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The Interactive Impact of Immersive Virtual Reality Experience on the Senses——Take the VR Project "Unlocking Perception in Virtual Reality" as an Example

QienYu[1,a,*]

[1]*Department of SOECS, University of the Pacific, Stockton Campus, 3601 Pacific Ave. Stockton, CA USA*
a. q_yu1@u.pacific.edu
**corresponding author*

Abstract: The research background of this paper will revolve around the VR immersive experience project "Unlocking perception in virtual reality". The main motivation of this analysis is to combine virtual reality projects with human perception unlocking as an entry point, and focus on analyzing the impact on the experiencer's immersion. The experimental conclusion found that "unlocking perception in virtual reality" has a good immersive effect on human vision and hearing. Although "Unlocking Perception in Virtual Reality" lacks story background and game hints compared to other game projects, and requires players to explore by themselves, it also increases the sense of immersion because of this design. This project demo brings a special VR experience to the experiencer by unlocking the main game concept of perception.

Keywords: Virtual reality, Augmented reality, Mixed reality, Extended reality

1. Introduction

Including (Virtual Reality, Augmented Reality, Mixed Reality, eXtended Reality) is a special immersive experience for people, and these experiences can help people experience things that are very different or impossible to achieve in the real world [1-4]. The different effects of virtual reality on people's senses have become an interesting and worth discussing topic; therefore, this topic will be combined with the virtual display experience project "Unlocking perception in virtual reality" for research and analysis. The current virtual reality technology can only allow people to invest and experience in the two main aspects of vision and hearing, but with the development of time, more sensory experiences will gradually appear; such as touch, taste and smell. And studying the different effects of these sensory and virtual reality interactions will help us think about the future direction and increase inspiration.

The reason for choosing "Unlocking perception in virtual reality" as the main research object is that the theme of this project is the VR experience based on the development of different human senses. This project is designed to be an immersive experience that unlocks one's senses through a virtual reality experience. By making and presenting this virtual reality experience design, the experiencer will experience the process of unlocking the human senses.

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2. Related Work

In the process of designing the "Unlocking perception in virtual reality" project, there are two very interesting games that have a great inspiration for this project. They are two games called DarkEcho and Stifled (Figure1) [5-6]. These two game projects have very novel designs, and the application of sound interaction in them is a good inspiration for the designers of "Unlocking perception in virtual reality".

In DarkEcho, the player is placed in an all-black or all white scene. The experiencer needs to judge the position through the sound and use it to clear the level [7]. But the waveform and movement of sound are represented visually. And Stifled is also a project that is experienced through sound interaction [8]. The main design of this project is that the experiencer is like a bat and needs to return through sound waves to get the picture. The experiencer needs to constantly make sounds from the folded microphone to judge the surrounding environment. Both games have good interactive applications for human auditory perception, and this is an example of how perception can have a good experience in games. But compared to the "Unlocking perception in virtual reality" project, the two games mentioned above have no design on the concept of unlocking perception.

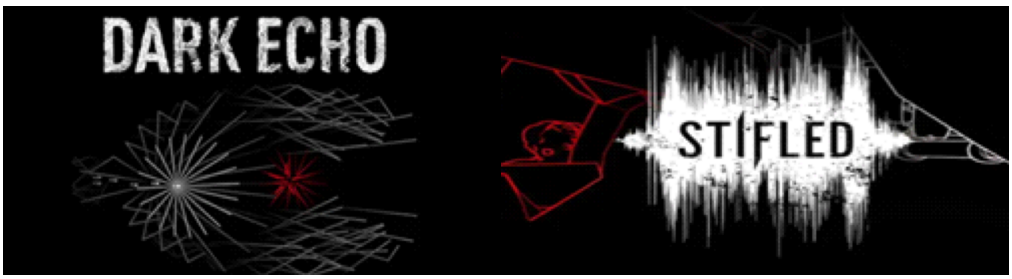

Figure1： DarkEcho & Stifled.

