An investigation into the psychology of immersion in video games and how you define it.

Studying the psychology of Immersion Enhancing Techniques in FPS Video Games: How do you define and measure immersion?

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Keywords

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1 Introduction

Computer games allow people to “lose themselves” in the screen and become so immersed in it that they often forget they are playing a game. This can be explained as the ‘pull’ of a video game, which can be interpreted as the willing suspension of disbelief (Juul, 2010). Often people can find the game so engaging that they do not notice things around them and will lose track of time. Immersion in videogames makes players awareness of their environment reduce, and their level of engrossment in the artificial environment presented to them is increased (Nechvatal, 1999). New media’s immersive capability is to make users believe that they are personally and physically “present” in the displayed environment, thus using the idea of "Presence" as a theoretical response to how they process and experience media form and content (Biocca & Delaney, 1995). By exploring the model of Spatial Presence, otherwise known as the Spatial Situation Model (SSM), a unified process structure can be applied which integrates theories from psychology and communication (Wirth & Vorderer, 2007).

![Figure 1 - Screenshot from 'Half-Life 2: Episode Two (2007)'](image)

By ignoring differences between games and narratives, essential qualities of both categories are ignored. The difference between them, however, is not immediately obvious as there are significant overlaps (Aarseth, 2007). Relying on narrative cut-scenes to explain a story is one reason why the idea of narrative is directly opposed to that of gameplay (King & Krzywinska, 2006) and can also be problematic as they prevent the player from doing anything (Juul, 2010). Advances in technology allow game-rendered cut-scenes to be produced, in order to keep the player immersed in the game as well as to tell the story. These allow developers to keep the player immersed in view of the character, while continuing to tell the story, and have often been coined as “Enacted Narrative”. By using
enacted narratives, the combination of elements, rather than a particular element, is important in delivering an immersive experience from both the game and its narrative (Brand & Knight, 2005).

Questions about how an individual player interacts with videogame characters have become central to new research paradigms, and are key to exploring why character relations are so key in producing immersion (Lewis, M., Weber, R., Bowman, N., 2008). The idea of para-social interaction (known as PSI) give the explanation that feelings of intimacy with a fictional character help to develop further feelings which make the player more connected to the game (Rubin, 1985). In interactive video games there is a tangible connection with the gamer and the character that they control; which can be described as Character Attachment (Lewis et al, 2008). The theory is one that has been described as an individual’s feelings of friendship and identification for a character, as well as feeling responsible for the character and in control of their actions. (Weber, R., Lewis, M., & Bowman, N., 2006) aimed to identify the main aspects of friendship which develop between the user and the character in an RPG based game. Their study proposed that RPG gamers who scored higher in a Character Attachment study would be more motivated to seek fantasy, social interaction and a sense of disbelief. (Brown & Cairns, 2004) conducted a study which is closely linked to these findings, and they further its results by stating that empathy and atmosphere are necessary to have a sense of ‘presence’ in a game.

Furthermore, while all the previous statements help to explain the reason behind player immersion, they do not help to actually define the term. Various terms are currently used to describe immersion and until the correct definition is applied, it makes it difficult to
measure the extent of a player’s immersion during gameplay. Once defined, however, it can lead to a set of guidelines or suggestions that will allow future game developers to develop / design the most immersive experience possible for their users.

This research will explore the idea of immersion as both an experience and as a model based theory. Immersion can be defined both through personal thoughts and relations to the game, as well as a planned and built design which delivers the intended experience. By examining existing research papers and tests relating to immersion in current media as well as video games, and investigating the theories behind immersion, character attachment and the models of spatial presence, this paper aims to further define what we mean by immersion and what game developers can do to further immersive aspects in their games.

2 Literature Review

2.1 Early Definitions of Immersion Pertaining to Videogames
The phrase ‘the ability to construct new beliefs through interaction with computational media’ (Murray, 1997), outlines the unique aspect of user control which videogames have over other media. From a technological viewpoint immersion can be described as the level of attention or engrossment a player receives from playing a videogame, depending on how much a computer system is capable of offering that illusion (Slater and Wilbur, 1997). From a physiological viewpoint it is debatable as to the degree to which an individual is aware that they are playing a game, or how aware they are of their surroundings, when surrounded in an engrossing artificial environment (Nechvatal, 1999). While many definitions of immersion can be made, it tends to change when described in different contexts and is a much-contested term in video gaming discussion (Taylor, 2002). While a dictionary definition of immersion is ‘a state of being deeply engaged or involved’, in videogames immersion needs to account for much more than a users engagement or involvement; the player’s expectation of the game environment must match the environment’s rules (McMahan, 2003).

When talking about immersion there is often confusion between it and other similar terms; engagement, flow and presence. While immersion is the term that most often describes feelings of being in the game, engagement describes the idea of being obsessed or heavily
knowledgeable about the game – often even ‘elitist’. (Csíkszentmihályi, 1988) first coined the term 'Flow', but it was used to describe the style of game desired by a player and the level of skill required to play and enjoy a game, while taking into account other factors such as boredom and anxiety. This can be represented on the 'Challenge vs. Skill' graph shown below (See Figure 3) The closest relation to immersion is presence, and is the experience of seeing a virtual world as material (McMahan, 2003). Someone who is engaged in a game is heavily focused on the gameplay as opposed to feeling immersed in the game world (Skarin, 2010). The term ‘being in the zone’ is a good synonym to the definition of flow, and as such means that immersion, presence and engagement are all parts of the flow experience (Skarin, 2010).

![Figure 3 - Challenge vs. Skill Graph (Csíkszentmihályi, 1988)](image)

2.1.1 The Theory of Spatial Presence

Early ideas of presence in new media were first explored using the idea of “telepresence” which refers to the sense of being in an environment generated by natural or mediated means (Steuer, 1992). His research was based on that of Minsky (1980) who first coined the term in reference to teleoperation systems for remote manipulation of physical objects. Sheridan (1992) also used the term “presence” to refer to the genetic perception of being in an artificial or remote environment and stated that “telepresence” should be reserved for cases only involving teleoperation (See Figure 4).
The idea of "telepresence" is heavily related to what we now know as Virtual Reality (hereby known as VR), a technology that has been in existence for decades. The use of VR in videogames dates back to the early-mid 1990s, when systems such as the 'iGlasses', 'Cybermaxx' and 'VFX-1' were available for consumer use (See Figure 5). The modern-day examples include the 'Nintendo Wii' and upcoming Head Mounted Display (HMD) development kits, such as the 'Oculus Rift'. In the business world the idea of telepresence is becoming more and more popular as it has great potential for people getting to work and collaborating from around the world (Edwards, 2011) and it is predicted that worldwide 'telepresence sales' could reach $6.9bn by 2016. The gap between standard communication and telepresence is moving ever closer, therefore it is important to consider the increasing accessibility of VR hardware. The commercial development of VR and how games will further use these features in the future will ultimately produce more immersive experiences for gamers.

