INVESTIGATING THE CONNECTION BETWEEN VISUAL DETAIL AND CHARACTER IDENTIFICATION
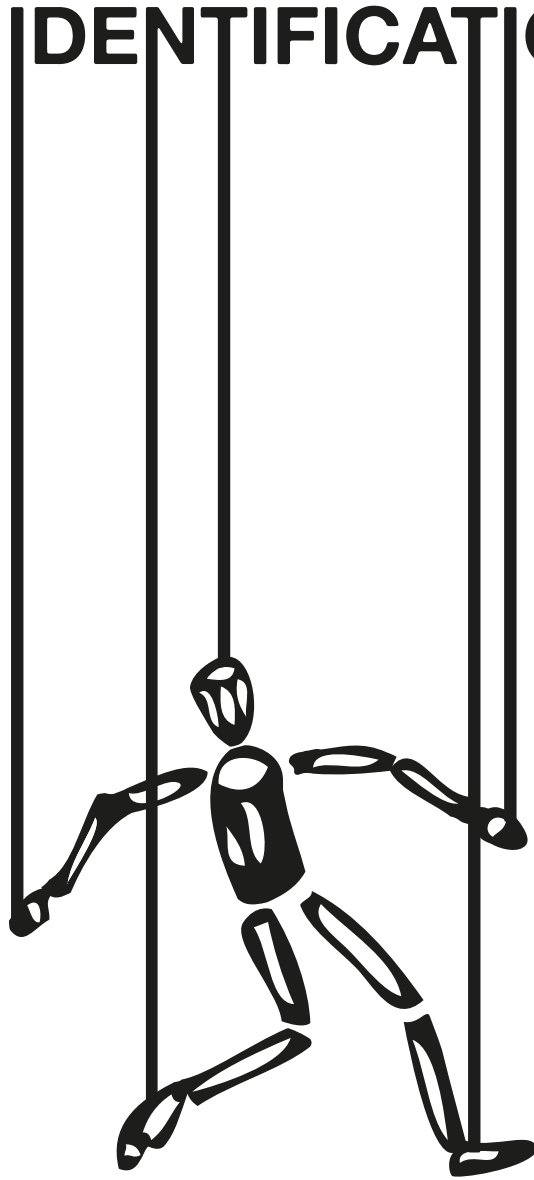
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Abstract:

In this project I investigated if the visual detail of the avatar in a computer game affect the character identification. Through research it was proven that character identification improves enjoyment of the game. It was further explored that a relationship is formed between the media user and the mediated content. This relationship is based on empathy of the main character and atmosphere in the game. Immersion and presence was established as indicators of gameplay experience. These were the measuring factors along side character identification. Two version of an avatar was created. One highly detailed avatar and one less detailed avatar. The avatars were tested in an existing game. The test participants were players of the game which the test was run in. The test material was distributed via online routes and installed on the participants computers. The test was then run on their computer at any time they wanted and for as long as they wanted. 78 people participated in the experiment splitting them up into two groups. One group testing the low detail avatar (38 participants) and the other testing the high detail avatar (37 participants). The result displayed an increase in immersion, character identification and enjoyment of the low detail test group compared to the high detail test group. It can thereby be concluded that the visual detail plays a important role in the context of the game and that it affects character identification.

Preface

This master thesis was developed during the 10th Semester of Medialogy at Aalborg University Copenhagen during the period from 1st of February 2012 to 24th of May 2012.

Readers guide

All references in the report are written in the 6th edition of the Publication Manual of the American Psychological Association (APA) (Hefner et. al., 2007 p. 180). All cross references in the report will be mentioned by the section number and headline (5.2 Defining the avatar) if it is not mentioned in the text. All references to the appendix will be written (Appendix A). A full list of all references will be included in the end of the report. In the results the mean is denoted as (μ), the standard deviation as (σ) and the t-test alpha as (a). All pages of the appendix, references and the full report will be included on the DVD accompanying the report.
A list of all figures are included in the beginning of the report after the table of content.

Acknowledgment

In the process of creating this project trouble and problems have been meet. I have in times of need found help in the people around me. I would like to thank these people for their support and guidance in the process.
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1 Introduction

Computer game companies are in constant struggle to produce the best looking graphics on the market. The ever rising curve of computing power is put to the test each year to fuel this struggle. A new game engine comes out with short time in between with now even better graphics and better performance than last year. The aim for more realism and "prettier" graphics in games today are seeking higher and higher with every passing month. The gaming industry is constantly investigating in better hardware to push the good graphics to great graphics. Each year our perception of realism is heightened. What seamed realistic last year is now outdated and we question ourselves how we could have thought last years graphics as realistic. Our constant focus on better graphics generate much work and profit for hardware companies and programmers. This aim for better graphics seems like a never ending quest. Ten years from now computer games will have better graphics than they have today. Will the gameplay experience also improve over the next ten years?

This boils down to the ongoing discussion of which is more important in a computer game, semantics or mechanics. Are the visuals in a game just a pretty layer on top of the game mechanics? Are the visuals as important to the game as the mechanics? Are the visuals and the mechanics equally important?

2 Motivation

I have an assumption I want to explore. I do not believe better graphics induce a better gameplay experience. I have in many instances experienced a great gameplay experience with low level graphics. I must assume I am not alone in this experience and that is what I will investigate. I can however not test a high graphics game with a low graphics game, there are too many variable in that equation. I will therefore delimitate it to focus on the character you control in the game, the avatar. I will make the assumption; if the graphical detail of the avatar is lowered the gameplay experience will be the same as if it was not. Furthermore will I focus on identification with the avatar. I want to see if the player experiences equal identification with both a low detail avatar and a high detail avatar. The graphical detail of the avatar is not important and the overall graphical quality of the game cannot be included in the conclusion. This will not prove if the quest for better game graphics is futile. It will only argue if the graphical quality of the avatar can be lowered and still maintain the same level of identification.

Based on my assumption of visual presentation of the avatar and identification this is my problem statement:

3 Problem statement

"To what extent does the visual detail level of the avatar in computer games affect character identification?"

4 Methodology

I will explore if visual detail affects the character identification in a computer game. I will explore the field of existing literature and combine it into a theory that can be used on the specific area I want to investigate. I will conduct an experiment that tests if the existing literature can answer the problem statement. Along the way I will be exploring different items that needs to be defined for the problem statement to be answered.

I will be defining character identification which will be the main focus in the project. I will define and explore gameplay enjoyment and use it as a control item in the test. I will use imaginative immersion (Ermi & Mäyrä, 2005) as the definition of immersion since it appeals to the emotional part of gameplay and includes an empathic relationship to the avatar. I find this definition fitting the scope of the project and have a strong correlation to character identification. Self presence defined by *Lee* (2004) is the definition for presence I found most relevant for the project. It includes the alteration of self which is essential when creating avatar-player relations. I will use character identification as defined by *Hefner et. al.* (2007) to determine the avatar-player relation and evaluate the player's identification with the avatar. Other theories relating to avatar-player relation such as character attachment (Lewis et. al., 2008) will not be included. It measures the player relation to a personal avatar and not a generic one. I will not look at social aspects of avatar play but only focus on the avatar-player relation. I will use the defined avatar attributes by *Gazzard* (2009) to define what an avatar is and how it can be understood.

I will use qualitative research to prove or disprove my problem statement by conducting a field study. The test participants will play a custom level created for the purpose on their own computer. Following the test participants will answer an online questionnaire. The weakness of this approach is that the test and custom test level will be difficult to replicate. The choice of measuring character identification is a rather unstable ground for an investigation. The theory can be interpreted in different ways and the definition could differ from researcher to researcher.

The test will be executed by altering an already existing game (*The Elder Scrolls V: Skyrim*) and create two versions of the same avatar model. The test participants will come from the already existing player base of the game. The results might be less reliable since the test participants perform the test at a non-unified location such as their homes. The test will be available to as many people as possible and therefore a certain margin of error is expected. The perspective on the avatar in the game will be of a third person nature since a first person perspective will not involve avatar representation as a whole.

4.1 Previous research

Several researchers have investigated virtual character identification. I will explain the ones I have found relevant to the research area. The studies I mention are used either as motivation for or directly in the project. They all deal with forms of identification and have contributed to my understanding of avatar-player relationships.

Bessière et. al. (2007) explore the difference between the ideal and actual self. Through computer game play they investigate the effect virtual characters and interaction has on the perception of ideal-and actual-self. They conclude that virtual worlds grants the participants the possibility to create a virtual self-concept independent of their actual self-concept. For instance a person with low self esteem can create a self in the virtual world with

high self esteem. This research has grounded my understanding of self in virtual worlds but are not directly linked to identification as I research it.

Hefner et. al. (2007) research character identification with focus on gameplay enjoyment. They found the narrative in computer games to be very important to the identification process of the player. They found the identification process to be directly linked to gameplay enjoyment. My focus adds to this research as I want to see the effects visual detail of the avatar affects character identification. I assume character identification improves enjoyment of the computer game as *Hefner et. al.* found in their research. Furthermore will I use this definition of character identification as one of the measuring elements in the project.

McDonald & Kim (2001) investigate children's self-concept and the impact virtual role models can have on their psychological development. This research has strong roots in identification but with a slightly different focus than I. They conclude children are strongly affected by virtual characters and can have implications on the children's personality development. I use this study to understand the power of identification and how it can affect the human mind.

Lewis et. al. (2008) propose a new theory for measuring character attachment. They focus on four attributes on which they have build the character attachment theory. Identification, suspense of disbelief, control and responsibility are the four attributes they use as measures for the theory. This study differs from mine as it focuses on attachment and not identification. The study is more focused on creating the measurement for attachment and proving the validity of the theory.

4.2 Definition of key terms

I will shortly describe terms used in the report which is necessary for the projects understanding. The terms are highlighted in bold for easier identification.

Parasocial interaction is a term deemed by *Donald Horton* and *R. Richard Wohl* (1956). It describes the relationship between a media person called the **media character** and his audience referred to as the **media user**. The media user forms an emotional connection to the media character. This can be seen in for instance fans of celebrities or television news hosts. The connection becomes stronger the more the media user is exposed to the media character.

Immediacy and **hypermediacy** are terms used in remediation theory. I use the definition by *Jay David Bolter* (2000) of immediacy and hypermediacy. Immediacy is a state the viewer of mediated content can experience when he does not perceive the mediating device. For instance looking at the television and forgetting the television is there. Understood in another way it is the disappearance of the mediating device. Hypermediacy is the opposite of immediacy. Hypermediacy is making sure the viewer is noticing the medium. For instance seeing a television show where the media character is knocking on the screen or speaks of being 'in' the television.

Self-discrepancy is a theory proposed by *E. Tory Higgins* (1987) which explains the perceived difference between the ideal-self and the actual-self. Discomfort and vulnerability may arise from realising the difference between the ideal and actual self. The effects can vary according to the realised difference.

