method (Carson, 2000), which was meant to guide players towards making assumptions on what comes next in the level. An open area shows up to the player and a cliff with red light coming from it is crossed by a bridge with an area at the end. The trap here is that the bridge is not solid and if the player steps on it he or she will fall into the precipice.

The entire area is designed to express danger using red lights and volcanic rocks. We took into account that players may not fear to go to scary places because often that's where they have to go in order to progress in games.

When they die by falling off the cliff we want them to create a reasonable explanation for why the bridge was not solid. In order to do that, we applied an ethereal texture on the bridge model, so that players could understand why the bridge was not solid. In the second version of the maze the bridge will have normal textures that will make it look solid, so that the reason for falling will hopefully be different. The second version of the maze will also omit all the environmental

changes and fictional cues like the statues, the spiky rocks and the lights. There will be no indication that such area is dangerous like in the first maze.



Figure 4

Before the beginning of the hazardous area we designed a shortcut (Figure 4) that allows players to regain the right direction and avoid the dangerous one. One rock on the wall is represented with a different texture which can be traversed freely since there is no collision. The rock is pointed out by a statue that opens its hand towards the secret path. A path on the ground also leads in the direction of the rock. In the second version of the maze there is no statue, no different ground and the rock looks exactly like the near ones.



Figure 5



Figure 6

The engaging area (Figure 5) is designed to contain a puzzle that blocks the player's progression towards the exit. In the first maze the path will be blocked by a giant blue statue of a dragon (Figure 6), and the player is guided by a path on the ground leading to an open area where the actual puzzle is. The area features a

smaller representation of the same dragon seen before, but surrounded by three statues of samurai warriors.

To solve the puzzle players have to activate the statues in a certain order to move them towards the dragon and make it collapse into the ground. The order will be queued by the amount of armor on the statues as well as the color, bronze, silver or gold. The order goes as follows: the bronze statue has no armor and has to be pressed first, the silver armor has some armor and has to be pressed second, and finally the gold statue has full armor and is the last to be pressed. When the small statue of the dragon disappears the same happens to the big statue and so the next area can be explored. We embedded a different value into each statue by adding metallic materials. We hoped that the combination of materials and armors would convey a hierarchy and by extension convey the order in which the statues have to be activated. We chose the lowest one in the hierarchy to be activated first because we wanted to convey a progression from the weakest to the strongest.



Figure 7

In the second version of the maze all three statues and the dragon will be replaced by blocks (Figure 7) having the same colors as the statues in the first version of the maze. The goal here is to trigger a different interpretation in the first version of the

maze, where we wanted to convey the idea that players have to send the three warriors in order to defeat the dragon.



Figure 8



Figure 9

In order to reach the exit, players have to pass a last section blocked by a wall that has to be shot to be destroyed. In the first version of the maze the wall has a glass

texture (Figure 8) in order to invite players to shoot it. In the second version the wall is made of normal concrete (Figure 9).

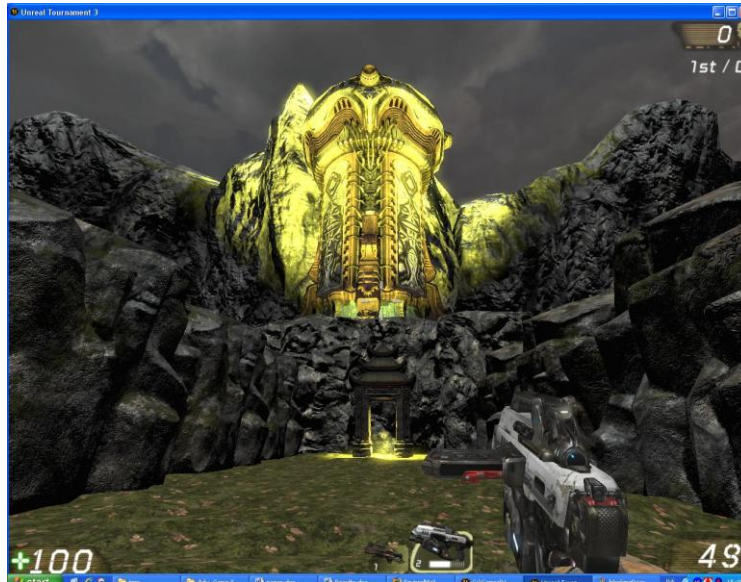


Figure 10

After that the path leads to the exit (Figure 10), represented by a small temple with a glowing yellow light in it. The first maze has a landmark represented by a huge tower right behind the exit, which is illuminated by the same kind of yellow light. “Landmarks are graphical, functional elements or traits that are mostly visible everywhere from within a section of the level and provide a visual/mental backdrop to the action and cues both for physical orientation and planning the next move” (Canossa, A., *Designing Levels for Enhanced Player Experience*, p.3). The tower is visible from the rest of the maze. Its placement can orient the player towards the exit. In the second version of the maze such landmark is absent.