Initial research (Steuer, 1992) was technologically but not theoretically based and, therefore, did not acknowledge that the idea of presence had many similarities to theoretical based concepts such as attention (Anderson & Burns, 1991), involvement (Perse, 1998) and perceived reality (Shapiro & Chock, 2003). More research studies have considered
some of these relations, but still argue for conceptual elements that separate presence from the existing terms. Because a wide range of disciplines study the definition of presence, such as computer science, neuroscience and philosophy, there is a lot of confusion about the concept and its description. Recent studies have explored the effects of virtual reality and videogames on systems in the brain and, more specifically a study was carried out that aimed to determine why a person’s sense of time will change while playing a videogame. Studies surrounding the changes in participants anterior cingulate cortex (ACC) while they played videogames, found that functional changes in the cerebellum, intraparietal sulcus and prefrontal cortex could change time perception and accompany the players immersive state (Mathiak, K., Klasen, M., Weber, R., Kircher, T.J., Mathiak, K.A., 2004). (See Figure 6).

Subtypes of presence have been discussed in order to try and provide a clearer definition of presence which remains closest to the early definition of presence (Minsky, 1980). The first idea of “Spatial Presence” (IJsselsteijn, W.A., de Ridder, H., Freeman, J. and Avons, S. E., 2000) is described as ‘a sense of being there’ and makes the player believe that they are in a physical location or environment completely different than their actual location in the real world (Wirth et al, 2007). This is the first area of research which directly links to the idea of immersion in video games, and relates to the original statement (Juul, 2010) ‘willing suspension of disbelief’, attempting to describe the feeling when you forget you are looking at a computer screen.

(Usoh, M., Arthur, K. & Whitton, M., 1999) further investigated the idea of spatial presence using an early prototype VR head-mounted display. 45 participants used a Virtual Research V8 headset to navigate their character through a basic game level which featured a large drop (See Figures 7 & 8). They found that by using quantitative research answers they could determine what made their participants immersed in the study, and what did not. One
participant said “Although I was willing to step out over the pit, that took an act of will. I had to remind myself I wouldn’t fall, or if I did it wouldn’t hurt” which showed how depth and distance became much more pronounced while using the headset. The test also found that 30% of participants became less immersed because they were aware of the weight of the headset on their head and the cables which they often made contact with while playing.

2.1.2 The Spatial Situation Model (SSM)

A model for spatial presence should take into account the factors that support the components of the model, as well as the factors which make the user attracted and bring attention to the media.

(Wirth, W. & Vorderer, P., 2007) suggests that spatial presence happens in a few distinct steps. Firstly players generate a virtual representation in their minds of the media they are witnessing, be it a game world or arena, in which they can present themselves. Secondly they begin to favour the media-based space over that of the real world, and use it as their point of reference for where they are. This process happens either consciously or subconsciously, and it is up to the player to decide if they are in the imagined world or the real one.

The SSM model is based around two steps which create the experience of spatial presence (See Figure 9). The first is the mental model which includes space-related information. This information is generated in response to the questions asked by the user which in turn decide if they are looking at a space or room, the description, size etc. which is the same as the ‘virtual representation’ steps mentioned previously (Wirth et al, 2007). The second level of the SSM model is where the formation of spatial presence takes place and effectively
confirms the spatial hypothesis, or user assumptions. The ‘PERF-hypothesis’ (Primary Ego Reference Frame) allows users to answer the question "am I located in this space/room?" (Wirth et al, 2007).

In order to keep themselves in a state of presence, players must continue to check their spatial surroundings in the game, and check for any inconsistencies or issues between that and the sensory feedback (Wirth et al, 2007). This suggests that in order for a game world to be immersive, its detail and structure must be perfect and without fault or issue which will cause the player to think otherwise. Their spatial world is constructed within an egocentric reference frame (ERF), which is described as a mental model of the world that is organized from a first-person perspective (Mou & McNamara, 2002). The term was first shown by explaining that a spatial framework model would help to show how people imagine locations in virtual space (Franklin and Tversky, 1990). This model took into account the three classes of models; Equivailability, Mental Transformation and Spatial Framework. By conducting a study in which participants were subject to 5 different spatial-based experiments, they came to the conclusion that the three classes of models predicted different results and that the spatial framework as a whole should be ‘enriched and extended’.

![Figure 9 - Spatial Situation Model (SSM) (Wirth et al, 2007)](image)
The same experience was explored to show that other mediated environments such as first-person shooter games also offer ERFs (Egocentric Reference Frames) (Schneider, E. F., Lang, A., Shin, M. & Bradley, S. D., 2004). They presented participants with four different video games, two with storylines and two without, and found that participants reported much stronger presence sensations when there was a story in the game. The SSM model very basically explains the complicated processes of making a user substitute their presence of being in the real world, for that of the media they are experiencing. In order to further explore this process, other media factors and user characteristics must be explored; more specifically, those which are present in video games.

2.2 Cut Scenes and Enacted Narratives

2.2.1 Ludologist vs Narratologist

The term 'Ludology' refers to the discipline of studying games and gaming, not just videogames, and takes the approach that these games should be understood on their own terms not by the narrative that goes along with it. The term 'Narratology' refers to the theory and study of the narrative and its structure, and gives the understanding that games are novel forms of narrative. The use of cut-scenes in video games has been an on-going debate between Ludologists and Narratologists, and although each argues that their respective fields are the most important, the idea of cut-scenes in videogames forms a middle-ground upon which the level of immersion generated can be argued. Because videogames are generally a much younger form of media than other areas of study it makes them difficult approach with this argument, and as such it makes it even more important to understand both sides of the argument.