3. Methods

The project design of Unlocking perception in virtual reality is very interesting because for this project there is a concept of sensory development that is rarely seen in other games.

3.1. Project Introduction

The design of "Unlocking perception in virtual reality" is an immersive experience that unlocks personal senses through a virtual reality experience. By making and presenting this virtual reality experience design, the experiencer will experience the process of unlocking the human senses. This VR experience process will display scene surround sound and visual errors, allowing people to experience different perceptions in VR. First, the experiencer needs to hear where to go to unlock the next level after first entering the scene, and then unlock the next level through the visual difference.

3.2. Scene Design

When they first entered the project Demo, the designer hoped that the experiencer could experience what a world with only hearing would be like, that is to say, the experiencer would experience a state of complete blindness. Then after gaining vision, feel the sense of accomplishment that unlocks different senses through your own efforts. Later, when the vision was obtained, the scene was different, and the designer hoped that the experiencer could feel the sense of space and embodiment in VR at this time. "Unlocking perception in virtual reality" is a process of self-

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exploration and unlocking perception, and its theme and project settings are the self-perception development of the experiencer. Because the experiencer who just entered the scene has no prompts and no background settings, and even deprived of some perception abilities. Only sound can lure the experiencer to where he should be. Then when reaching the destination, the experiencer will use the next unlocked perception to unlock a new perception. But when the experiencer overcomes this discomfort, they gain a sense of accomplishment. Then go deeper into the immersive experience by unlocking more perceptions.

3.2.1. First Scene

In the project demo "Unlocking perception in virtual reality", players go through three main large scenes. In the first and second scenes, it is divided into several small levels (Figure 2). Because it was mentioned before that the whole concept about the design of this VR immersive experience is to unlock people's perception. Therefore, after the experiencer brings up the VR headset, there will be no prompts, and there will be no visual reference. In the first level, the experiencers do not have any other senses except hearing. They can only judge the direction through the sound and then approach the next level with the sound. Because it is different from the original intention of many other games and projects. "Unlocking perception in virtual reality" does not have any prompts at the beginning, and the experiencer may be caught in a dilemma. The experiencer may feel uncomfortable or even nervous after being deprived of the original senses after entering the experience, resulting in not knowing how to move on. The first experiencer who was invited even took thirty minutes to pass the first scene without guidance. But this discomfort actually increases the sense of immersion, because only when the player feels discomfort can it show that the sensory deprivation part of the first scene has done a good degree.

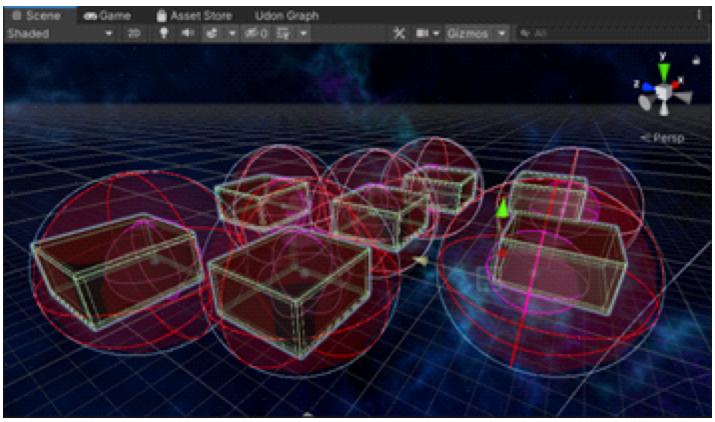

Figure2： The first stage scene setting.

3.2.2. Second Scene

In the second scene, the experiencer will be teleported to a room surrounded by mirrors, which is very confusing for people who have a bad sense of space. Because the four corners of the room are all mirrors, and after the first level is over, experiencer can use my hearing to gain vision and immediately fall into the test and confusion of vision. The experiencer must find the difference of a certain mirror and get close to that special different mirror in the process of moving to continue to the next place (Figure 3). The second level of "Unlocking perception in virtual reality", as mentioned earlier, focuses on the visual experience. Therefore, after discovering the difference between different mirrors, the experiencer needs to continue to enter a maze to find rubber ducks with different colors and click to finally pass the second level. The design of the maze is generally

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influenced by the idea of "this is the wrong route, experiencer should go back and find a different rubber duck" after discovering ducks of the same color.