4.3 Report structure and reasoning

The structure of the report will be as follows. First I will explore existing literature on the areas I find necessary for understanding the problem. I will explain my definition of visual detail and what it will mean in the project. Next realism in computer games and its connection to visual detail will be explored. I want to investigate realism and come to a definition which will be used further on in the project. Next I will investigate what the avatar consists of and how it can be understood by the player. It is important for me to understand the avatar and how it works since I will use it as the independent variable in the test.

Next I will investigate character identification and what theories apply to the term. Character identification is the most important aspect in the theory. It will help me understand how people identify with mediated characters in an interactive environment. Last section in the theory investigation is gameplay experience. As several definitions exists I must define my own definition which fit the projects goal. I include this theory because I believe character identification affects gameplay experience. For me to address this belief I must understand both terms. Of character identification and gameplay experience.

Most of the analysis contains definitions for measures of the terms of character identification and gameplay experience. First I will explore and chose the testing environment. This is done in the beginning of the analysis because it further on can be used as ground for other choices in the analysis if necessary. Some decisions are based on which game engine will be used for the creation of the test. Next section explores the different options for measuring character identification and how it can be implemented in the test. The same is done for gameplay experience. I move on to discuss the connections the avatar can have and how I want it to affect the player. I discuss the aspects of the avatar I want to focus on and how I believe the player will perceive the avatar. The last section in the analysis is the discussion of what visual elements I can change to create a testable avatar.

After the analysis I go into designing the custom test level and the avatar. I take the specifications from the analysis into the design and argue for my choices on the avatar and the level. Implementation follows where the process of creating the level and the avatar is explained. I explain how technical limitations forced design changes in the implementation.

The last parts of the report is the test execution, results, discussion and conclusion. Test execution is explaining how the test is executed and what questions are asked in the questionnaire. In the results section I am presenting the results which I discuss and conclude on in the results. The final section in the report is the future perspective. I explain what elements could have been done more effectively and how future research could improve on this.

5 Theoretical background

In the theoretical background section I will define subjects that are needed to understand the avatar-player relation. Furthermore will I investigate and define gameplay experience since I believe it will be affected by altering the character identification. The areas I need to understand to investigate the connection between visual detail of the avatar and character identification. The areas I will investigate and define are; Visual detail and realism according to computer games and their affect on the gameplay experience. The avatar, what it is and how it can be understood by the player. Character identification according to computer games and how it affects the player. Gameplay experience and how it can be measured in a virtual environment. I will begin by defining visual detail and realism in games.

5.1 Visual detail in computer games

Many elements in computer games dictates how realistic they seem. The realism of animations in a game might be believably realistic but the sounds or the graphical quality might not. One might argue that realism depends on the platform and devices the game is created for. For instance a smartphone game cannot have the same level of visual detail as a game for the PC due to its lack of computing power. I will however focus on visual detail as the main focus of realism in the project. I understand many elements in a game affects the player while playing but I will focus only on the visual factors. I will look at the visual detail level in games and investigate the effect it has on character identification. I will not explore other elements in computer games that contribute to realism of the game as for instance; animation, voice acting or game physics. I know that these elements affect the realistic feel of a game but will not be investigated in this project. I will now discuss realism in games and what factors affect the visual detail of avatars.

5.1.1 Realism in computer games

When looking at virtual worlds in computer games many elements play into producing a realistic looking result. These elements make the game feel more realistic according to how well they are executed. The player will compare the virtual realism with the realism he knows from the real world. This creates a problem of comparison since the two worlds cannot be compared without the virtual world loosing credibility. If we are looking at a world we know is not real we have only our imagination to compare it to. When we compare a world that is aiming to be realistic it becomes more difficult because the margin diminishes between the two worlds. When the margin between virtual- and real-world is diminished the difference between these two worlds will become more visible the smaller the margin gets (Wages et al., 2004 p. 217). This phenomenon can be supported by the term uncanny valley that is a known factor when mimicking human form and behaviour (Mori & Minato, 1970). The uncanny valley is a problematic factor that plays into the recreation of human or animal form or behaviour. Figure 1 shows how the uncanny valley moves along the axis of human likeness and familiarity. The closer we get to creating something of 100% human likeness the higher familiarity we will feel. At about 75% human likeness the increasing curve collapses down into a "valley." This valley is the uncanny valley and are causing problems for those trying to recreate the human form or behaviour. Since the valley causes the work effort required to produce 100% human likeness to rise exponentially. I will have this knowledge in mind when creating the avatar for my test and when analysing the results. When the custom level and avatar is created I will alter an already existing game and stay true to the level of realism present in the particular game.
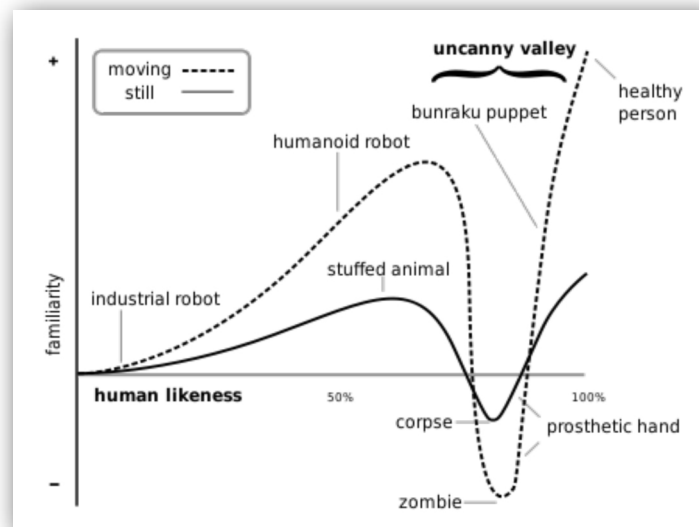
Figure 1 - The uncanny valley graph

5.1.2 Understanding visual information

I will explore how we perceive visual information and what we as humans are focused on when doing this. Humans as other living beings perceive the world to understand and react to it The human perception system is build around identifying essential information from a larger picture. Meaning parts of information in a scene can be disregarded and still maintain the same understanding to us. An example of this from the animal kingdom is presented in the study performed by *Niko Tinbergen* and *Konrad Lorenz*. They investigated sea gull chicks' reaction to artificial gull beaks. Differently formed representations of gull beaks was presented to gull chicks and their reaction to them observed. The chicks reacted to a normal gull beak by pecking at it to be given food. The fake gull beak that looked as a real gull beak produced an equal amount of pecking from the chicks. The fake gull beak that was just a strip of white material with red dots on produced more pecking than a real gull beak did (Wages et. al., 2004 p. 218). This proves that the stimuli produced by the non-realistic beak was equal or even better compared to the real gull beak. This illustrates that gull chicks filter the visual information down to the essential and do not realise the difference between real and fake beaks. This could indicate that humans filter information down to the essential parts and process those in much the same way as the gull chicks. We probably have a more complex perceptive system but are still governed by essential information.

If we filter visual information in a given situation it still matters what is presented to us. Research in this field has proven more realistic graphics in computer games heighten the sense of immersion, identification and presence (Krcmar et. al., 2011). This study however has a stronger focus on computer games as a catalysts for aggressive behaviour correlating how well the player identifies with the main character.

When investigating realism and how it is perceived stimuli independencies must be considered. *Hodgins et. al.* (1998) demonstrated that an alteration of one factor of realism will effect other factors of realism. In the study three different versions of the same virtual character were presented to test participants. The first one was a simple stick figure, the second was represented by a polygon model and the last was a richly detailed character that showed muscular movement. The test result showed that it was not possible to see animation errors in the two lower detail versions. In the richer detailed version the flaws of the animations were noticeable. This indicates that if one factor of realism increases other factors are bound to follow. This emphasises the amount of work that has to be generated to achieve a higher level of realism. Since all aspects of the human form must be considered when aiming for realism.

Since many games have unrealistic elements in them such as dragons or aliens clearly the realistic feeling of playing the game must suffer from unrealistic elements in the game. However this is with complications, because the realistic feeling of a game is only obstructed when an element which does not belong in the universe of the game is introduced. If we put a modern car in a game that is set in a medieval setting it would be considered unrealistic (Wages et. al. 2004 pp. 217). As mentioned earlier many elements must be present for a game to be considered realistic. I will aim to maintain the level of realism present in the particular game and not try to exceed the visual detail level of the existing game. I will keep the items I create connected to the original visual setting not to through the test participants off with a new visual style. An aspect of computer games that affect how the avatar is perceived is the perspective in which the game is played in. If I test a game played in first person I would probably get a very different result than from a third person perspective game. A short discussion of perspectives will now follow.

5.1.3 Remediation

A factor to consider when creating computer games and aiming for realism is remediation. When a computer game is played it is seen through the computer screen thus making the computer a medium that must be considered. As the medium can make itself noticeable to the viewer, called immediacy, or push the content it is mediating forward letting the medium in the background called hypermediacy (Bolter, 2000). Since a computer game can mediate many forms of media it can to a larger extent choose to make itself noticeable. One could argue that the hypermediacy effect *Bolter* (2000) describes can be associated with immersion and presence (Mcmahan, 2003) (Lee, 2004). Since the player looses the understanding of the real world and accepts the virtual world as real. Immersion and presence makes the player forget about the medium and focus only on the remediated content and play an important role when wanting the player to enjoy the game experience (Sweetser & Wyeth, 2005). The element of perspective will be considered when the testing environment is chosen and must be considered when creating the avatar and level.

Visual detail, realism and remediation in games have now been investigated. I now have an understanding of how these elements work according to computer games and what is important when dealing with them. When looking at realism in games on important aspect is the avatar and how it is presented. The avatar can have a strong imprint on the player especially if it is not working realistically according to the games realism. I will now discuss what the avatar is and how it is understood by the player.

5.2 Defining the avatar

I will in this section investigate what elements an avatar consists of and how these elements can be understood. An avatar is a representation of the player within a play environment. The environment can be a board game, a doll house, a computer game or any other environment the player needs representation in (Gazzard, 2009). According to *Alison Gazzard* the avatar is made up of four different characteristics. These characteristics are present in all avatars whether it is a barbie doll or a virtual character. The characteristics are:

1. **Locus** – it's place in its world and how that is communicated to the user/player.
2. **Agency** - the ability to effect an action in its world.
3. **Empathy** – how much the player/user relates to and/or cares about what they are affecting in the world.
4. **Player Character** – who am I within the world? What can I do? What do I represent? (Gazzard, 2009 p. 191)

The four characteristics are present to different degrees but are all required for the avatar to exist. *Gazzard* points out that players always has a dual embodiment of the self. One in the real-world and one in the virtual-world (Gazzard, 2009 p. 191).