One of the founding members of the ludology movement claims that narratives in games are fundamentally different from those of other mediums because they are far more interactive and are built on a set of rules to create the user experience (Juul, 2010). He stated that watching a cut-scene creates a far more different experience to that of playing out a narrative experience, including the quote "We would not have had the same experience as had we watched Hamlet performed...we would think of the game as an explorable dynamic system that allowed for a multitude of sequences".
Although narratologists understand games are far more interactive than any other medium, they still understand them as novel forms of narrative and, therefore, suggest games that games should be studied using theories of narrative.

2.2.2 Types of Narration

The unique level of interactivity in video games unlike that in movies or books allows users to almost create their own story and it is this that makes games far more immersive than any other medium (Ryan, 1999). (Murray, 1997) describes the sense of agency as ‘the satisfying power to take meaningful action and see the results of our decisions and choices’, as an explanation to the difference between storytelling in games and other mediums.

Different types of narrative can be outlined as evocative spaces, enacting stories and embedded and emergent narratives (Wardrip-Fruin & Harrigan, 2004). They state that evocative spaces paint images in broad outlines of the world for the player, and they can use their imagination to do the rest. Enacting stories have also been described as a controlled experience by which the author or designer creates it in a certain order and in such a way that tells the story with maximum impact (Costikyan, 2000). Embedded narratives are an ongoing process in which players make their own assumptions and predictions about the narrative, on the basis of what they have seen in the narrative. Emergent narratives are those which could be described as an authoring environment with no pre-programmed narrative, but goals and stories for the user to create themselves.

2.2.3 Embedded Narratives

The use of embedded narratives has been explored in the first-person shooter Half-Life 2, including the techniques used by the developers to maintain player immersion while developing the story further (Aonshix, 2009). Half-Life and Half-Life 2 are famous for their ‘never lose control’ style of storytelling which at the core keeps the player experience fixed in the first-person viewpoint of the main character, Gordon Freeman (See Figure 10). There is never a period of gameplay when Gordon Freeman experiences something without the players control (Aonshix, 2009), which includes all storytelling cut-scenes. The use of embedded narratives, or ‘continuous narratives’, can often occur within contested spaces. A good mixture of enacted and embedded narrative elements can allow for a good balance between the flexibility of interactivity and the coherence of a pre-authored narrative.
The downside to the repetition of embedded narratives in which the player keeps control is the repetition of scenes in which all exits are locked, leaving the player to become less immersed when they have no room to explore – if they choose not to listen to the cut scene. There is also a risk of a player missing vital information by using embedded narratives, as there may be vital information that will be overlooked during the course of playing (Rouse, 1998). Industry professionals acknowledge the importance of cut-scenes in conveying story to the player, but stress that they must have context to be effective (Nutt, 2009). By merging the cut-scene into a level, a seamless gap between gameplay and cut-scene can be achieved.

It is also important to consider how technological developments have progressed in the last 15 years. The previous statement (Rouse, 1998) was made at a time where cut-scenes were outsourced and often filmed using live-action rather than the game engine. The current quality of game engines allows for the creation of cut-scenes that exactly match the quality of the game they are playing – thus getting that seamless gap between narrative and gameplay which game developers desire.

The concept of para-social interaction dates back almost 30 years and was first explained in relation to television personalities and their involvement with viewers through informal gestures and interpersonal communication (Horton & Wohl, 1956). In videogames we imaginatively take the role of somebody else in their situation (Chung, 2007) - and have a tendency to experience strong emotional reactions to another person’s pain or misfortune.
It has also been observed that a viewer’s effective response to a media message was
dependent on the believability of the circumstances that show the emotions of the
character; the more believable it is, the more immersed the user becomes (Zillmann, 1995).

By understanding the mapping between real and virtual people and the factors which
determine how they respond to each other, the development of more effective, believable,
and entertaining virtual characters can be made (Coulson, M., Barnett, J., Ferguson, C J. and
Gould, R., 2012). Personality is usually described by using the Big-5 trait model, which
determines an individual’s personality depending on where they score on five different
dimensions; Openness to Experience, Conscientiousness, Extraversion, Agreeableness and
Neuroticism. In video games, as previously mentioned, it is important to consider the
motivation as well as the interpersonal attraction. There is little research, however, to show
feelings of attraction and empathy with virtual characters. We can assume that if a virtual
character is physically or socially attractive and is generally liked by the player, they will
form a better connection to it than one without these traits. It has been said that the
barriers to presence are empathy and atmosphere; empathy is a deeper form of attachment
to a main character or team (Brown & Cairns, 2004). A study was conducted with seven
gamers who were interviewed about immersion, being prompted to give answers about
their sense of presence and attachment. From their results, it was determined that
alongside character empathy, the graphics, plot and sounds combine to create the
supporting atmosphere. If gamers need to attend to sound, as well as sight more effort is
needed to be placed into the game. The more attention and effort invested, the more
immersed a gamer can feel (Brown & Cairns, 2004). This suggests that it is not solely the
emotional attachment to characters that helps boost immersion and prompts further
research into the style of gameplay.