4 Playtesting

This chapter will focus on documenting the methodology used in the playtest conducted in the project period. The test serves to investigate if the points we raise in the report can be observed in practice in the user experience provided in our level. Furthermore the chapter will give reason for our chosen methodology.

In the conceptual stage of our level design we incorporated participants to evaluate our early puzzle design and representational choices. The participants consisted of fellow students with a high level of game literacy. We chose to incorporate them in order to test the logic of the maze and puzzle design. The tests were done in an informal manner where we asked the participants to play the unfinished prototype. These participants of course became biased by their knowledge of the experiment and therefore excluded from the final test.

The initial puzzle consisted of two elements, which had to be activated in a random order to open a door and progress. It was pointed out by the confidants that the interaction was too simple for the representation to have any meaningful impact on the logic of the puzzle. This led us to redesign the puzzle to incorporate three pieces which had to be activated in the right order to remove the obstacle that blocks the player's advancement in the maze as described above.

The test population consisted of ten participants, six males and four females. The participants were students at the IT-University of Copenhagen aged 19 to 30. The population was not representatives of the general public since they had above average game literacy. They were however representatives of the sub-group which possess a higher degree of game literacy.

The participants played two single player game maps created for the Unreal Engine 3. The participants were divided into two groups based on a random draw. The groups were identified by two different colours – *Red* and *Blue*. Members of the blue group would play the map with less representation and members of the red group would play the map with the richer representation. Before the test started an introduction was given to the controls of the game as well as inviting participants to think aloud.

If any technical problems should emerge during the playtest, the game was restarted from the beginning. During the playtest the two group members took up different roles. To minimize the engagement of the interviewer with the participant during the playtest, the introduction to the game was given by an instructor while the interviewer would occupy the observer role until the interview phase. The method for the interview was based on the semi-structured interview method (Kvale, 1997). The interview was followed by a debriefing, where the participant was informed of the interview goal and had the opportunity to ask questions.

The play test was conducted on a standard gaming PC featuring a LCD screen in an office at ITU, where only the interviewer, instructor and the participant would be present. The game would be loaded and ready to play at the beginning at the test session.

In order to frame the interview in a structured manner an interview guide was produced (see Appendix A). The guide contained predefined questions to start the discussion. In accordance with the semi-structured interview method, the interview guide allowed for some improvisation to pursue interesting developments in the interview. Each question was designed with theme and dynamics in mind. The theme of the interview was to reveal the impact of the theories we had incorporated in the level design. The theme had to be preserved without sacrificing the dynamics of the interview.

By attaching keywords to the questions, in the interview guide (see Appendix A), the interviewer had the option to use a keyword to spark a reaction from the participant should the interview enter a 'dead phase'. To ensure a balanced pace and positive conversation between the interviewer and the participant, the formulation of the questions was done in a way to allow a high degree of neutrality. It was important that the questions would spark discussion but at the same time not imbed the initial expectations for the experiment.

For analyzing the interview results we used Kvale's *meaning condensation method* (Kvale, 1997). The first step was to read through the whole interview to get a sense of its entirety. Then we determined the meaningful keywords which were expressed by the participant. The third step was to attach a simple as possible theme to the keywords. Then we framed the keywords as questions in order to

generate sentences that would relate to the theme. The sentences served as a base for a discussion which led to the analysis results. We combined this with the observation of player behavior in the game space. The context of the analysis was the theories incorporated in the level design.

5. Evaluation of Results

After the playtesting sessions we condensed all the notes and answers we got from observing participants and from interviewing them in according to the meaning condensation method. Once we had the feedback from the two groups we started analyzing the results. We will call the level with enhanced visual representation “*maze 1*”, and the control level “*maze 2*”.

It was clear from the beginning that *maze 1* had been more successful in guiding the players towards the exit since all the participants that played that level found the exit. Our participants in the other group gave up more frequently in *maze 2* when stuck at the puzzle of the three colored objects. In the end three out of five participants in the control group gave up before reaching the exit. This result gave us indications that the theories we incorporated in our design had an impact on the player internalization of the space and the player performance in the game.