When engaging in the activity of play we enter the magic circle of the game (Huizinga, 1970). The circle dictate rules that only applies in the circle. All parties willingly included in the circle are governed by the same rules. These rules are expected to be followed by the participating members. The circle however exists within already defined rules of the real world. This means the play circle is within another circle. One might argue that the rules defined in the circle of the real world would also apply to the circle of play. This is however not true. The participants in the play circle knows about the rules of the real world but they can to some extent be disregarded in the play circle. If a play circle participant would kill another member of the circle it would of course not be accepted and the rules of the real world circle would apply. The participants are however inclined to follow defined rules for instance to win a price. If a play circle is defined and a challenge is presented within it. The participants are willingly following the rules of the play circle and accepts the winner of the challenge to receive the price. Even if the rules where unfair or to one persons benefit. This exemplifies the notion of having multiple frames of reference present at the same time. We understand the play circles rules while we know of the real worlds rules and can interchange these accordingly.

The idea of having multiple realities of reference was first explored by *Erving Goffman* (1974) and deemed frame theory. The play circle exists within the circle of the real world. Rules in the play circle may contain contradicting concepts with the real world circle. The contradictions are possible because we as players perceive our self as being represented in two circle at the same time. According to *Goffman* (1956) we reinterpret other peoples view on us all the time. When we enter a social setting we manage self according to how we think other people sees us. This concept can be used to understand dual embodiments in virtual worlds. In the same way we can understand our dual embodiment in the real-and play-circle. A player of a computer games can also have a dual embodiment of self in the virtual-and real-world.

The understanding of self in multiple realities at the same time can be further explained by *Gary Alan Fine* (2002). His theory is grounded in the already defined frame theory by *Goffman* (1974). The theory defines the avatar-player relation in three layers that can all exist simultaneously.

First, gaming like all other activities is grounded in the 'primary framework' the common sense understanding that people have of the real world. This is action without laminations. It is a framework that does not depend on other frameworks but on the ultimate reality of events.

Second, player must deal with the game context; they are players whose actions are governed by a complicated set of rules and constraints. They manipulate their characters, having knowledge of the structure of the game, and approximately having the same knowledge that other players have. Players do not work in light of their primary framework-in terms of what is physically possible-but in light of the conventions of the game.

Finally, this gaming world is keyed in that players not only manipulate characters; they are characters. The character identity is separate from the player identity. (Fine, 2002 p. 186)

This theory have been further refinement by *Linderoth* (2005) in a study of children' play in a social setting. The study investigated the I relation the children felt with their avatar. *Linderoth* conclude the children could relate to their avatar in three different ways.

1. A fictive character that you can pretend to be, a **role**.
2. A piece of equipment, a **tool** which extends the player's agency in the game activity.
3. A part of the players setting, **props** which can be used as a part of the players presentation of self (Linderoth, 2005).

As in *Fine's* theory the multiple identifications of the avatar can all be present at the same time during play. The player can effortlessly change the understanding depending on the interaction. Item one in *Linderoth's* theory a **role** seems very similar to *Gazzard's* **player character** as they both relate to the roleplaying nature of the avatar. The second item in Linderoth's theory a **tool** seems also similar to the **agency** of *Gazzard's* theory as it extends the player actions in the gaming environment. The last item in *Linderoth's* theory a **prop** looks similar to *Gazzard's* **empathy** as they both relate to the players self representation and avatar relationship.

I have discussed how the player can understand the avatar and now I want to investigate why the player would understand the avatar. I will investigate what the player get out of identifying with the avatar and how this can be observed. A general view on character identification will be investigated and refined to fit the goal of the project.

5.3 Character identification

I this section I will explore the term character identification and how it can be understood. I will refine it to the goal of the project and focus on how it can be understood in interactive and non-interactive media. Identification with media characters have been investigated in media research through out the years. However most of the research have been focused on non-interactive media such as television or literature (Cohen, 2001) (Oatley, 1994). As I want to understand the interactive nature of computer games these do not fully apply. The term parasocial interaction have been established by *Donald Horton* and *R. Richard Wohl* (1956). It is used to identify the relationship a viewer of non-interactive mediated content can experience. The theory argues the that relationship between the media character and the media user is somewhat like a real relationship between two people. The big difference in this context is the media user is the only one having emotional responses to the interaction. It is argued by *Dolf Zillman* that televised drama is entertaining because of the emotional response from the media user (Hefner et al., 2007 p. 40). The definition of parasocial interaction is not applicable to interactive media since the media character is controlled by and depended on the media user. This means that a slightly different take on the one-way-interaction model must be defined. It can however create a ground for understanding identification at a distance.

D. Hefner, *C. Klimmt*, and *P. Vorderer* (2007) propose the theory of "monadic identification" which is targeted at interactive media. I will explore this theory and use it as the definition of character identification in the context of the project. The theory use the social psychological item 'the self' and explores what media exposure can do to the self. Empirical research suggests when 'the self' is exposed to a media character it adopts attributes of the media character to its own self concept thus changing its understanding of its own abilities and attributes (Hefner at al., 2007 p. 40). This effect is temporary and only in effect when exposed to the media stimuli. *Hefner et. al.* further argues that the media user has an intrinsic motivation to escape his or her everyday concerns and experience the game world as a relieving or relaxing activity. With that in mind I will argue that the media user actively wants to adopt the media characters attributes.

The conflict between the ideal self and the actual self, called self-discrepancy, affects the intrinsic motivation towards escapism. Since the ideal self and the actual self can in some cases be very different and the media user might recognise this by interacting with the media character. Thus wanting to adopt the attributes of the media character for instance to feel more courages or strong (Hefner at al., 2007 p. 41) (Higgins, 1987). In interactive media the media user actively controls the narrative and the media characters choices. This control will further appeal to the adoption of attributes and involvement in the interactive medium. As long as the media user is exposed to the medium he must manage the level of closeness to the medium. If the media user is immersed he would be very close to the mediated content and forget about the self and surroundings. The closer the media user is to the mediated content the stronger immersion he will feel. This closeness is governed by the relationship the media users feels with the media character.

The interaction in computer games are somewhat personalised between the media user and the media character. In this context personalised between the media user and the main character in the game. The interactivity between these two parties are playing a big role in the identification process. The interaction ads to the immersion and could help in bringing the media user closer to the mediated content thereby improve the overall enjoyment of the interaction (Klimmt et. al., 2009).

"Video games thus seem to facilitate a non-dyadic or monadic user–character relationship in the sense that players do not perceive the game (main) character as a social entity distinct from themselves, but experience a merging of their own self and the game protagonist." (Klimmt et. al., 2009 p. 354)

Simulation theory proposed by *Keith Oatley* (1994) argues the emotional and cognitive processes of the protagonist in written literature is performed by the reader. This theory indicates that in written literature the reader or media user will feel as the protagonist in some instances. Much in the same sense an audience feel about the main character in a movie. I will argue this process also occur with interactive media.
As explained by *Jonathan Cohen*:

"While identifying with a character, an audience member imagines him-or her-self being that character and replaces his or her personal identity and role as audience member with the identity and role of the character within the text. While strongly identifying, the audience member ceases to be aware of his or her social role as an audience member and temporarily (but usually repeatedly) adopts the perspective of the character with whom he or she identifies." (Cohen, 2001 p. 251).

For the identity shift between media user and media character to occur the attributes of the media character must be appealing to the media user. An emphatic relationship with the media character must therefore bee present for shift to happen (Klimmt et. al., 2009 p. 359). The proposed identification theory is not supposed to be a stable connection between the media user and the medium, and strong identification might be followed by equally strong non-identification. Another important element in the interactive identity theory is the media users familiarity with the controls of the medium so no unintended events of the interaction occur. If the media user are not familiar with the controls he could accidentally fall or perform unintended actions within the interactive medium.

The faults of this theory in the context of this project is that the theory is based on the desirable nature of the media character the media user can identify with. A person with no desire for identifying with for instance a soldier in a war scenario would probably never reach the "monadic identification" *Hefner et. al.* suggests in such a scenario. This might be problematic when performing the experiment and will be considered in the questionnaire or eliminated in the design of the experiment. Another problem that must be considered in the experiment is the issue of competence. The media user will feel more or less competent according to how well he is doing in the role of the media character. This will include the media user feeling less competent at a certain role or task in the game and will decrease his desirable identification with the media character (Hefner et. al., 2007 p. 42). This can be avoided by testing on users that are used to playing the game I will use for the test. If the test participants are familiar with the game and have played it before they must also be familiar with the controls of the game.

I have explored different theories of identification and these will be discussed in the analysis to figure out how character identification can be measured. We now have information on visual detail, the avatar and interactive character identification. We can now look at how this effects the player. I want to define gameplay experience and investigate how it can be measured and what elements I should consider when creating the test.

5.4 Gameplay experience

I want to investigate gameplay experience since I believe this is affected by character identification. As stated by *Klimmt at. al.* (2009) The enjoyment of a game will increase if the player identifies with the media character. This is why I want to explore how gameplay experience can be established and if it can be measured in an experiment scenario. For me to investigate gameplay experience I must define the elements in a game that makes it enjoyable. As mentioned in section 5.3 Character identification, immersion and presence are major factors in gameplay enjoyment and will be the first features I will explore. Other features than immersion and presence affect the gameplay experience but some of them cannot be controlled. Depending on the test setup I will argue; the physical environment the player is playing in, how the player is playing and what time of day the player is playing in affects the enjoyment of the game. As these factors will depend on the test setup I might not be able to control them.

5.4.1 Immersion

Immersion is an important element in gameplay enjoyment. It has been defined for various scenarios and has multiple definitions accordingly. I will define immersion according to interactive media and define a theory on immersion that is fitting this project dealing with character identification. *Janet Murray* describes in 1997 immersion as such:

"A stirring narrative in any medium can be experienced as a virtual reality because our brains are programmed to tune into stories with an intensity that can obliterate the world around us. . . . The experience of being transported to an elaborately simulated place is pleasurable in itself, regardless of the fantasy content. We refer to this experience as immersion. *Immersion* is a metaphorical term derived from the physical experience of being submerged in water. We seek the same feeling from a psychologically immersive experience that we do from a plunge in the ocean or swimming pool: the sensation of being surrounded by a completely other reality, as different as water is from air, that takes over all of our attention, our whole perceptual apparatus . . . in a participatory medium, immersion implies learning to swim, to do the things that the new environment makes possible . . . the enjoyment of immersion as a participatory activity." (Mcmahan, 2003 p. 68)

I have chosen two theories among the definitions of immersion as the main focus in the project. I will use *Brown* & *Cairns* (2004) grounded investigation of immersion as the definition for the different stages of immersion. I believe it has well defined arguments for its stage separation and it is fitting the theme of the project well. I will use *Ermi* & *Mäyrä* (2005) fundamental components of gameplay experience to define the different types of immersion a player can experience. I find this theory appropriate according to character identification since one type of immersion is directly affecting this namely imaginative immersion. The two theories will now be explained according to character identification.

5.4.2 A grounded investigation of immersion

Engagement, engrossment and total immersion are the terms deemed by *Brown* & *Cairns* (2004) for the three stages of immersion in their theory. They however explores immersion from a standpoint leading away from gaming and trying to apply it to other interactive media. The three stages of immersion is blocked by a barrier that needs to be removed before the stage can be entered.