2.3.1 The first-person perspective

The use of the first-person perspective in games has often been noted as the most effective
for generating immersion. This identification with the character and the use of hands only,
provides a first-person perspective with which it is proposed player immersion in the game
world derives from the player ‘becoming’ the game character. The assumption is that the
player has a sense of acting ‘within’ the game world as themselves more than as the
character (Grimshaw, 2008).
Half-life (1998) is a first-person shooter developed by Valve Corporation, and is often the centre of attention for immersive video game characters. The main protagonist Gordon Freeman is often noted as one of the best in video game history, yet his personality is almost non-existent. If one looks at Gordon Freeman in Half-Life, one will find no personality whatsoever (Rouse, 2004). One explanation for this is ‘person schema’, which is often referred to as a ‘person prototype’, a configuration of personality traits that we use to categorize people and to make inferences about their behaviour. While he has no voice or face other than that shown on the game box, the fact that he is referred to as “Dr. Freeman” and early on in the game is treated as someone with upmost importance, the player can expect him to have a body, intentions and emotions even when a player controls the character (See Figures 12 & 10). This also demonstrates that the NPCs (Non-player characters) are talking not to the player, but to Gordon Freeman. (Houghton, 2008) says that ‘Gordon Freeman is the most psychologically rounded, nuanced, and realistically multi-layered character currently in existence in the videogame format’. The player is not portraying Gordon Freeman; Gordon Freeman is portraying the player. Similarly in ‘Bioshock’, the immersive storytelling arc is portrayed through the first-person perspective using a character that the player almost creates themselves, and the game developers use this to increase immersion (See Figures 2 & 11). ‘In retrospect, you are a little puppet in videogames... let’s turn that into the narrative... if you have a villain, make it personal. Make the gamer feel like the villain’s bitch, not the character’ (Kennedy, 2011). By having decisions presented to you with outcomes that change as a result of those decisions, both the story and the development of the character changes once the player decides what to do. This gives the impression that the player is becoming the character by acting in the same way.
The differences in player-driven characters are that they often tend to reflect either the player’s own personality and characteristics or their idealized versions of the player’s fantasy self (Kennedy, 2011). Although this may increase the player’s satisfaction, their sense of immersion is diminished because they have consciously determined the differences between the game and the real world. A previous VR Study (Lu & Mattiasson, 2013) outlined the effect of a head-mounted display on 20 undergraduate students playing *Elder Scrolls III: Morrowind*. They found that 75% of participants had heightened enjoyment while the other 25% were unable to use the hardware for physiological reasons. By exploring the area of Virtual Reality it can be determined whether the effects of immersion are increased due to the nature of the hardware being used, or decreased because of psychological issues such as nausea. Furthermore the level of technology being used may not be at the standard required to generate a truly virtual experience.
3 Methodology

3.1 Design
A pilot study was conducted which explores the idea of VR hardware as a method of immersing players into the game world, by following an Interpretivist / Constructivist approach. This approach was chosen because it relies on the Participants views of the situation, and their experiences, to back up the theories described in the Literature Review (Mackenzie, 2006). The data collected will be made up of questionnaire answers given by participants after taking part in a practical experiment, and it consists of both Qualitative and Quantitative data. Observations made while participants perform the practical task will also help to conclude the results of the experiment. The quantitative data will be used to support the qualitative findings as well as to deepen its description. 12 undergraduate Multimedia and Interactive Games Design students from the University of Gloucestershire were selected as participants, all of whom were active videogame players and had previously played FPS games (See Figure 18).

3.2 Hardware & Setup
The test was carried out by the participants, individually, using the same hardware. Using a 27" All-in-One Lenovo IdeaCentre A730. The computer specifications were an Intel i7-3610QM Quad-Core running at 3.2GHz on 64bit Windows 7, with 8GB of RAM and a GeForce GT 630M graphics card. Half-Life 2 was running on the latest build of the game, BuildNo: 119324, at 1920x1080 and on max graphics settings - resulting in a stable 120FPS. Participants also used a set of SONY MDR-XD100 stereo headphones for sound, and controlled the game using a Microsoft IntelliMouse Optical 1.1A, and a Viglen standard QWERTY Keyboard. On the first play through participants played using the 27" monitor to watch the game, and the second time round participants used the Oculus Rift head-mounted display - otherwise the exact same setup was used on both occasions (See Figure 13). It is also important to note that participants were sitting on a standard office swivel chair, which allowed them to easily turn their bodies 180 degrees either way to look around using the Oculus Rift.
3.3 Procedure

Participants were first instructed to read through and sign a Health & Safety Consent Form (University of Gloucestershire Research Ethics, 2014) that detailed the risks of nausea and motion sickness while using the Oculus Rift, as found on the Troubleshooting Documents included with the Oculus Rift Hardware (Oculus Rift, 2014). Participants were advised not to drive or operate any heavy machinery within 30 minutes of using the hardware, as per recommendations made by the Hardware Developers. Participants were also notified that their results would remain anonymous, would not be published using any personal details and would be destroyed after use for the study (Great Britain. Data Protection Act, 1998). It was important to make sure participants were completely comfortable when using the hardware to help them become as immersed in the game as possible during both play-throughs, and they were also assured no other data was being recorded or readings being taken, other than those to which they had given their consent.

Participants were instructed to play a short section of the level "Our Benefactors" in the FPS game Half-Life 2 twice; once using a standard PC screen and once using the Oculus Rift hardware (See Figure 14). This level was chosen for its cinematic style of gameplay, which did not involve any fast-paced action or require participants to be skilled at the game. This eliminated worries about skill level and, therefore, made it a fair test for all participants. The
section of the level involved entering and sitting in a pod which moved itself through the level and only requires the use of mouse / head movement to look around.

After playing through the game twice there was a short questionnaire for participants to complete; this asked both open and closed questions for them to detail their experiences. By using a Likert scale participants could list answers to certain questions on a scale of 1-5, written from Strongly Disagree to Strongly Agree (Malhotra, 2013). Using these results, both qualitative and quantitative data could then be examined to determine if the use of the Oculus Rift was a success or failure in adding immersion. The total time taken for each participant did not exceed 15-20 minutes, including time to fill out the questionnaire.

Figure 14 - Screenshots of ‘Our Benefactors’ from ‘Half-Life 2’. Includes the Pod (Left), an example Alien Strider (Middle) and the drop at the end of the level (Right).
4 Results

See Appendix Items 1-3 for full-page versions of questionnaire

![Figure 15 - Pilot Study Questionnaire - Part 1](image-url)
## 2. Test Feedback

2a. Did you feel immersed in the game, when using the Regular Monitor?
- [ ] Not at all
- [ ] Not Really
- [ ] Undecided
- [ ] Somewhat
- [ ] Very Much

2b. Did you feel immersed in the game, when using the Oculus Rift?
- [ ] Not at all
- [ ] Not Really
- [ ] Undecided
- [ ] Somewhat
- [ ] Very Much

2c. When using the Oculus Rift, did you feel like you were experiencing rather than playing the game?
- [ ] Not at all
- [ ] Not Really
- [ ] Undecided
- [ ] Somewhat
- [ ] Very Much

2d. When using the Oculus Rift did you feel consciously aware of being in the real world?
- [ ] Not at all
- [ ] Not Really
- [ ] Undecided
- [ ] Somewhat
- [ ] Very Much

2e. When using the Oculus Rift, did you forget about other worries? E.g. University deadlines?
- [ ] Not at all
- [ ] Not Really
- [ ] Undecided
- [ ] Somewhat
- [ ] Very Much