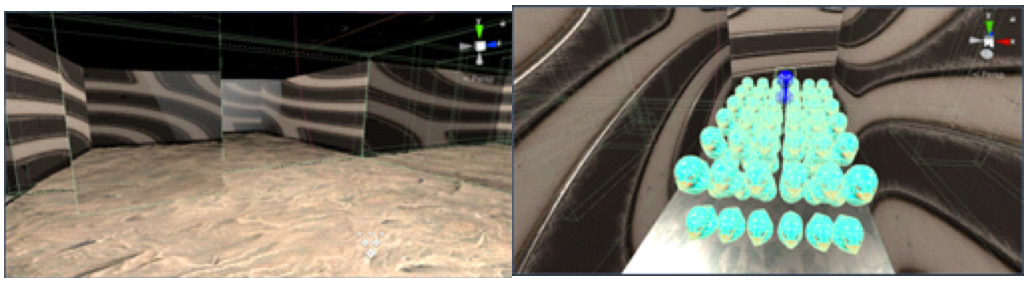

Figure3： Second Scene Mirror & Rubber Duck Maze.

3.3. Style and Build

The overall project design style of "Unlocking perception in virtual reality" is a relaxed experience, and there is no setting to let the experiencer die or fail. But what may happen is that the experiencer is stuck in the middle of the scene and the level because of the lack of prompts, and doesn't know what to do to move on. The creators made this project through software such as Blender, Houdini, Unity, Polycam, and websites such as Mixamo, Sketchfab, Assetsstore, etc. In level 1, the creators used different ambient sounds to create the surround sound and create a sound with a sense of space. In order to increase the experience, some sound effects are captured from the real environment through recording equipment (Figure 4). Players need to follow the sound of each room to teleport to the next room. So, the first level mainly uses hearing, and then when the experiencer reaches the second level, they will need to use vision to find the key to the level. The experiencer will be teleported to a room full of mirrors, and they will need to find mirrors that don't look the same. Part of the design is mirrors that only appear when they get close and click to continue. After that, the experiencer needs to find a different one from the other rubber ducks in a maze and finally arrive at the customs clearance place. These are all designs that need to be discovered and cleared by relying on visual and visual errors after the experiencer first obtains the vision through the unlocked hearing.

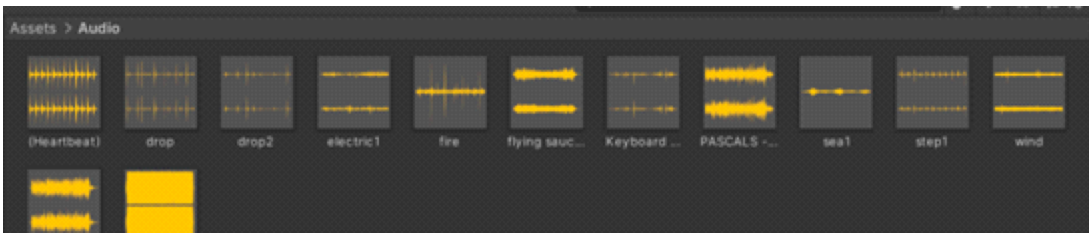

Figure4： Ambient sound effects used in the project.

3.4. Project Features

In addition to unlocking the special concept of perception, "Unlocking perception in virtual reality" as a Demo also has a hidden easter egg design (Figure 5). The designer hopes to add different skills in the customs clearance, that is, using the skills of Houdini, Polycam and Mixamo to scan, model, bind and animate the real characters in reality and then bring them into the game scene. It is realized that when the experiencer clears the level, they can see the interesting picture of people in the real-world dancing to music in VR. And this small design actually has a good effect on increasing the sense of immersion by increasing the connection with reality.