1. **Engagement** is the first stage the player enters. The barrier of engagement is investment, effort and having access to the medium. If the player does not enjoy a particular game genre he is less prone to enter the first stage of immersion while playing that game genre. I will use an already existing game for testing with an already existing player base. Therefore will I assume the players of the game will have an initial desire to play the game.

2. **Engrossment** is blocked by the emotional link between the player and the game. If the game is unable to elicit an emotional response from the player he will not enter the second stage of immersion. This stage of immersion is linked to the world the game consists of and the narrative structure of the story. This definition of immersion illuminates that I need a narrative in the test for test participants to enter engrossment.

3. **Total immersion** is described as presence by *Brown* & *Cairns* and refers to the player feeling transported away from his real position or location. Total immersion is entered when the barrier of empathy and atmosphere are removed. Meaning that empathy and atmosphere must be present and enjoyed by the player for the final stage of immersion is entered. As this is the highest level of immersion it is difficult to enter and will in most cases not last long.

We have now explored the three stages of immersion and will move on to defining the different types of immersion that can be experienced.

5.4.3 The SCI-model

The second theory defined by *Ermi* & *Mäyrä* (2005) explores the different types of immersion the player can be in. The study investigates children's understanding of immersion in games. The research produced the SCI-model which entails three immersion types; Sensory, challenge-based and imaginative immersion. The theory is closer to gameplay experience than *Brown* & *Cairns* theory and defines the different immersion types one can experience in a game. The three types of immersion are:

Sensory immersion is the audiovisual elements of the game that effects the player. It is however stated that these aspects of a game are not the strongest catalysts for immersion. Sensory immersion is of medium importance to me since I deal with the visual aspects of games. I will use sensory immersion in the test to see how much the test participants enjoy the visual and auditory stimuli in the test. Meaning the game environment, the avatar and the audio.

Challenge-based immersion is almost self-explanatory. It has to do with the challenges the player face in the game and is strongly related to the controls of the game. If the controls of the game is not familiar to the player he will not be able to experience this type of immersion. This will probably be avoided to a certain extent since the test participants already know the controls due to having played the game before. Challenge-based immersion resembles the term flow introduced by *Nakamura & Csikszentmihalyi* (2002). The challenge level and controls of the test must be fitting the test participants. As it is impossible to tailor the test to fit all participants this stage will probably be difficult for some participants to experience.

Imaginative immersion is the emotional connection the player has to the interactive media. It consists of the story, the characters and the world in which the game is played. Imaginative immersion relies on the players empathy towards the characters in the game and the ability to identify with them. Imaginative immersion is very

important to me as it allows the player to become familiar with the in game characters and emphasise with them. Since I focus on the identification element of the avatar, imaginative immersion will be a key component of immersion.

As described earlier immersion has multiple definitions I will therefore pick elements from the two theories that I find relevant to the project. We learned that immersion has different stages and barriers must be removed before each stage can be entered. The higher the level of immersion the harder it is to enter and maintain that level of immersion. I will test the character identification the player feels with the avatar in a game. The game I will be testing on will be an already existing game with an existing user base. The test participants will already be familiar with the setting, controls and story of the game and will maybe make it easier for them to enter the different stages of immersion. I will attempt to establish their level of immersion while they are playing the game. I will also consider the different barriers when constructing the test so they are easily removed by the player. The different types of immersion I will focus on are the sensory and imaginative immersion. I will attempt to evoke a higher degree of imaginative immersion than sensory since I focus on the identification process. The imaginative immersion will be the most important type of immersion in the project. It will feature as a measuring factor for immersion and be an indicating factor towards gameplay enjoyment. I will now define presence as it resembles the last stage of immersion namely total immersion.

5.4.4 Presence

Presence was mentioned as the last stage of immersion in *Brown* & *Cairns* theory. That makes presence a subject that needs a definition according to this project. It is according to *Brown* & *Cairns* (2004) the highest level of immersion and must therefore be when the player enjoys the game the most. I need to understand this last stage of immersion to know when a player enters this stage.

Kwan Min Lee (2004) has made a comprehensive collection of all the definitions of presence and proposed a common definition for it. I will use this definition as ground for presence since the collected review of many theories of presence must entail a somewhat uniform presence definition. Generally presence explains the feeling of being some place else than your physical body. Many definitions of presence have been formulated and many of those define presence according to e.g. virtual environments and tele-operations. *Lee* (2004) propose presence to be a three part term that can be experienced in three ways:

Physical presence is the state of presence which is experienced in the same way as virtual environments and virtual objects are perceived as real. This can occur in virtual and tele-presented environments. The term is somewhat self explanatory and defines the physical presence the player feels when engaged in virtual environments such as virtual reality. It makes the player feel as if his body is physically transported to another place.

Social presence is presence where the user experiences interaction with artificial or real agents and understands those as real. When the user believes the authenticity of the interaction is indistinguishable from real interaction. This interaction can be between non player characters or actual players in a multiplayer setting.

Self presence is the state where the user experiences his representation of self in a virtual environment as real. This representation can vary from a hand or a cursor to a complete virtual body. Self presence has a strong relation to character identification and will be my main focus as presence measurement.

The state of self presence is the presence type I will mostly focus on since it directly relates to avatar presentation in virtual environments. I will use this definition of presence as one of the measuring factors of how well the player identifies with the avatar. Since I believe a good character identification follows a good gameplay experience.

5.5 Theoretical background summary

I will shortly summarise the sections in the theoretical background so it is fresh in our memory for the next section of the report. In section 5.1 Visual detail in computer games, we found the margin between virtual and real worlds to be important to the sense of realism in computer games. The smaller the margin the more sceptic the viewer will be to the virtual content. This concept corresponds closely to the uncanny valley that also has to do with mimicking realism and perceived realism. The uncanny valley is a factor that must be considered when recreating human or animal form and behaviour. The more realistic a creation gets the more familiar we feel with it until a certain threshold where we lose all familiarity even though it looks more realistic. Until the creation is almost 100% realistic. Perceived realism in computer games has to do with the elements in them. If an item is not fitting the theme of the game that item will be considered unrealistic in the setting. We found remediation an important element in computer games. Because of the multimedia nature of computer games they have to a larger extent the option to use immediacy or hypermediacy when mediating content.

We investigated the avatar (5.2 What is an avatar?) and what it consists of and found two theories. One theory explains what an avatar consists of namely *Gazzard's* four components.

1. **Locus** – it's place in its world and how that is communicated to the user/player.
2. **Agency** - the ability to effect an action in its world.
3. **Empathy** – how much the player/user relates to and/or cares about what they are affecting in the world.
4. **Player Character** – who am I within the world? What can I do? What do I represent? (Gazzard, 2009 p. 191)

Furthermore we found *Linderoth's* three states the avatar can be experienced by the player.

1. A fictive character that you can pretend to be, a **role**.
2. A piece of equipment, a **tool** which extends the player's agency in the game activity.
3. A part of the players setting, **props** which can be used as a part of the players presentation of self (Linderoth, 2005).

We found that identity shifts can happen and the player can have multiple perceptions of self present at the same time or interchanging between them.
In section 5.3 Character identification we found different theories explaining how the player can relate to the avatar. Theories on interactive and non-interactive media was explored and traits were found relevant to the problem we are trying to investigate. Parasocial interaction was found and related to character identification in non-interactive media. Self-discrepancy was found to be a motivating factor for players to adopt attributes from the avatar and feel more connected to the avatar by that. Since interactive media can elicit a form of escapism the adoption of attributes and closeness to the media character can be a strong intrinsic motivator for the player to play computer games. We found that in all mediated content the user can feel an emotional connection with the main character and that story is a strong identifying factor in such content.

In section 5.4 Gameplay experience we found gameplay experience affected by immersion and presence of the player. We found the items of immersion and presence that relates to character identification which will be used as measuring factors in the test. The most important element in gameplay experience is immersion. From the two definitions of immersion, namely the SCI-model (Ermi & Mäyrä, 2005) and the grounded investigation of immersion (Brown & Cairns, 2004), we found the following items relevant for measuring gameplay experience related to character identification. From the grounded investigation of immersion we use the three stages of immersion; engagement, engrossment and total immersion. The three stages will be used to indicate how

immersed the test participants are while playing the level. Total immersion is argued to resemble presence and conveying a form of self transportation. Three types of presence are stated by *Lee* (2004) and one of the three namely self presence will be the focus of presence in the project. Self presence relates to the feeling of being in a virtual environment and believing this representation of self is real. From the SCI-model we use the imaginative immersion as the main focus type of immersion the test participants display. Imaginative immersion relates to the emphatic relationship the player feels with the avatar and will be of most importance in the test. Sensory immersion will be the second focus on immersion since it relates to the atmosphere and the visual stimuli presented to the test participants.

I will now investigate the technical background of computer games and how visual detail can be related to that. I will look at the technologies that are visually on the forefront of game engines and what they are capable of.

6 Technical background

To investigate the visual detail level of the avatar I will look at the visual detail of games in general. I will explore how games today are rendered and what game companies focus on. Investigation in state of the art of game graphics is directly related to the game engine the games are created in. Many game engines exist, but I will focus on the leading few in visuals. Some game companies create their own engine for a specific feature they want in their game. For instance the developer *Team Bondi* created an engine specifically for doing very detailed facial animation. They use this feature in the game *L.A. Noire* where the goal is to spot if a non player character (NPC) is lying or telling the truth. The actors' performance must therefore be very visible in the virtual character to be able to identify the subtle cues that tell if he is laying or not (Team Bondi, 2011).

The engines created by individual game developers are for the most part not publicly available. This means that I will not be able to use them or know the technology they are using. I will therefore focus on the ones that are publicly available and have a list of features that can be identified. The engine that are used the most in games today are the Unreal Engine developed by *Epic Games* (Epic Games, 2011). The engine is known for it ability to render high quality imagery with low computational requirements. The Cry Engine developed by *Crytek* is the other recognised engine with excellent graphical quality. The engine is however not used in many other games than the ones *Crytek* develops (Crytek, 2011). The research to improve these engines are ever ongoing and a new version of the engines come out with short time in between. I will explore what features are available in the two engines to establish the cutting edge technology in this field. I will use the two engines to establish a threshold for how realistic game graphics are today. I will look at the released versions of the engines that are available at time of writing which is *CryENGINE 3* (Crytek, 2011) and *Unreal Engine 3* (Epic Games, 2011).

I will explore the features *Crytek* and *Epic Games* have highlighted to be important to their engines. The focus will be on the features in the game engines that have to do with character presentation. I will go through the most important features used to render real time characters and explain their use. All features mentioned are ones highlighted as important to the visual representation of either *CryENGINE 3* or *Unreal Engine 3*.