2f. When interrupted for the second time, were you disappointed not to carry on?
- [ ] Not at all
- [ ] Not Really
- [ ] Undecided
- [ ] Somewhat
- [ ] Very Much

2g. Which was the most enjoyable?
- [ ] Regular Monitor
- [ ] Oculus Rift
- [ ] No Preference

2h. Which was the most immersive?
- [ ] Regular Monitor
- [ ] Oculus Rift
- [ ] No Preference

2i. Which was the easiest to control the character with?
- [ ] Regular Monitor
- [ ] Oculus Rift
- [ ] No Preference

2j. Which did you prefer playing the game with, overall?
- [ ] Regular Monitor
- [ ] Oculus Rift
- [ ] No Preference

*Video game Immersion Survey*
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<tr>
<td>3a. Did you have any physiological issues with the Oculus Rift?</td>
<td></td>
</tr>
<tr>
<td>3b. What did you find the most immersive aspects of the Oculus Rift?</td>
<td></td>
</tr>
<tr>
<td>3c. Likewise, what were some issues you found while using the Oculus Rift?</td>
<td></td>
</tr>
<tr>
<td>3d. Which parts of the game did you find the most immersive, and why?</td>
<td></td>
</tr>
<tr>
<td>3e. Do you think using the oculus rift would be too inconvenient, if so why?</td>
<td></td>
</tr>
<tr>
<td>3f. Finally, are there any other observations, issues or comments you would like to mention?</td>
<td></td>
</tr>
</tbody>
</table>

Thank you very much for taking the time to complete this survey.

Your feedback is valued and very much appreciated!
See Figure 22 for full question Titles & Graphs

<table>
<thead>
<tr>
<th>Participant No.</th>
<th>Gender</th>
<th>Age Group</th>
<th>Plays FPS Games</th>
<th>Used Oculus Before</th>
<th>Often Immersed in Games</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>18-25</td>
<td>Frequently</td>
<td>Never</td>
<td>Frequently</td>
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<tr>
<td>2</td>
<td>Male</td>
<td>18-25</td>
<td>Rarely</td>
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<tr>
<td>3</td>
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<td>18-25</td>
<td>Frequently</td>
<td>1-2 Times</td>
<td>Very Frequently</td>
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<td>Male</td>
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<td>Frequently</td>
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<td>18-25</td>
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<td>Occasionally</td>
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<td>6</td>
<td>Male</td>
<td>18-25</td>
<td>Very Frequently</td>
<td>1-2 Times</td>
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</tr>
<tr>
<td>7</td>
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<td>1-2 Times</td>
<td>Occasionally</td>
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<td>8</td>
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<td>5+ Times</td>
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<td>1-2 Times</td>
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Figure 18 – The 12 Participants and some general information about them

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<thead>
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<th>Participant No.</th>
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<th>2b</th>
<th>2c</th>
<th>2d</th>
<th>2e</th>
<th>2f</th>
<th>2g</th>
<th>2h</th>
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<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>Oculus</td>
<td>Oculus</td>
<td>No Pref</td>
<td>Oculus</td>
</tr>
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<td>5</td>
<td>2</td>
<td>4</td>
<td>Oculus</td>
<td>Oculus</td>
<td>Regular</td>
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<td>4</td>
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<td>Oculus</td>
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<td>4</td>
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<td>Oculus</td>
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<td>4</td>
<td>Oculus</td>
<td>Oculus</td>
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<td>Oculus</td>
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<td>4</td>
<td>Oculus</td>
<td>Oculus</td>
<td>Regular</td>
<td>Oculus</td>
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<td>12</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>Oculus</td>
<td>Oculus</td>
<td>Regular</td>
<td>Oculus</td>
</tr>
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</table>

Figure 19 – The 12 Participants answers to the second set of questions
<table>
<thead>
<tr>
<th>Participant No.</th>
<th>3a</th>
<th>3b</th>
<th>3c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Felt a bit sick to start with and after taking it off at the end</td>
<td>When going along the level, when the pod track changed height, felt very</td>
<td>The graphic quality and being able to use the action button on keyboard as couldn’t see</td>
</tr>
<tr>
<td>2</td>
<td>Sickness, I was about to vomit</td>
<td>It is like you are in the games world</td>
<td>I wear glasses and it was difficult for me to wear the oculus rift</td>
</tr>
<tr>
<td>3</td>
<td>Felt slightly sick after playing for extended period of time</td>
<td>Looking around the level</td>
<td>The graphics are considerably worse than on the monitor</td>
</tr>
<tr>
<td>4</td>
<td>Yes felt really sick after 20 mins with motion sickness</td>
<td>The 3D Graphics</td>
<td>found aiming and looking around difficult</td>
</tr>
<tr>
<td>5</td>
<td>Headache after playing</td>
<td>360 surrounding feel</td>
<td>need to get used to controls</td>
</tr>
<tr>
<td>6</td>
<td>Didn’t get any of the symptoms which were predicted, felt fine</td>
<td>Turning and looking around was far more realistic than regular monitor</td>
<td>The weight of the headset</td>
</tr>
<tr>
<td>7</td>
<td>No</td>
<td>The distance of objects from you</td>
<td>The wires using headphones and rift got in the way</td>
</tr>
<tr>
<td>8</td>
<td>Little bit dizzy</td>
<td>Moving my head to look in the game</td>
<td>Took getting used to to control</td>
</tr>
<tr>
<td>9</td>
<td>Not really just irritating</td>
<td>Unsure probably the better 3d looking models</td>
<td>Found it really difficult using the OR, when I don’t play PC FPS games</td>
</tr>
<tr>
<td>10</td>
<td>Not at all</td>
<td>Depth of objects was much more pronounced</td>
<td>Looking around was a bit trickier than the regular game</td>
</tr>
<tr>
<td>11</td>
<td>Motion sickness but not unplayable with it</td>
<td>The 3D effect is much greater using OR</td>
<td>Looking around was sometimes complicated</td>
</tr>
<tr>
<td>12</td>
<td>No</td>
<td>Motion being tracked to where I look made it really realistic and immersive</td>
<td>Graphics of the OR are a lot worse than using the regular monitor</td>
</tr>
</tbody>
</table>