The representation of the walls in the maze seemed to have no influence on the participants’ ability to recognize the environment as a maze. There was no division between the two groups but in *maze 1* the Oriental style of the environment was pointed out by the majority of the participants in group *Red*. We noticed that they associated the different props located in the different areas, like statues, the bridge and the little temple They linked them because of their graphical style, thereby associating the entire level as an Asian themed environment.

The main landmark of *maze 1*, the big illuminated tower, helped some players in understanding which was the direction to take, but surprisingly some of our participants either did not notice it or did not think it was an element of importance. We also noticed that by being seen from almost every section of the

level, the landmark was misinterpreted in the hazardous area, since some players thought they *had* to cross the bridge because it was leading in the direction of the tower.

An interesting side effect of the landmark was that it influenced the player behaviour inside the game space even though it was clearly located outside the game space. Juul defines the game space as a part of the fictional world enclosed within the Magic Circle (Juul, 2005, p.166) where players have agency (Murray, 1997, p. 126), and where the fictional world outside the circle does not influence the game experience. But as we have seen the landmark had influence on the player experience, therefore we would argue that it was part of the game. For example the interview revealed that the landmark had lured some people onto the bridge drastically changing their game experience when they died.

The design of the shortcut was pretty unsuccessful since most of the players didn't notice the marks on the ground nor the statue in *maze 1*, except for one case where the participant noticed that there was something different but didn't dare to cross the non-solid rock. In *maze 2* there were no signs to guide the players to find the shortcut and, as we predicted, nobody found it. Something we noticed with our landmark and also with our engaging area was that players tended to not pay attention to the textures on the ground.

In the hazardous area of *maze 1* we saw that players understood *1* that the area had a different atmosphere, but they didn't feel like they should not go there. The problem in this case was that even though the atmosphere of the level changed, players felt like they should go there anyway and explore the environment.

What ended up being interesting in the two versions of the maze was the encounter with the bridge. In *maze 1*, where the bridge was represented by a smoky texture, players made a link between the visual representation and the rule that the bridge was not traversable. In that sense they accepted the rule of the fictional element thanks to the explanation given through its representation. Some players even didn't try to cross it since they understood from the beginning that they were not able to do it.

In *maze 2* all the participants that went to the hazardous area fell off the cliff and were not able to give any meaningful explanation of why that happened. This led to frustration and they saw this as a bug in the virtual environment.

The engaging area was the area with most interesting results. We noticed that the coded colors bronze, silver and gold were not understood by most of the players and this happened in both mazes. One of the differences that emerged was that players were keener in understanding that they had to interact in a certain order in *maze 1*, while in *maze 2* moving blocks was apparently not conveying the same intuition.

The puzzle in *maze 2* also revealed some interesting characteristics. All of the participants jumped on them while they were moving, something that didn't happen with the statues in *maze 1*. This showed us that the shape of the blocks conveyed some affordances that encouraged players to jump on them, therefore providing distraction from the designed objective of just interacting with them. This result goes against Juul's assumption that games are *themable*. Switching the statues with blocks intrinsically changed way players experienced the puzzle since now they were able to ride the blocks while activating them. This shows that the relation between fiction and rules is closer than Juul would acknowledge.

The colors of the blocks in *maze 2* were also interpreted by one of our participant as representing other unexplored parts of the level, therefore showing how an unexpected and unwanted meaning was given to the anonymity of the fictional representation of the blocks themselves. Our experiment indicated that no matter how poor the representation is, players tend to give some kind of interpretation to it.

In the engaging area of *maze 1* things happened more in the way we expected. Our participants made a link between the big dragon and the statue of the little dragon and, more importantly, they understood the narrative aspect of the task they had to complete. Players understood the concept of moving three warriors to attack the dragon which would eventually have some consequences for the big dragon that was blocking their path.

That result was important to us because it showed that fictional representation can convey a meaning to player agency in a way that simple blocks cannot, even though the rules of the puzzle were the same. Such meaning and understanding of player interaction was also the one we expected players to have, therefore showing us that our design was able to guide them towards the direction we expected.

The players ability to give meaning to the puzzle disappeared when we replaced the fictional representation with blocks. With the meaning gone they could not make sense of the agency they had with the blocks. We argue that a more meaningful representation not only leads to cueing the rules but also to the acceptance of rules. We observed that when players encountered a representation that could not adequately provide an explanation for the rule, the player tended to not accept that rule. Therefore we argue that representation has an impact on the acceptance of the rules which is important to keep the player engaged with the virtual environment. What Juul doesn't take in account is that fiction not only cues players into understanding rules but also in giving meaning to their actions which leads to the acceptance of the rules.