Screen space subsurface scattering is imitating the interreflection that happens within semi-translucent material such as skin or wax. The function use the bidirectional surface scattering distribution function (BSSRDF) which is a more complex version of the commonly used bidirectional reflectance distribution function (BRDF). The BRDF calculates the outgoing radiance of a specific point on a surface, and does so expecting the ingoing radiance is outgoing at the exactly same point. The BSSRDF considers the material when calculating the outgoing radiance by including interreflections within the material in the calculations. The function let game engines render semi-translucent materials and are essential when wanting to render realistic looking human skin (Jensen et. al., 2001) (Nicodemus et. al., 1977). As can be seen in figure 2 there is a great difference between the two methods. One seems plastic like and the other more as human skin would look. The feature is not essential when rendering game characters at a distance. However it is important to close ups of character where the skin must have more fidelity. The method is important in games that focus on facial animation or have cameras very close to the characters body.

Figure 2 - The BSSRDF and BRDF methods

Normals mapping is an extra texture that is applied to the virtual model to give the illusion of it having more geometric detail than it physically does. Most of the finer details on game characters today are done by applying a normals map to the model. It is called a normals map because it manipulate the face normals of the geometric surface. The algorithm calculates the shading of each surface by adding the information given in the normal smap, altering the surface normal and thereby given a smooth surface the interpretation that it is for instance bumpy. (Krishnamurthy & Levoy, 1996). This is a very powerful tool and is used in most games because of the low computational power needed to run in real time.
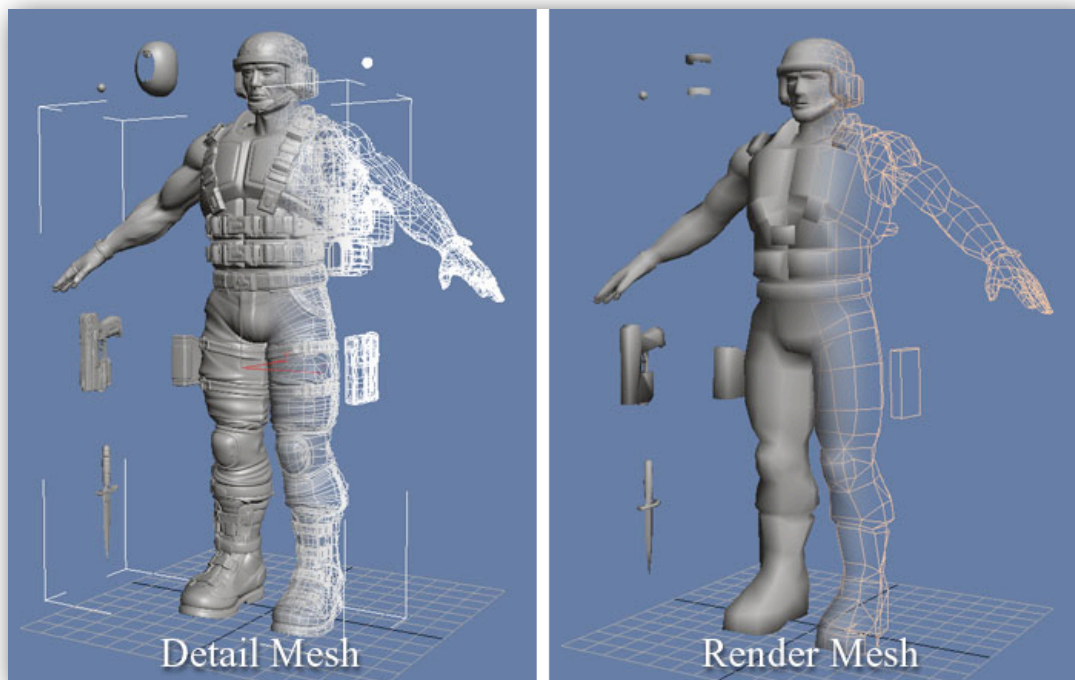

Figure 3 - High and low detail model mesh

Virtual Displacement mapping, also referred to as parallax mapping, is a technique that displace the geometry of the virtual model according to a height map. The amount of displacement is related to the dark and light shades of the height map. The displacement map is altering the mesh perpendicular to the face normal of the

original mesh. Virtual displacement mapping is a very strong algorithm when combined with tessellation as can be seen in figure 4 (Szirmay-Kalos & Umenhoffer, 2008).Virtual displacement mapping are different from normals mapping because it deforms the mesh where normals mapping only alters the perceived shading of the surface. This algorithm is powerful because it increases the visual detail of a virtual model without much computational power. The downfall of this algorithm is that only the newest graphic-cards support it and cannot be run on older machines.
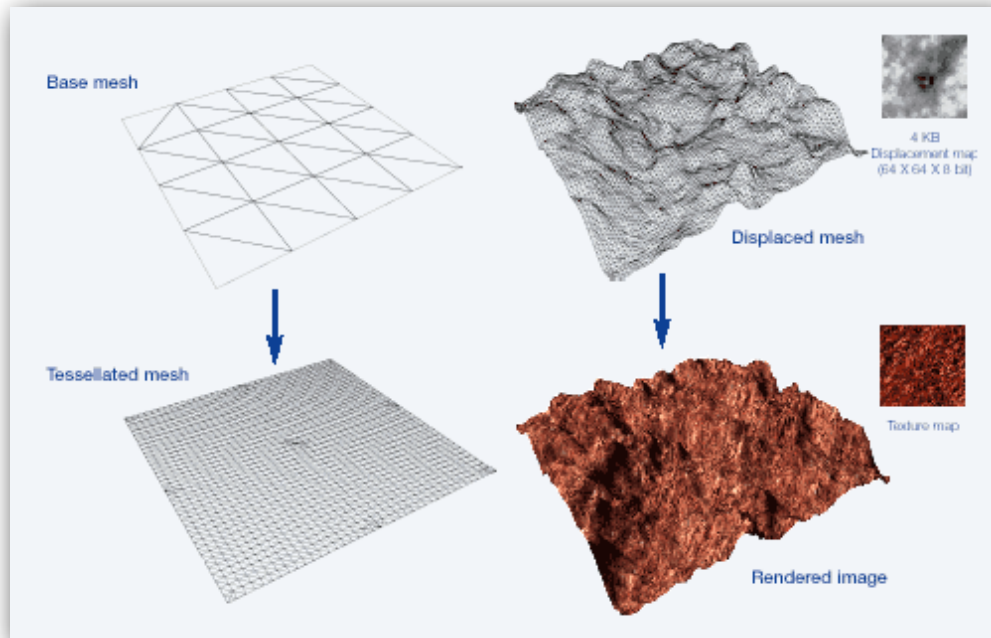
Figure 4 - Virtual displacement mapping combined with tessellation, hight map and applied texture

Tessellation is a technique that adds visual detail to a lower detailed model. The technique subdivides the geometric mesh and adds vertex points to it. This makes it a very powerful algorithm when combined with displacement maps and can create very detailed models with minimal geometric information (Core et. al., 2009 p. 94). Tessellation is in general a subdividing algorithm that makes it possible to create richer visual detailed characters. It is important when rendering computer generated imagery aiming for realism. It however requires *DirectX11* (Microsoft, 2008) to run and are therefore not prominent in games yet.
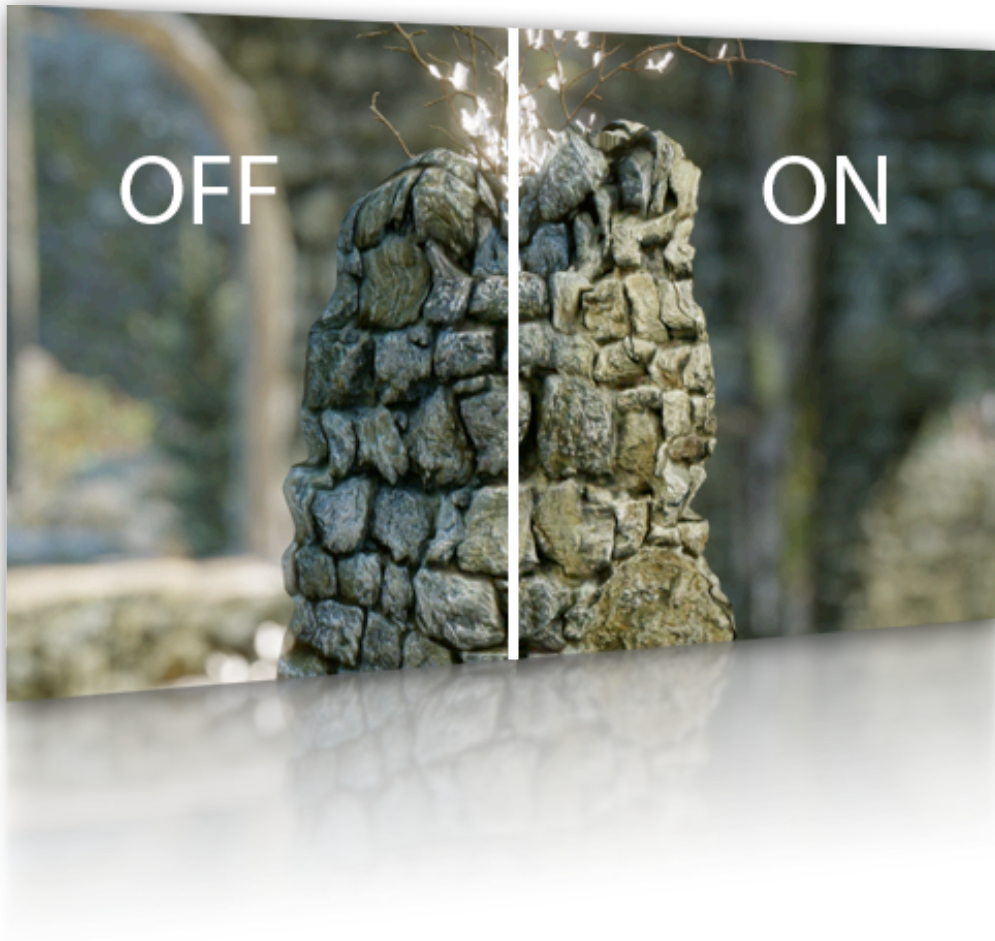
Figure 5 - Tessellation off and on

All the features mentioned are needed when rendering high quality imagery in real time. The game engines are always aiming for rendering as detailed information as possible with the least amount of computing power. Because computer games are played in real time the rendering engines must emphasise speed over quality.

6.1 Technical background conclusion

We found that game engines today use many different techniques to render real time graphics. I focused on the common algorithms important for portraying virtual characters. Several other elements play a role in rendering virtual characters in real time. I chose not to list all the features since I found it irrelevant to the project. In this section I explain the features that *Crytek* and *Epic Games* highlight as important in their engines. I use this section to establish a ground for understanding real time graphics and how they are produced. As the scope of the project is not including technical limitations to the avatar. I wanted to explore the most common methods of presenting avatars in games. I focussed on the features I found important to the project which affect the design decisions of altering the avatar. This section paved the road to understand how alterations to the avatar can be done.