*Figure 20 – The 12 Participants answers to the third set of open questions*
<table>
<thead>
<tr>
<th>Participant No.</th>
<th>3d</th>
<th>3e</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seeing other characters doing things along the level as it was where most action was and most interesting</td>
<td>Not really because it makes the experience so much better</td>
</tr>
<tr>
<td>2</td>
<td>Everything was immersive when using Oculus Rift</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Dropping from the capsule because it creates the false idea of falling</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>3D Depth of the game when on the pod</td>
<td>Yes too many cables and no awareness of where you are in the room</td>
</tr>
<tr>
<td>5</td>
<td>the ending when I fell 30ft. Realistic feel</td>
<td>Yes, headaches are annoying</td>
</tr>
<tr>
<td>6</td>
<td>The drop at the end gave the feeling of falling in real life, stomach churning feel</td>
<td>Possibly, easy once set up</td>
</tr>
<tr>
<td>7</td>
<td>Looking at the moving tripods</td>
<td>Yes, it was difficult to find mouse and keyboard by myself</td>
</tr>
<tr>
<td>8</td>
<td>Generally looking at distance up and down</td>
<td>Yes It takes up a lot of room on the desk</td>
</tr>
<tr>
<td>9</td>
<td>The end part felt realistic / strange when falling</td>
<td>For me definitely, much easier to use a regular monitor</td>
</tr>
<tr>
<td>10</td>
<td>Looking at objects closer up or running towards them was really realistic</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Looking up and down at the floor and ceiling while on the pod</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>The fall at the end was really good at making you think you were falling</td>
<td>Yes I think it could be cumbersome to set up regularly</td>
</tr>
</tbody>
</table>

*Figure 21 – The 12 Participants answers to the third set of open questions*
Figure 22 - 2A - 2F Question Graphs
Figure 23 - Question 2G-J Pie Charts
5 Discussion & Findings

75% of Participants stated that they frequently or very frequently played FPS games, and only 41% had ever used an Oculus Rift before – 4 of those only 1 or 2 times, showing that the majority of participants would have no problem using the setup and hardware provided, and would not be accustomed to the effects of the Oculus Rift. The test sample also provided results from participants with varying levels of interest or experience.

Overall participants felt that their experience using the Oculus Rift was more immersive than using the regular monitor. 91% of Participants said the Oculus Rift was most enjoyable over the Regular Monitor, and 100% of Participants felt that the Oculus Rift was the most immersive. Initial responses to the Likert scales suggest the same outcome. When asked if they felt immersed playing the game with the regular monitor, Participants were split between ‘Not Really’ (16%), ‘Undecided’ (33%) and ‘Somewhat’ (50%), however when asked if they felt immersed while using the Oculus Rift those numbers jumped to answers ‘Somewhat’ (25%) and ‘Very much’ (75%). When asked what they felt was immersive about the Oculus Rift, one participant said “Motion being tracked to where I look made it really realistic and immersive” while another stated “It is like you are in the games world”. Furthermore Participants noted that there were specific areas of the level that felt more realistic than others, one said “The drop at the end gave the feeling of falling in real life, stomach churning feel” or another “The end part felt realistic / strange when falling”. These answers suggest similar results to that found in the previous study (Usoh et al, 1999).
When asked which version of the play-through was easiest to control the character with, 75% said that it was easier to control using the Regular Monitor with a further 16% giving no preference. This relates well to the previous answers about issues using the Oculus Rift (Question 3C). One Participant said “I wear glasses and it was difficult for me to wear the Oculus Rift” with another stating “The wires using headphones and Rift got in the way” to suggest that often it was not the gameplay or the rift itself which deterred from an immersive experience.

When asked about physiological issues, 50% of Participants noted some sort of motion sickness or dizziness, while a further 33% noted a very minor effect or nothing at all. From the small “Headache after playing” to the extreme “Sickness, I was about to vomit”. The other 12% noted effects somewhere in the middle. Interestingly 4 of the 6 Participants who noted motion sickness still preferred playing with the Oculus Rift rather than the regular monitor, due to its immersive effects. This strongly suggests that although the effects were felt by participants, the overall immersive experience was not diminished. This effect, known as Cyber sickness (Seppanen, 2013), is more likely to occur in those who have motion sickness – although for the purpose of this study it was not important to ask this. Participant 2 was the only one who stopped playing the game before the end of the level, because they felt uncomfortable carrying on, and throughout the task needed to adjust the headset for comfort. It was also observed that many of the participants had trouble reaching for the keyboard and mouse once they put the headset on, due to their conflicting vision of the screen conflicting with hand-eye co-ordination.

It can be deduced from this small sample that the virtual reality headset increased immersion. The same experience with the headset cannot be generalised for all participants however, as there was a split between those who felt physiological issues and those who did not. Many of the Participants explained that the most immersive areas of the experiment took place at the end of the level, where there was a large drop. These answers replicate the results of the previous study (Usoh et al, 1999) that suggested areas of great height or the actual motion of falling generated a much greater sense of immersion. Many of the observations also noted that they did feel like they were in the environment, or at least felt much more so than using the regular monitor. This suggests that the statement at the
beginning of the Literature Review (Biocca & Delaney, 1995) about New Media’s immersive
capability to make people feel like they are in the game is true in this case.

6 Recommendations
Developers should further investigate the issues with current-generation devices. From a
practical viewpoint, the ability to use the device wirelessly or with a battery pack will
eliminate movement issues due to the length or tangling of cables, but the weight of the
device might be a drawback. Many of the physiological issues included nausea and motion
sickness, and are most likely down to bad calibration of the device or movements in game
which do not perfectly match the movement of the head. By designing a secondary method
of tracking the head movements, possibly using a webcam or specialised Bluetooth camera
to track the movement, should mean the device does not need to be calibrated every time it
is used. This technology is currently in use with wireless controllers for the 'Nintendo Wii',
'PlayStation 4' and 'Xbox One'.

For future use of the Oculus Rift, for personal use and the purpose of experiments, a break
period of 15 minutes per hour as a minimum should be enforced as suggested in the
hardware guidelines (Oculus Rift, 2014). Further research into military simulators also
suggests that the 34% of soldiers from a sample of 742 had symptoms which dissipated
within 1 hour, and they suggest that 1 hour is the longest period of time any soldier would
be expected to remain using a simulator (Gibson, 2007). For all participants warnings should
be enforced to stop using the hardware if any discomfort is felt, this is reinforced with the
same findings (Lu & Mattiasson, 2013) of a previous study whereby 25% of Participants had
physiological issues while using the VR headset.

