User Evaluation of a Stationary Virtual Reality Game

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Abstract

Virtual Reality (VR) games with no player movement are rare in the field despite mismatched stimuli through virtual locomotion being a common cause of cybersickness. The potential for a stationary VR auto-scroller game is discussed in its possibility to bring comfortable and satisfying VR experiences to more users. Players are tasked with defending a fantasy-style village, taking up a sword to battle against enemies that spawn periodically in their view. Utilizing data collected from five anonymous test subjects, results suggest that there is no correlation between playtime and cybersickness among players and little to no cybersickness exhibited at all, implying that the stationary VR experience can provide an insightful look into future VR game design.

1 Introduction

Video games based in Virtual Reality (VR) are often complemented by explorable virtual environments. This can come as a benefit to immersive gameplay experiences, and while it is quite rare in the medium of video games for the player to be incapable of exploring a virtual space, it is even more unlikely for first-person titles, which all VR games can be classified as. Despite developers having a multitude of choices for player movement in VR – such as teleportation, continuous movement, and real-world walking – the best method is still being actively researched as cybersickness amongst users continues to occur [4]. In the meantime, stationary VR game titles such as *Tabletop Simulator* and *Beatsaber* have become popular alternatives. While the reasoning behind their successes is very well in part due to the fun experiences the game provides the player, it is certainly possible that the stationary aspect of each game also plays a part. This paper covers the user experience testing of a stationary VR game built as an entry point for new VR users as well as its effects on enjoyment and cybersickness.

2 Related Work

Cybersickness being amplified by movement in VR is not a new concept. Papers in the past have gone in depth on how movement velocity and sudden changes in direction generate illness in users compared to smoother motions [1]. Of course, virtual locomotion in general can produce cybersickness, ranging from simple continuous movement to flying or driving simulators, Caserman et. al. writes. The mismatched sensations of standing in the same place while seeing one's own visuals portray something different increases the likelihood of feeling unwell [3]. This paper specifically focuses on whether a game with no movement at all can still produce cybersickness, and if not, how enjoyable it still is to the user without any method of transportation. Kari and Kosa have detailed that VR users tend to seek out more fun and pleasurable experiences than those that are intended for utilitarian use [2]. The stationary VR game this paper focuses on has similar intentions, focusing on collecting data that refers specifically to enjoyment instead of usefulness. With this appearing to be the primary usage for VR, understanding how to better create games that can introduce new users and keep their attention without producing a feeling of cybersickness is important.

3 VR Auto-Scroller

The overall goal in the creation of this paper's VR Auto-Scroller game was to develop a fun experience for players that resulted in little to no cybersickness. For the best approach in terms of graphics, Epic Games' Unreal Engine 5.3 was decided on as the tool of choice given its reputation for industry-leading visual effects. This would also provide me with usage of the Epic Games Store's community-made assets, making the development process much smoother and allowing for plenty of time to be dedicated to programming the gameplay. Additionally, I had set out to make the game as easy to understand as possible for new players. Therefore, a simple objective that could be understood within a short time frame was necessary.

Players spend the game standing in a small fantasy village equipped with nothing but a sword in their right hand (see Figure 1.) At random intervals, three types of monsters – a goblin, a zombie, and a skeleton (see Figure 2.) – spawn from specific locations where they then chase toward the player. Upon reaching the player, each monster attempts to attack them before likely being defeated by a swipe from the player's sword. This process repeats until the player decides to end the game.

Figure 1: The player's point of view of the village.

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Figure 2: The player draws their blade against a skeleton.

The design of how each enemy interacted with the player was given specific thought to provide an endlessly enjoyable experience. The goblins, for example, were designed as an ever-present force up close, being fast, difficult to hit, and the most common to spawn. They provide a constant challenge in the presence of the player. The zombies are the opposite – built to be slow and large, they are viewed as a distant threat for a majority of their gradual trek toward the village. They are meant to show the player that more obstacles are always coming. Waiting for a zombie to approach is intended to keep the player on edge and give time or more enemies to spawn around them, resulting in a seamless gameplay experience with very little downtime. The skeletons are built to provide a satisfying in-between, being a large, fast, and easy-to-hit enemy while still feeling like a threat due to their large build and intense sound effects. In order to reduce framerate issues, an enemy would be de-spawned one second after being defeated by the player or if it was unable to reach the player within one minute.