In this section we found the core features that affect real time rendering of the avatar. I chose to focus on screen space subsurface scattering which is a very important feature when rendering human skin. We found normals maps to have a large impact on detail level and that they are very effective when dealing with real time renderings. Virtual displacement mapping and tessellation are other very powerful algorithms that are used in games today. They work by subdividing and altering the geometric structure of the mesh. These features will form the base for my understanding of avatar rendering. We have now established the ground for technical terms which will be used in design and implementation of the test. I will now analyse the defined theory so I can use them for measuring character identification and gameplay experience.

7 Analysis

The analysis section will include analysing elements that are needed to understand how the defined theoretical elements can be measured. First I will investigate the possible testing environments and what game engine I will use to create the avatar and test level. Next I will go through character identification and how it can be measured. Next I will explore gameplay experience and what specific parts of gameplay I want to measure. Immersion and presence will be the prominent factors in that matter. Next I will look at the avatar and what constraints there are to perspective and attributes stated earlier (5.2 Defining the avatar). More precisely the four attributes defined by *Gazzard* (2009) and the three defined by *Linderoth* (2005).

7.1 Possible testing environments

I need a testing environment to create and run the test in. I have already discussed two visually leading game engines that I could used for the purpose. These engines, however, does not have direct implementation options for the test. If I want to modify elements in the *Unreal Engine 3* (Epic Games, 2011) or the *CryENGINE 3* (Crytek, 2011) I will have to create a method for distributing the modification (MOD). If I am to do a laboratory test I do not need distribution. If a field test is performed distribution is needed. It has come to my attention that *The Elder Scrolls V: Skyrim* (Skyrim) (Bethesda Game Studios, 2011) do have distribution integrated in their game engine, the *Creation kit* (Bethesda Game Studios, 2011). It is possible to distribute MODs via the *Steam workshop* which is a powerful games platform and community (Valve, 2012). This feature makes it easy to distribute the test material to all users of *Steam* and players of *Skyrim*. From the discussed game engines I believe three options for executing the test exists.

1. Create my own environment from scratch by using game engines such as *Unity3* (Unity Technologies, 2012), *Unreal Engine 3* or *cryENGINE 3*.
2. Create my own environment using existing elements by using engines such as *Unreal Engine 3* or *cryENGINE 3*.
3. Use an already existing game as environment such as *The Elder Scrolls V: Skyrim* which has integrated distribution options using the *Creation Kit*.

If I want to use Unreal- or Cry-engine a laboratory approach will be the most suitable. This facilitates a stronger research basis since the physical testing environment can be restricted from external stimuli. It however creates an artificial environment for the test participant as he is used to play games on his own computer at home. This argument swings both ways. By using a laboratory test I will get more control over the test environment. If I choose a field study approach. The results will probably be more realistic due to the non-artificial environment.
As I want the test to portray the results without artificial stimuli I will use the field study approach. I want the test participants to play the level in their own environment and therefore use the *Creation kit* from *Bethesda* to create the test. Another reason to use this approach is that *Skyrim* already have a player base which will become my target group I can draw from. Because the test participants are going to play a game they have played before. I will have less trouble removing the first barrier namely control from the equation.
The Elder Scrolls V: Skyrim is a sandbox roleplaying game (RPG) where the player creates a character and can either follow the storyline or roam freely in the world. It has much emphasis on character and character creation thus making it an ideal candidate for testing character identification. The fact that it has a dedicated modification platform and community is a huge benefit for distributing the testing material. The graphical detail level in the game is up to par with other current generation games and can go for one of the best looking games today.

7.2 Measuring character identification

Character identification have been established (5.3 Character identification) and I will now explore ways to measure this identification. I will use *Hefner et. al.* (2007) And *Klimmt et. al.* (2009) previously mentioned work as ground for this exploration. They identified a connection between character identification and gameplay enjoyment with the focus of roles in games. I will use character identification as an indicator of gameplay enjoyment. I will focus on the avatars visual representation and the connection between that and character identification. I will argue visual detail of the avatar affects the character identification which again affects the gameplay enjoyment.

The way *Hefner et. al.* (2007) indicate character identification is by asking questions directed at the players adoption of the avatar's attributes, goals and player embodiment. I will follow some of the same lines but I will not include the adoption of attributes. For me to ask questions relating to attribute adoption I would need to establish the test participants baseline of self-discrepancy and after the test see if that baseline had changed. As I will not be able to measure the baseline of self-discrepancy in the test participants, it will not be include. The measurement of self-discrepancy will require a laboratory test approach. I will however include the avatar's goals as a measuring factor. If the test participants feel the goal of the avatar becomes their own they are adopting some of the traits of the avatar. They are taking responsibility for the avatars mission and adopts the goal as their own.

The defined theory on character identification relies on the users desire to adopt the avatars attributes and or abilities. This will cause problems for me since I will test the participants character identification towards a predefined avatar and not given them the option to alter it according to their personal preference. The expectation of customisation of the avatar in roleplaying games pose a problem. The participants might expect the avatar to be customisable which it will not be. The test participants' relation to the predefined character will be equal zero when they start the test. If the test participants where given time to customise the avatar before starting the test they would have a stronger sense of identification with it.

No avatar customisation will be possible for the test participants. Due to the extensive work it would take me to produce customisable avatars for the test. The test participants are used to customise their avatar and will probably lessen their emotional attachment and character identification. However this starts the character identification at an absolute minimum and more effort will be put into narrative elements in the level to induce empathy towards the avatar. As the test participants are not creating the avatar they will play the level with. They are going to control the aspect of self-discrepancy on a somewhat unstable ground and will have a higher distance to the avatar. The test participants will not have a personal attachment to the avatar because it is predefined by me. Therefore can the identification of actual- and ideal-self not be related to the predefined avatar. *Hefner et. al.* (2007) used the difference from the test participants actual self to their ideal self and compared that to how the test participants felt about their avatar. I cannot rely on this information because the test participants will not have an already defined relationship with the avatar at the beginning of the test. This means that I must find another way of pinpointing identification.

We learned from the section 5.2 Defining the avatar, that people in general find games relaxing and to some extent a form of escapism. Therefore will I incorporate questions in the questionnaire about their attitude towards this element. If they enjoy the time while testing it could indicate they want to test more. If they want to

test more chances are they enjoy the interaction. Questions concerning the participants thoughts on everyday chores might also give an indicator of escapism and to some extent immersion and presence.

Character appeal is an important factor in character identification and must be considered. As I create the predefined avatar it is very unlikely all test participants will find it appealing. I must therefore accommodate for this by creating the character as appealing to a broad audience as possible. I must assume the test participants find the visual style appealing since they are part of the already existing player base.

The loss of self awareness is stated as crucial for the character identification to happen (Hefner et. al., 2007). I must therefore include questions regarding self awareness in the questionnaire. As it can be quite difficult to remember that you forgot about your self while playing a game. I will ask questions which can be reasoned the person were not self aware. *Hefner et. al.* have the question: "I have forgotten about my self during the game" and have the test participants rate it on a five-point scale from "completely disagree" to "completely agree" (Hefner et. al., 2007 p. 43). I will include such questions in the questionnaire.

"I had almost the feeling of being the game character" and "The goals of the character became my own goals" is pointed out in *Hefner et. al.* study as questions to establish if the test participants where identifying with the avatar. They argue if the goals of the avatar becomes the goals of the test participant character identification is present. These questions relate highly to the control aspect of game interaction and the test participant must therefore be familiar with the controls of the game. This should not cause a problem since the test participants are going to play a game they are used to. I will however be considering this when analysing the results.

7.3 Measuring gameplay experience

To reach the goal of measuring the gameplay experience I will use immersion and presence as indicating factors. The gameplay experience will be used as a guideline. It will be uphold against character identification to see the connection between the two. By correlating gameplay experience with character identification it will be possible to see if they are affected by each other.

7.3.1 Immersion

We learned from section 5.4 Gameplay experience, that barriers exist between the different stages of immersion. The barriers that needs to be removed to enter engagement is effort, investment and access to the medium. As the medium is accessible to all test participants, because they bought the game before the test is performed, the access issue is not present. It will be more difficult to evoke investment from the test participants. Some test participants might be bored with the game due to overplay or having completed the main storyline. The problem of effort will probably emerge caused by the predefined avatar because it has no personal investment from the test participants.

To enter engrossment the barrier of emotional response from the player must be present. As this is a difficult barrier to remove I am not positive the test participants will enter this stage of immersion. I will however create narrative elements in the test so the possibility is there for the test participants to elicit an emotional response. I will aim to make the narrative emotional by including emotional choices for the avatar either in the story or as interactive options in the test.

The last barrier governs total immersion and can be removed with empathy and atmosphere. As they are the most difficult to evoke I find it uncertain the test participants will ever enter this stage of immersion. It can be difficult to create an appealing atmosphere since appeal is a very personal element. I hope the test participants enter this stage of immersion as they will have a bigger chance of strong character identification. I however doubt they will reach this final and most powerful stage of immersion.

Sensory and imaginative immersion are the immersion types I want to focus on. Sensory immersion is present when the user is intrigued by the audiovisual elements in the game. It will however not be the most important form of immersion since it does not accommodate character identification. The audiovisual elements are present in the game and will therefore evoke sensory immersion. It will however be fluctuating based on how appealing the user finds these elements. I will not create new assets for the game but use existing items from the game. Because I use existing game assets the test participants should be familiar with them since they have played the game before. Questions about the appeal of the environment and characters will help understand if the test participant were sensory immersed.

The imaginative immersion will be included by the story both surrounding the avatar and the environment. It must be an appealing narrative for imaginative immersion to be displayed in the test participant. The test participants will be playing as a predefined avatar they have had no influence on. They will be playing a narrative they know nothing about. I therefore believe it will be difficult for the test participants to enter imaginative immersion. The length of the test level affects the narrative structure and cannot be as explicit as it might be necessary to evoke imaginative immersion. If an empathic relationship with the avatar is present all other measures will follow. To measure the empathic relationship questions concerning the test participants feelings towards the avatar and if they found the environment appealing could be asked.

7.3.2 Presence

As the last stage of immersion, total immersion, correlates to presence the two may be hard to distinguish and can in some situations be considered the same. I will focus on the self presence as I mentioned in the theory section (5.4.4 Presence). Questions relating to the realness of the avatar and the environment will indicate self presence. However that might be a too direct approach and will not yield the desired outcome. I will use the loss of time, the loss of self awareness, and the loss of everyday concerns to indicate if self presence is present. As all three of these indicate some sort of transportation of mind or body. Questions regarding these items will be in the questionnaire.