Surprisingly from this research it would suggest that by putting less narrative into a game, it
becomes more immersive. Less details about the main character of a game actually allows
players to create the character they want to be, and does not force them to assume the role
of somebody they may not like. This should be considered for future development of FPS
games specifically, and the successes of Half-Life and Bioshock are examples of this design in
use. Similarly the use of enacted cut scenes to continue this immersion should also be used
as they keep the player in the viewpoint of the character. While cutscenes often use
graphics and animations that are far more complex and exciting, the overall effect may
cause a play to sit back and relax while they watch the film; again this takes them away from their presence in the game.

7 Conclusions

While the definition of immersion in videogames is often disputed due to complications with other media the overall agreement is that in videogames, immersion has a deeper meaning due to its interactive nature. The SSM Model (Wirth et al, 2007) gives us a theoretical response to a players immersion in a videogame, by suggesting that a second level of involvement, consisting of high levels of involvement, help to develop a sense of presence for the user. The initial first level factors of the model which attract user’s attention, have been explored further in this research paper by looking in depth at character attachment and types of narration.

Research would suggest that the use of the first-person camera perspective generates improved character attachment and empathy. When combined with a character that has no visible face or voice, as seen in Half-Life, the personality created by the player is of their own design (Chung, 2007). This allows the player to become emotionally attached to the character and create an experience which they feel they are playing through themselves, rather than as the character on screen. Furthermore when the game developer creates a narrative that never leaves the perspective of the main character, the player will continue to become more immersed as the game progresses (Weber et al, 2006).

Looking at telepresence as a starting point for what we know as virtual reality, suggests the principles have always been the same but the lack of technology has restricted research of the theory. The effects of virtual reality hardware tested in 1999 (Usoh et al, 1999) generated similar results to a test done 15 years later, even though the hardware has developed so much further. This suggests that even though hardware is progressing towards a truly immersive experience in videogames, it will continue to produce similar results until it becomes more accessible and perfected for the general public. Given the design of the hardware it is impossible to make the experience comfortable for everyone, but these issues definitely need to be addressed when looking at the future of VR technology. Theoretically the ability to develop for virtual reality without the use of a head-mounted display would be
ideal. Using PC monitors that have native 3D displays means that not only would additional hardware be required but also the experience could be simultaneously shared with multiple users. This will reduce the issues that stop a player becoming immersed in the game, though whether or not going back to a regular monitor will break this immersion needs to be investigated.

After exploring the various definitions of immersion it is clear that it cannot be defined in a simple phrase or sentence. Immersion explains the way a person feels emotionally attached to a character in the game, or the way they feel like they are exploring the world for themselves rather than controlling a character to do it for them. It gives the player the sense that they are not sitting in front of a screen playing a game, but that they are inside the game experiencing it all for themselves. With the aid of virtual reality a players immersive state is heightened to such a point that they will completely forget they are sat in a room, forget any real life worries they have and assume the role of the character on screen.

8 References


9 Appendices

9.1 Appendix Item 1 - Pilot Study Questionnaire

Ali Wilson – Videogame Immersion Pilot Study
S1002610
University of Gloucestershire
Multimedia Web Design

I am writing an individual research project about videogame immersion, and your help answering these questions would be most appreciated. The following survey is for my personal use and the results will be included anonymously as part of the final submission. During the test you are perfectly free to leave the test at any point if you feel nausea or motion sickness.

By signing the following I understand that the use of the Oculus Rift can be mentally involving, may induce nausea, headaches and/or dizziness. I have no heart condition or other medical issue that could cause myself or others harm that could be triggered, agitated, or induced by playing Half-Life 2. I do not have epilepsy that can be triggered by video games or flashing lights.

SIGNED:

Thank you for your time.

1. General Information

1a. Gender
☐ Male ☐ Female

1b. Age Group
☐ Under 18 ☐ 18-25 ☐ 26-35 ☐ Over 35

1c. How often do you play FPS games?
☐ Never ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Very Frequently

1d. Have you used an Oculus Rift before?
☐ Never ☐ 1-2 times ☐ 3-4 times ☐ 5 or more times ☐ All the time

1e. Do you often find yourself becoming immersed in a videogame?
☐ Never ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Very Frequently
### Test Feedback

2a. Did you feel immersed in the game, when using the Regular Monitor?

- [ ] Not at all  
- [ ] Not Really  
- [ ] Undecided  
- [ ] Somewhat  
- [ ] Very Much

2b. Did you feel immersed in the game, when using the Oculus Rift?

- [ ] Not at all  
- [ ] Not Really  
- [ ] Undecided  
- [ ] Somewhat  
- [ ] Very Much

2c. When using the Oculus Rift, did you feel like you were experiencing rather than playing the game?

- [ ] Not at all  
- [ ] Not Really  
- [ ] Undecided  
- [ ] Somewhat  
- [ ] Very Much

2d. When using the Oculus Rift did you feel consciously aware of being in the real world?

- [ ] Not at all  
- [ ] Not Really  
- [ ] Undecided  
- [ ] Somewhat  
- [ ] Very Much

2e. When using the Oculus Rift, did you forget about other worries? E.g. University deadlines

- [ ] Not at all  
- [ ] Not Really  
- [ ] Undecided  
- [ ] Somewhat  
- [ ] Very Much

2f. When interrupted for the second time, were you disappointed not to carry on?

- [ ] Not at all  
- [ ] Not Really  
- [ ] Undecided  
- [ ] Somewhat  
- [ ] Very Much

2g. Which was the most enjoyable?

- [ ] Regular Monitor  
- [ ] Oculus Rift  
- [ ] No Preference

2h. Which was the most immersive?

- [ ] Regular Monitor  
- [ ] Oculus Rift  
- [ ] No Preference

2i. Which was the easiest to control the character with?

- [ ] Regular Monitor  
- [ ] Oculus Rift  
- [ ] No Preference

2j. Which did you prefer playing the game with, overall?

- [ ] Regular Monitor  
- [ ] Oculus Rift  
- [ ] No Preference
3. *Oculus Rift Feedback*

3a. Did you have any physiological issues with the Oculus Rift? Nausea, sickness etc.