In the section of the maze that features the blocking wall before the exit we were able to deduce some interesting results as well. In *maze 2* the path was blocked by a wall made of concrete, but all our participants that reached that area shot it and successfully broke it. In the interviews we found that players shot at the wall because its visual representation didn't match the style of the environment.

The same happened in *maze 1* where the same wall was represented as a glass wall. Some of our participants confirmed that they shot at it because they understood it was made of glass, while some others admitted that they tend to shoot at any object that looks different from the rest of the environment.

In our observations we noticed that a lot of players tend to shoot at everything that looks anomalous, just to see if they can interact in some way. The difference in this particular case is that players were able to give a meaningful reason to why the glass wall was destroyable. In our observations we noticed that they tended to use the gun in the case of the glass door, while in the concrete wall of *maze 2* all our participants tried to interact first with the "E" button, and used the gun only when they saw that the use button was not working. This result gave us a clear sign on

how the glass material applied to the wall conveyed the affordance of shooting better than the one made of concrete.

It is worth to mention two cases in *maze 1* where the participants thought it was possible to pass through the glass door when they first saw it. When interviewed we found out that the reason was that the glass material of the wall apparently looked similar to the smoke material used for the bridge. Those players encountered the bridge before and died, therefore they associated the fact that they went through the bridge to its visual representation. When they saw the glass wall their expectation was that the wall, like the bridge, was not solid and that they should be able to go through.

This was an unexpected result. By our surprise some players linked two parts of the level that for us were completely unrelated with each other. This shows that by exploring previous parts of the level they had internalized some properties of the virtual environment related to its fictional representation; this repertoire was used afterwards to trigger some expectations in the way they had agency towards another fictional element.

The player behavior towards the exit of the maze gave us some expected results. Every participant that reached the exit related the yellow light in the little temple as a place to go. In *maze 1* the players that noticed the tower made an immediate connection between the two, showing that they associated the landmark to a place they had to go. Some players noticed the landmark only at the end but they also related the exit point to it. It would be interesting to notice how this understanding of the landmark would influence their gameplay and relation to the space in a hypothetical second level where the same landmark would be used again.

While Juul agrees that rules and fiction matches in virtual spaces (Juul, 2005. page 188) he calls this a “special issue between rules and fiction”. By this he places virtual spaces outside a clear definition of either rules or fiction, therefore classifying them as borderline cases. All videogames feature a virtual environment. In those virtual environments, like argued by Juul, fiction and rules match and cannot be separated, then those games cannot be *themable* because changing fictional elements can have an influence on rules, therefore changing the game experience and the game itself.

6. Conclusion

Player experience and performance can be influenced by theories about environmental storytelling and fictional elements. Such theories empower designers with tools to enhance the internalization of space and rules. By putting them into practice it is possible to show that fiction and rules are integrated and generate synergies between each other. A fictional element situated outside the game space can influence player behaviour both in a negative and a positive way.

Changing the representation of fiction in a virtual environment has an influence on how rules in that environment are perceived and accepted by the player. No matter how poor the representation is, players will always try to inject meaning into the elements they are engaging with. However, this internalization process can be optimized by understanding the influence of fiction. This gives the designers methods to convey the envisioned interpretation and player experience.

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Appendix A

Interview Guide

Ask informal questions about the participant (name and so on) to make him/her feel comfortable with the interview environment and to establish a positive conversation.

Age:

Gender:

1. What was your first thought when you entered the environment?

- keywords: yellow light, rocks

2. What led to your choices for the navigation in the environment?

- keywords: layout, landmark, environmental theme

To be asked only if the participant noticed the shortcut:

3. I noticed that you moved towards/through the fake rock?

- keywords: statue, path on the ground

To be asked only if participant visited to the hazardous area:

If participant died in the hazardous area:

4a. What were your thoughts about the area where you died?

If the participant didn't die in the hazardous area:

4b. I noticed that you went back in the area with the hole in the ground?

To be asked only if participant visited the engaging area:

5. What were your thoughts when you entered the area with the 3 colored objects?

To be asked only if the participant visited the blocked section:

6. When you encountered the blocked path what were your immediate thoughts?

To be asked only if the participant found the exit:

7. What were your thoughts when you found the exit?

Debrief participant with the purpose of the experiment and allow participant to ask questions about their role in the experiment.