7.4 Measuring the avatar

Since I want to investigate the character identification the player feels while playing. I need to understand how the player relates to the avatar in the most practical way and in what setting and perspective I need to test this relation. As we learned the avatar has four different attributes from *Gazzard* (2009). These can vary according to the players perspective. The four attributes that make up an avatar is:

1. **Locus** – it's place in its world and how that is communicated to the user/player.
2. **Agency** - the ability to effect an action in its world.
3. **Empathy** – how much the player/user relates to and/or cares about what they are affecting in the world.
4. **Player Character** – who am I within the world? What can I do? What do I represent?

The strength of the character identification can be affected by the four attributes stated by *Gazzard*. Two of the four attributes will be my main focus since I believe they will elicit character identification. I want to focus on **locus** because the presentation of the avatar must be as strong as it can be. **Locus**, I believe, can be affected by the point of view (POV) the player has of the avatar. If one play a game in first person POV he might have less **locus** than if he play a game in third person POV. I believe perspective play a dominant role in the amount of **locus** the player feels when playing. I must therefore insure the POV in the game is not first person and the player can see as much of the avatar as possible.

The other attribute I want to focus on is **empathy**. As I want the player to have an emotional connection to the avatar I want this attribute to be prominent in the test. It is difficult to develop an empathic relationship with a character you have just be introduced to. This makes the **empathy** difficult to evoke in the test participants. Since the test participants will have no prior relation to the avatar before the test. I believe a narrative element will increase the **empathy** towards the avatar. If I include a story about the avatar the player might be more prone to be emotionally attached to the avatar thus increasing **empathy**.

The next attribute, **agency,** is of minor importance since the ability to interact with the game environment will already be implemented in the game. **Agency** is an important attribute to the avatar but will not be focused on. The interactions in the test will follow the interactive scheme from the game. I will therefore not focus on creating **agency** for the test participant.

The last attribute, **player character,** is somewhat important since it relates to the roleplaying aspects of the avatar. Much like **empathy** this attribute will be evoked by the narrative in the test. The story will inform the test participant of who the avatar is hence who the test participant is playing as. It will to some extent explain what the avatar can do in the environment and what the avatar is representing. As these aspects will be included in the story they are not of major concern to evoke elsewhere. Because the story aspect of the test is already necessary the **player character** will not be further explored.

The avatars attributes have been analysed and defined according their use in the project. We can now define the three ways the player can understand the avatar in. These are the perspectives stated in section 5.2 Defining the avatar, by *Linderoth* (2005).

1. A fictive character that you can pretend to be, a **role**.
2. A piece of equipment, a **tool** which extends the player's agency in the game activity.
3. A part of the players setting, **props** which can be used as a part of the players presentation of self

In the test one of the three perspectives will be important. The understanding of the avatar as a **role** the player embodies. The test participant will be playing with the predefined avatar to use in the test. Because the player has no influence on how the avatar was created he will try to embody the avatar as a **role**. The test participant is told to play the game using this avatar and will therefore understand the avatar as a character he is controlling. The narrative element in the test will help strengthen this understanding of the avatar as a **role**.

The player might feel to some extent the avatar as a **tool**. Since the test participant is told to complete the test level he might think of the avatar as a **tool** to complete the level. Since the **tool** perspective is already supported by **agency** in the virtual world the **tool** aspect will not be empathised in the test. The last perspective is the test participant seeing the avatar as a **prop** for his representation of self in the game. As this perspective is very personal it must take time for this perspective to emerge. Since the player is only presented with the avatar for a short amount of time. This perspective will probably not emerge in the test. It is however a good component for character identification and I hope this perspective to be present. If the test participant reaches a point where he is forgetting the avatar exists he will be complete immersion. Because he has replaced the avatar in the game with his own self-image.

7.5 Identifying changeable elements of the avatar

In this section I will explore the different options for alteration of the avatar and come to a conclusion of what elements to change. As there are several elements that can be altered to create the visual detail difference I need in the avatar. I will use *Skyrim's Creation kit* as game environment and must consider the options available in this engine. There are technical and aesthetic limitations to consider before I chose one element to change on the avatar. Technical issues prohibit me from altering the mesh of any characters extensively. It is possible for me to alter the vertex placement on the model but I cannot add or subtract vertex points from the mesh. This complicates things and I must consider what is most efficient according to time and scope of the project.

1. I can focus on the normals map of the avatar, changing and adding details to it. I am, however, not certain this rather subtle visual detail change will be noticeable to the test participants. Even if I removed the normals map of the avatar it might not be altering enough for it to be visible in the test. I can use a model mesh from the *Skyrim* with normals map and textures as the control avatar. The other avatar will have no normals map or textures to lessen the detail level. This could create enough difference between the different avatar versions.

2. I can focus on the texture that holds a decent amount of visual detail like skin colour, dirt and form of the avatar. Again I am not certain it will create enough visual difference between the different avatars. If I combine it with the normals maps it might be visually different enough to be testable. I will create a version of the avatar with no or altered normals maps and no or altered textures. This might give the visual difference I need to test my problem statement.

3. I can create an entirely new shell for the avatar. I can add cloths or armour to create the visual difference I am looking for. This will however create complications. Since the avatar is not really changed but only put in a different shell. The test participant might not have the same connection to the avatar as if the skin was changed. The test participant might believe "his" character is underneath the shell and will keep the same character relation as he has with his "own" avatar from the game. The test participant might not get a feeling of it being a new character he is controlling but believe it is still his 'own' avatar. This can corrupt the test result and ultimately deem it unreliable. It is however possible for me to create an entirely new shell for the avatar and I would have complete control over the visual appearance. I can change the geometric mesh, alter the normals map and the textures. This will give me more visual freedom to give the avatar the personality and atmosphere which is so important to immersion and character identification.

4. The last option is to alter the vertex point of the geometric mesh of the model. This option will include altering the mesh of the model and creating new textures and normals maps for the new mesh. This option will take the most effort and time to produce and I am not certain if the result will be much better than option 1 and 2. It will however give me more freedom to create a whole new entity in the game.

I will use a combination of method one and two to create the different version of the avatar. I will alter the normals map and texture of these avatars. I will not remove the normals map or the texture of the model. I will modify them to the desired level of detail.

7.7 Analysis summary

I have argued for an against the different theories and from the theoretical background and found the items I want to measure in the test. In section 7.1 Possible testing environments, I explored the possible testing environments and chose to use the game *The Elder Scrolls V: Skyrim* as environment. By choosing this environment I will use a field study approach. Because the game has an integrated distribution method which simplifies the test execution. It also has an available game engine with all the game assets which I will use to create the test level.

I argue in section 7.2 Measuring character identification, that it will not be possible to create a dynamic avatar for the test. The test participants will therefore not be able to customise the avatar according to their preference. This will affect the starting character identification and will require the test participants to evolve it while playing. The test participants will have to manage the closeness to the media character and will begin the test with no closeness. Because of the non-existing relationship with the avatar before the test begins it is not possible to compare self-discrepancy. Questions relating to self awareness and escapism will be included in the questionnaire. These questions will determine some aspects of character identification. Also the loss of time will factor as indicator of character identification.

We found the barriers to immersion in section 7.3 Measuring gameplay experience, can be removed by various elements. The elements I will focus on is empathy, atmosphere and narrative. These elements will be considered when creating the test level and avatar to include as many barrier breaking elements as possible. I will focus on imaginative immersion and sensory immersion since they both relate to character identification. The last stage of immersion is argued to resemble presence and I will focus on evoking self presence in the test.

We looked in section 7.4 Measuring the avatar, at two theories on what the avatar consists of and how it can be understood. I argue that some elements of the two theories will have more focus in this project due to their relation to identification. I chose to focus on **Locus** and **Empathy** from *Gazzard's* four attributes. **Locus** because it communicates the avatar to the player and **empathy** because it relate to identification. From *Linderoth's* three understandings I chose to focus on the avatar as a **role** and to some extent a **tool**. The **role** perspective emphasises the roleplaying nature of the avatar. The **tool** perspective considers the avatar as a **tool** to the player and emphasises the players self-representation in the game.

In section 7.5 Identifying changeable elements of the avatar, we explored the changeable elements of the avatar and chose to use a combination of method one and two. I will alter the textures and normals maps of the different test avatars to create the testable conditions.

7.8 Design specifications

I will list the design specifications we found in the analysis. The design specifications will help when designing the test level and the avatar. The design specification:

1. I will use the Creation kit as development tool to create the level and the avatar.
2. Appeal is important and must be considered in the design.
3. Personal preference is important and must be considered in the design.
4. All barrier removing elements of the three stages of immersion must be present in the test.
    a. Barriers to Engagement
        i. Access
        ii. Effort
        iii.Investment
        iv.Control
    b. Barriers to Engrossment
        i. Narrative
    c. Barriers to Total Immersion
        i. Atmosphere
        ii. Empathy
5. All barrier removing elements of imaginative and sensory immersion must be present.
    a. Barriers to Sensory immersion
        i. Visual stimuli
        ii. Audio stimuli
    b. Barriers to Imaginative immersion
        i. Empathy
        ii. Atmosphere
        iii.World interaction
6. Measuring elements of character identification
    a. The goal of the main character must becomes the players own.
    b. The player enjoys the interaction with the avatar and the level.
    c. The players loss of self awareness and time.

The design specifications have now been listed and we can move on to designing the test avatar and level.

8 Design

As the measuring factors have been defined in the analysis I will design the level and avatar. The level must include the design specifications defined in the analysis to induce the desired effects. The level should immerse the player in the game. As we learned from the analysis (7 Analysis) that I choose imaginative and sensory immersion as the key components. To include these types of immersion in the level I need a compelling story and an atmospheric environment. To enter the three stages of immersion the barriers to each stage must be broken. The attributes that break them can be seen in the design specification (7.7 Analysis summary). In the design I will theoretically construct the level and avatar. These designs will be used as base for the implementation but might due to change.

8.1 The story

The story is an important element in the test since it invokes imaginative immersion. I aim to induce as much empathy in the test participants as possible and story is a strong factor in that regard. Story will help remove the barrier to total immersion. It is possible the test participants will never enter this stage, but I will include it and hope they do. The main purpose of the story is to evoke an emotionally response from the test participants. It can further have the effect of triggering interest from test participants undecided about participating in the test. Since I plan to have the story in the description of the test the story might work as initial interest. The story is as follows:

"You are a man that have been sentenced to death and therefore thrown down into a cave. Here you are to die a horrible death by starvation. This is however not the way you see it. You will find a way out and avenge your wife who was killed by the very same people that put you in this place. It is now your quest to survive, find a way out of there and avenge your beloved wife."

The story has elements of wrong doing and a cause for the test participant to fight. He must survive and escape the cave. His wife have been killed by the same people who sentenced him to death. The test participant might feel a need to take action and correct the wrong doing to the main character. The way the story is told is also important and could be done by quests in the game. As I am not certain how the quest system will work the final story telling element might be implemented differently.