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Figure5： Easter egg & Stinger.

3.5. Item Extension

Because "Unlocking perception in virtual reality" is just a project demo, the designers only used a small part of the design to show their ideas. Therefore, the designer may have more updates and designs in the future and study how to make more senses in virtual reality to have a virtual experience and make different designs. When the five senses of human beings (hearing, sight, touch, taste, smell) are slowly brought into VR technology, projects similar to "Unlocking perception in virtual reality" will slowly appear and bring individuals to unlock more Perceived experience. And "Unlocking perception in virtual reality" was also uploaded to VRChat's [9] public platform by the designer, so that more people can experience the project by entering the map name (Figure 6).

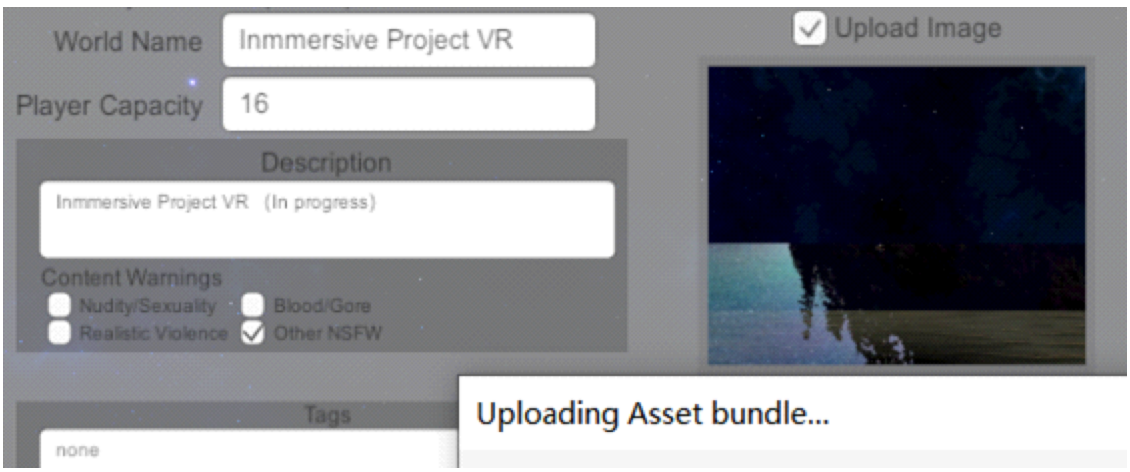

Figure6： Uploading to VRchat public platform.

4. Results & Discussion

4.1. Research

In the final demonstration session, the author of "Unlocking perception in virtual reality" showed the professor and other experiencers the process and design concept of the entire project, and entered the project for a live demonstration. After the designer made the first demo, the professor responded in addition to suggestions about the authenticity of the sound element. Therefore, in the design of the first scene, part of the real sound was recorded and processed to make it more surround and spatial. Overall, this rating for the immersion of the experience was praised by everyone. And people were also amused by the easter eggs that finally brought real characters into

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the virtual world, and gave positive comments. In addition, the main feedback given by the experiencer is about the feeling of a strange core and a dream that the experience of "Unlocking perception in virtual reality" can bring to people, because the lack of prompts and story background increases the experiencer's sense of immersion in the project. Although some parts of the process caused some experiencers to get stuck in the process because they wanted to achieve the core concept, in exchange "Unlocking perception in virtual reality" achieved a good sense of immersion and embodiment.

4.2. Investigation

In order to verify the three important aspects of "Unlocking perception in virtual reality": immersion, interactivity and experience; the designer invited 50 experiencers to wear VR equipment and experience the project demo in VRchat and finally participated in the Survey ratings. Through the different ratings and feedback of these 50 experiencers, it can see the different feelings of this project Demo in these three key aspects. The table 1 is the personal experience rating of 50 people in three aspects.