3b. What did you find the most immersive aspects of the Oculus Rift?

3c. Likewise, what were some issues you found while using the Oculus Rift?

3d. Which parts of the game did you find the most immersive, and why?

3e. Do you think using the oculus rift would be too inconvenient, if so why?

3f. Finally, are there any other observations, issues or comments you would like to mention?

Thank you very much for taking the time to complete this survey.

Your feedback is valued and very much appreciated!
## 9.2 Appendix Item 2 – Questionnaire Part 1 Answers

<table>
<thead>
<tr>
<th>Participant No.</th>
<th>Gender</th>
<th>Age Group</th>
<th>Plays FPS Games</th>
<th>Used Oculus Before</th>
<th>Often Immersed in Games</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>18-25</td>
<td>Frequently</td>
<td>Never</td>
<td>Frequently</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>18-25</td>
<td>Rarely</td>
<td>Never</td>
<td>Rarely</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>18-25</td>
<td>Frequently</td>
<td>1-2 Times</td>
<td>Very Frequently</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>18-25</td>
<td>Frequently</td>
<td>Never</td>
<td>Frequently</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>18-25</td>
<td>Frequently</td>
<td>Never</td>
<td>Occasionally</td>
</tr>
<tr>
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<td>Male</td>
<td>18-25</td>
<td>Very Frequently</td>
<td>1-2 Times</td>
<td>Frequently</td>
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<td>1-2 Times</td>
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<td>1-2 Times</td>
<td>Very Frequently</td>
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<td>Frequently</td>
<td>Never</td>
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</table>
9.3 Appendix Item 3 – Questionnaire Part 2 Answers

1  = Not at all
2  = Not Really
3  = Undecided
4  = Somewhat
5  = Very Much

See Appendix Item 1 for Full Questions

<table>
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<tr>
<th>Participant No.</th>
<th>2a</th>
<th>2b</th>
<th>2c</th>
<th>2d</th>
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<th>2f</th>
<th>2g</th>
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<td>Oculus</td>
<td>Regular</td>
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<td>No Pref</td>
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<td>Oculus</td>
<td>Regular</td>
<td>Oculus</td>
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<td>Oculus</td>
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### 9.4 Appendix Item 4 – Questionnaire Part 3 Answers

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<th>Participant No.</th>
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<th>3b</th>
<th>3c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Felt a bit sick to start with and after taking it off at the level</td>
<td>When going along the level, when the pod track changed height, felt very real</td>
<td>The graphic quality and being able to use the action button on keyboard as couldn’t see</td>
</tr>
<tr>
<td>2</td>
<td>Sickness, I was about to vomit</td>
<td>It is like you are in the games world</td>
<td>I wear glasses and it was difficult for me to wear the oculus rift</td>
</tr>
<tr>
<td>3</td>
<td>Felt slightly sick after playing for extended period of level</td>
<td>Looking around the level</td>
<td>The graphics are considerably worse than on the monitor</td>
</tr>
<tr>
<td>4</td>
<td>Yes felt really sick after 20 mins with motion sickness</td>
<td>The 3D Graphics</td>
<td>found aiming and looking around difficult</td>
</tr>
<tr>
<td>5</td>
<td>Headache after playing</td>
<td>360 surrounding feel</td>
<td>need to get used to controls</td>
</tr>
<tr>
<td>6</td>
<td>Didn't get any of the symptoms which were</td>
<td>Turning and looking around was far more realistic than regular monitor</td>
<td>The weight of the headset</td>
</tr>
<tr>
<td>7</td>
<td>No</td>
<td>The distance of objects from you</td>
<td>The wires using headphones and rift got in the way</td>
</tr>
<tr>
<td>8</td>
<td>Little bit dizzy</td>
<td>Moving my head to look in the game</td>
<td>Took getting used to to control</td>
</tr>
<tr>
<td>9</td>
<td>Not really just irritating</td>
<td>Unsure probably the better 3d looking models</td>
<td>Found it really difficult using the OR, when I don’t play PC FPS games</td>
</tr>
<tr>
<td>10</td>
<td>Not at all</td>
<td>Depth of objects was much more pronounced</td>
<td>Looking around was a bit trickier than the regular game</td>
</tr>
<tr>
<td>11</td>
<td>Motion sickness but not unplayable with it</td>
<td>The 3D effect is much greater using OR</td>
<td>Looking around was sometimes complicated</td>
</tr>
<tr>
<td>12</td>
<td>No</td>
<td>Motion being tracked where I look made it really realistic and immersive</td>
<td>Graphics of the OR are a lot worse than using the regular monitor</td>
</tr>
</tbody>
</table>
### 9.5 Appendix Item 5 – Questionnaire Part 4 Answers

<table>
<thead>
<tr>
<th>Participant No.</th>
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<th>3e</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seeing other characters doing things along the level as it was where most action was and most interesting</td>
<td>Not really because it makes the experience so much better</td>
</tr>
<tr>
<td>2</td>
<td>Everything was immersive when using Oculus Rift</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Dropping from the capsule because it creates the false idea of falling</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>3D Depth of the game when on the pod</td>
<td>Yes too many cables and no awareness of where you are in the room</td>
</tr>
<tr>
<td>5</td>
<td>the ending when I fell 30ft. Realistic feel</td>
<td>Yes, headaches are annoying</td>
</tr>
<tr>
<td>6</td>
<td>The drop at the end gave the feeling of falling in real life, stomach churning feel</td>
<td>Possibly, easy once set up</td>
</tr>
<tr>
<td>7</td>
<td>Looking at the moving tripods</td>
<td>Yes, it was difficult to find mouse and keyboard by myself</td>
</tr>
<tr>
<td>8</td>
<td>Generally looking at distance up and down</td>
<td>Yes it takes up a lot of room on the desk</td>
</tr>
<tr>
<td>9</td>
<td>The end part felt realistic / strange when falling</td>
<td>For me definitely, much easier to use a regular monitor</td>
</tr>
<tr>
<td>10</td>
<td>Looking at objects closer up or running towards them was really realistic</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Looking up and down at the floor and ceiling while on the pod</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>The fall at the end was really good at making you think you were falling</td>
<td>Yes I think it could be cumbersome to set up regularly</td>
</tr>
</tbody>
</table>