4 Evaluation

The purpose of this product's evaluation is to gain further insight into the following five questions: In what areas does the game succeed? What aspects do users believe could be improved upon? Are users generally favorable or unfavorable toward the stationary experience? How much time do users tend to spend on the application? Do users exhibit or claim any signs of cybersickness after playing? The first two questions allow me to observe qualitative data from unbiased guests. Ultimately, the goal is to acknowledge any trends found in the data and lean further into what was done correctly while attempting to alleviate any frustrations in future development. The following two questions intend to answer whether stationary VR games can be thoroughly enjoyable and satisfying experiences for an audience while measuring playtime and observing if there are any potential correlations. The final question asks how well the stationary experience was able to curb the effects of cybersickness on the player.

4.1 Procedure

To gain an understanding of user's opinions on these questions, five anonymous test subjects were given the opportunity to play the game. After signing a short consent form acknowledging that their personal information would be kept confidential and that their participation is entirely voluntary, the subjects were asked to play the game for however long they felt comfortable and willing as their playtime was recorded. Once the subject was satisfied with how long they had played, they were asked to fill out a questionnaire.

4.1.1 Questionnaire

Subjects were given a two-page questionnaire that issued nine statements that the subjects would rate using a five-point Likert scale, with one being "Strongly Disagree" and five being "Strongly Agree", as well as three written questions, which were inspired by Schell's *The Art of Game Design*. The statements were as follows:

1. I am satisfied with how easy it was to start playing the game.
2. I do not feel any symptoms of cybersickness after playing the game.
3. I was capable of entering a comfortable flow state while playing the game.
4. I am satisfied with how I performed in the game.
5. I would have liked to play the game even longer.
6. I quickly understood the objective of the game.
7. I did not mind the lack of player movement in the game.
8. I liked the user interface of the game.
9. The overall experience was highly satisfactory.

On the other side of the paper, the three written questions asked the following:

1. What was the most frustrating moment or aspect of what you just played?
2. What was your favorite moment or aspect of what you just played?
3. If you could change, add, or remove anything from the experience, what would it be [5]?

4.2 Results

For their favorite aspect of the game, three of the five subjects stated they enjoyed the visual and auditorial aesthetics of the game. As for their least favorite aspect, two subjects shared frustrations about difficulties in attacking certain enemies – specifically, the goblins. At least three subjects also agreed that a sense of progression or challenge would improve the game and give them further motivation to play even more – for example, a score counter that tracks the number of enemies that have been defeated, or a hitbox for the player so that they truly had to defend themselves or it would be game over. One subject suggested making the weapon longer so that attacking enemies would be easier.

The ranked questions resulted in many coinciding answers; users generally agreed that they felt little to no motion sickness after playing the game, with a mean score of 4.8. Similarly, they indicated that the lack of player movement was not much of an issue, with the same mean score of 4.8. Users also enjoyed the overall experience, once again rating it with a mean score of 4.8. The lowest overall score pertained to whether users would have liked to continue playing the game further, resulting in a mean of 4.2. This low score may be a result of the fact that players were asked to play for however long they wished, making it a somewhat redundant question. Players on average played for a total time of 5 minutes and 21 seconds. Checking for any correlation between time and score of cybersickness results in a p-value of 0.559, indicating there is no statistical significance and it is likely that subjects who had longer playtimes did not necessarily always exhibit signs of cybersickness.

4.3 Interpretation

The goal of making a stationary VR game to curb cybersickness while also being a fun experience appears to have overall been a success, with very few signs of cybersickness at all from the subjects and a high level of satisfaction. The game can likely be improved with the addition of a clearer end goal – enemies could not damage the player and there was no measurement of success, which confused subjects and could have resulted in shorter

playtimes. Subjects also expressed frustration at one of the enemies being difficult to hit which could have damaged the experience.

5 Conclusion

In this paper, we discussed the data collected from user experience testing of a stationary VR game created in Unreal Engine 5.3. Employing the Likert scale, we took note of players on average having a highly satisfying experience, praising the visual and audio style of the game. No users took issue with the stationary aspect and all suggestions for improvement focused on adding better methods of tracking progression and increased difficulty rather than being able to explore the virtual environment. Certain users expressed slight frustrations at some enemies being unnecessarily difficult to attack and wished for a longer in-game sword. Player times were recorded and showed no correlation to cybersickness, which no subjects expressed strong symptoms of, suggesting the game was successful in its goal to provide an enjoyable experience that provided little to no cybersickness. The overall findings imply that stationary games very well can provide entertaining and easy-to-play alternatives to VR video games for those easily affected by cybersickness.

References

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