Table1: 50 people rated the three aspects of the project

	Immersion	Interactivity	Experience
Excellent	30	7	20
Good	17	13	10
Moderate	3	23	7
Poor	0	7	13

4.2.1. Immersion

It can be seen from the scores of the experiencers that among the 50 people, 30 people think that "Unlocking perception in virtual reality" has done a very good job in terms of immersion [10]. While 17 people voted "good" and "moderate," no one thought the game's immersion was poor. It can be seen from the feedback from the experiencers that the original intention of the "Unlocking perception in virtual reality" project has been achieved. This project Demo mainly hopes to greatly increase the immersion of the experiencer by unlocking human perception.

After the experience, the experiencers reported that although they were confused after entering the project, as the game scene deepened and the process of unlocking the vision after unlocking the hearing, they felt that this was actually a process of self-exploration as the protagonist. In this process, there is no story background and narration intervention, but instead achieves the best immersive experience. The experiencers' feedback on the sound in the first level was particularly prominent. Most of the experiencers believed that the surround sound they heard in a completely dark environment after they brought their VR headsets brought them into a state of hearing-only blindness.

4.2.2. Interactivity

In the design of the "Unlocking perception in virtual reality" Demo, interactivity is also one of the criteria considered in the experimental investigation. Most people think that this virtual reality demo is average in terms of interactive petitioners, and only a few of the 50 people think that it is excellent in terms of interactivity; even a small number of people think that the interactivity is not good. "Unlocking perception in virtual reality" is designed to be very simple in terms of interaction.

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The interaction of the experiencer is only a simple interaction of raising an arm and clicking a button. That is to say, in the first scene, it will be transmitted after reaching a designated place through sound interaction, and the design of the second scene for the mirror and the rubber duck to be transmitted after clicking is also relatively simple. Although the part where the live-action model danced in the final scene increased people's interactive feelings about the project, it had little impact on the whole. Designers do not pay too much attention to interactivity and design an interactive teleportation experience design or game-like design.

4.2.3. Experience

"Unlocking perception in virtual reality" is polarizing in terms of experience; some people think it's very good, while others think it's bad. It can be seen that 20 votes were "excellent" and the other "20" votes were divided between "moderate" and "poor". The main reason why "Unlocking perception in virtual reality" feels bad is that the first scene design is too confusing and difficult for most people. As soon as they brought their VR headsets on, they were plunged into darkness, with only strange surround sound to guide them in the right direction. And this is extremely uncomfortable for a person with normal senses, who will suddenly lose sight and other sensory judgments; they can only explore slowly through hearing. This exploration process allowed some experiencers to pass through the first scene that should have been within 5 minutes, but it took them about 30 minutes to pass. But for other people, the process of unlocking the senses through their own exploration after depriving one of the senses is novel, and this novelty actually increases their sense of experience.

4.3. Discussion

From this experimental investigation, it can be found that "Unlocking perception in virtual reality" does a very good job in immersion, and the concept of unlocking perception adds to the experience in this regard. There is not much emphasis on interaction, and there are fewer design elements in interaction. While the easter eggs in the final scene add to the sense of interactivity, it doesn't add much. In terms of experience, different people have different profiles. This kind of project design is actually uncomfortable for some people, and some people find the setting of deprivation perception confusing. For others, this process of sensory deprivation and acquisition is very interesting and novel.

5. Conclusion

The overall design of the "Unlocking perception in virtual reality" project demo is mainly designed around the concept of immersion and unlocking human perception. Compared with many other projects and game experiences, the biggest difference is that the experiencers are deprived of many of their original senses at the beginning and have no hints and story backgrounds. Although most of the current VR devices can only give the experiencers a visual and auditory experience that is completely different from reality, with the development of time, there will be more breakthroughs in VR devices to allow the experiencers to develop experiences with other different senses. The design of "Unlocking perception in virtual reality" is also the same, because this project is just a demo; if more sensory devices can appear, this project will surely design more sensory development experiences.

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