8.1.1 The quest structure

The different parts of the story will be told in form of quests. The quests will inform what to do and display the progression of the story and test. When the test participant enters the cave the first part of the quest is initiated. The quest system informs the test participant about the story and that he has to escape the cave. Next part of the quest is started when the main character enters the bridge puzzle area (Figure 6). The test participant is told to solve the puzzle to lower the bridge. Last part of the quest is started when the main character enters the explorable area which contains different chests (Figure 6). The test participant is told to search the chests for clues and information on the people who sent him to the cave. The quest is completed when the test participant exits the cave and returns to the surface. When the quests are complete the test participant is informed to fill out the questionnaire to complete the experiment.

8.3 The environment

The environment must be a cave according to the story. It has to include challenges for the test participant. If the test participants feel challenged they will easier become immersed in the game according to the theory of flow (Nakamura & Csikszentmihalyi, 2003). I know flow is not include in the immersion definition, but challenge could increase the felt enjoyment of the level. As the level is not the main focus of the test few features have been defined for it. It will be a cave system with large rooms and narrow hallways. It will have puzzle and fighting elements to challenge the player. It will have a starting area and an end area. The environment must be build around the interactive possibilities in the game. With the chosen game environment in mind (*The Elder Scrolls V: Skyrim*) these are the options available:

- Active object (push, pull step on, open, close)
- Sneak
- Attack
- Jump
- Pick up / Put down

This mean all interactive elements in the environment must be manipulative in one of the stated methods. The test participants begin in a large room with rocks covering the entrance he just entered by. This is where the main character has been thrown into the cave and the exit is now blocked by big boulders. The next room in the level contains a jumping puzzle to challenge the test participant. The test participant must jump on multiple pillars to cross a deep shaft beneath him. A narrow hallway leads away from this room into a larger room. In that room the test participant must figure out how to lower the bridge that separates this and the next room. Different levers must be pushed and pulled in the correct order for the bridge to lower. This puzzle is done to further challenge the test participant and hopefully produce more enjoyment in the level. When the bridge is lowered the test participant enters the combat room. In this large room several large rats attack the main character. The test participant must defend himself and move on to the next room. The last room is an explorable room with several chests that holds parts of the story. This area is optional and can be skipped if the test participant is uninterested in the story. The last part of the level is a tunnel that leads up to the surface and freedom for the main character. I expect the level to take around 10 minutes to complete. As the time it takes for each test participant is very unpredictable this estimate might be inaccurate.
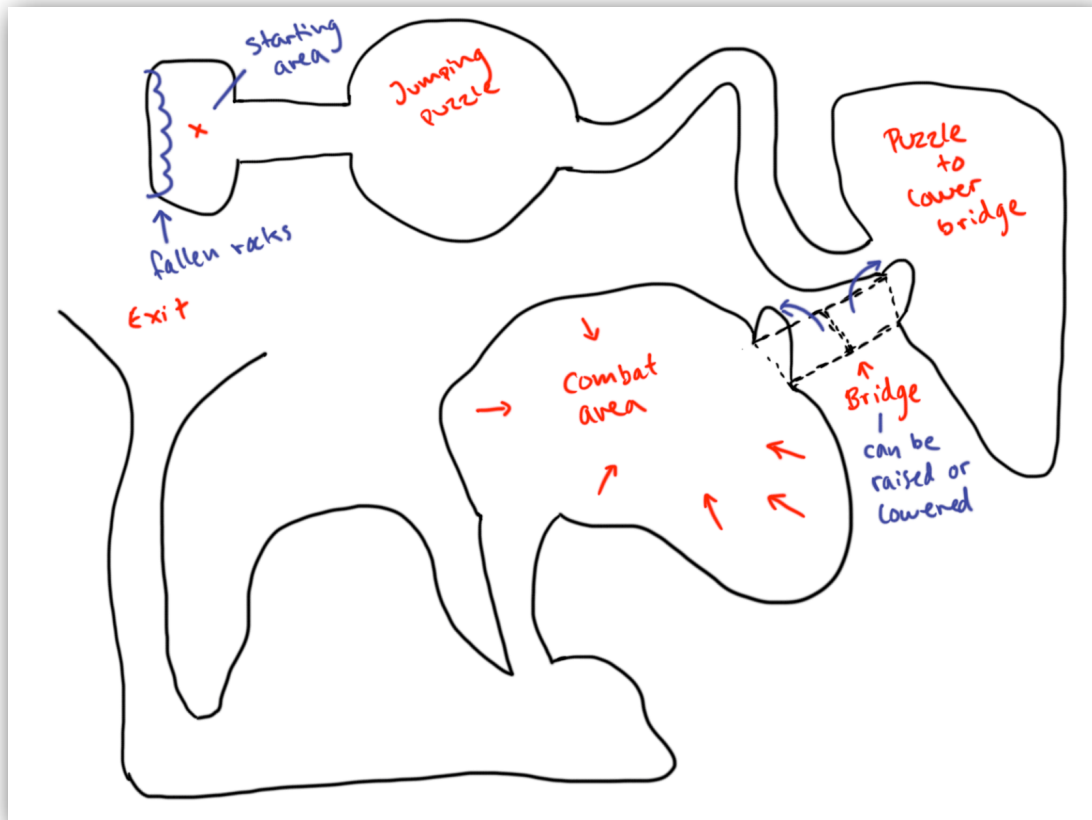
Figure 6 - The test level design

8.4 The avatar

There will be two versions of the avatar. One low detail and one high detail version. The avatar is stripped for armour and other elements that obstruct the skin of the avatar. He is only wearing underwear to cover his private parts. Stripping the avatar is done to insure the test participants are only relating to the avatars skin and body. Only a male version of the avatar will be produced. If I would include multiple test avatars the results would differ according to which gender were chosen. I am keeping it simple and focusing on the male avatar partly because the target group mainly consists of males.

8.4.1 The low detail avatar

The low detail avatar is a less defined version of the high detail avatar. The two models must be from the same base mesh to measure a correlation between the two. The low detail avatar will be having blurred textures to make the skin look flat and uniform. The normals map of the model will be altered to lessen the detail on the model. I will decrease the detail level of the model to the level of the geometric mesh. The in game model will look almost identical to the model without normals map and texture. I believe the difference between the two avatars will be significant enough to be tested.

8.4.2 The high detail avatar

The high detail version of the avatar is an existing model from the game. I will not change anything on the geometric model or the textures. This model will represent the detail level the developers of the game chose to go for. This insures the model will fit within the universe and setting of the game. There is a chance the test participants have seen this model before since it is already existing in the game. I will however argue the test participants have not seen this exact model before due to the customisable nature of the game. I assume most players of *Skyrim* will customise their avatar to their preference. Therefore not be playing with the standard model when playing normally.

Now the design of the story, environment and the avatar have been defined I will implement the designed features.

9 Implementation

I will in this section explain how the test level and avatar is created and if design decisions were changed due to technical limitations. The test level is created in the *Creation kit* by *Bethesda* (Bethesda Game Studios, 2012). The *Creation kit* is the developed tool used to produce content for *The Elder Scrolls V: Skyrim* which will be the testing environment. I will go through the creation process of the story, the environment and the avatar. Also the file structure of the *Creation kit* and file types will be explained.

9.1 The story

The story implementation is changed from the quest structure defined in section 8.1.1 The quest structure, to a less complex construct. I found it to take up to much effort and time to create the rather simple quest system. Because of the complex quest system used in the *Creation kit* it would have taken a long time to implement. I prioritised the effort and outcome of the process and chose a simpler approach. I chose to tell the story by letters left in the level and in the inventory of the main character. The introduction to the test is explained in two places. One in the description on the forum the test is posted on (Lauritzen, 2012). The other in the introduction letter (Figure 7) the main character has in the inventory when the level begins. This means the test participants has two opportunities to read the story of the main character. One before and one while testing.
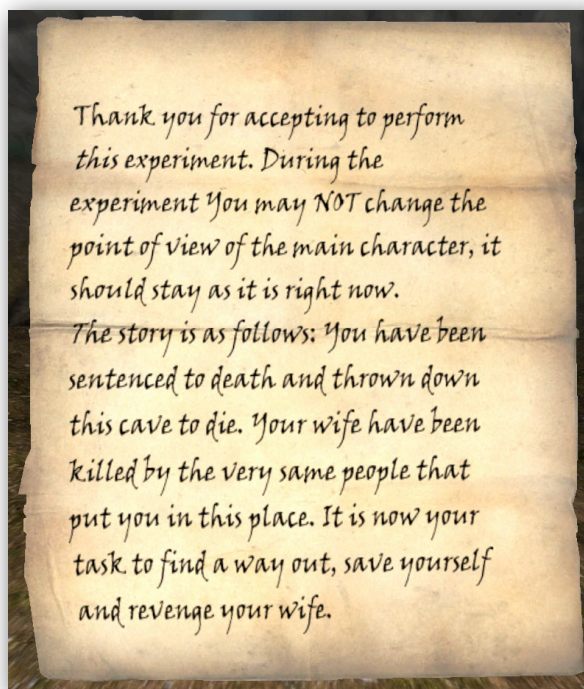
Figure 7 - Introduction letter   *Figure 8 - Test complete letter*
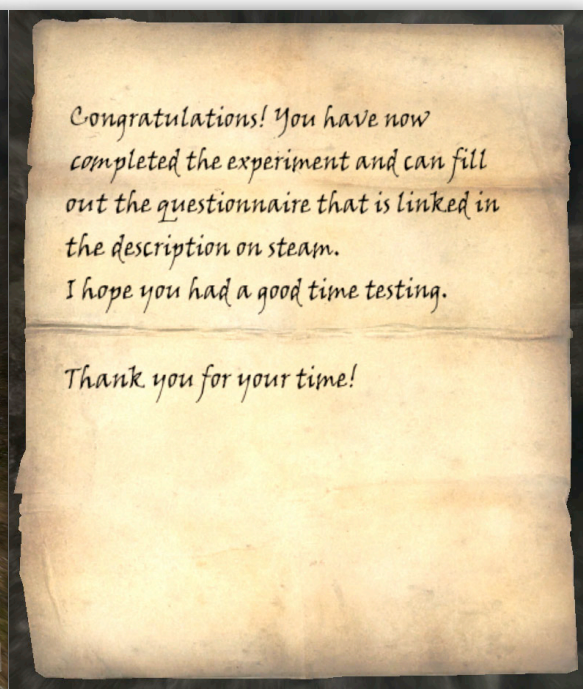
The next part of information the test participant is given is placed at the end of the level. When the test participants reach the end of the level they are presented with a chest with a note inside. The note informs the test participants that the test is over and he should fill out the questionnaire. The note is included to inform the test participants of the conclusion of the test and send them to the questionnaire.

9.2 The environment

The level is constructed by existing assets from the *Creation kit*. The existing assets are used in the original game and therefore build to fit together. The test participant will start in a large room with a hole in the ceiling. A sunlight source is placed above the hole to have it illuminate the room and make the scene more believable in the games setting. The main character has been thrown into the cave through the hole. A narrow hallway exits the room and splits further on into two hallways. One leading to a human skeleton that holds *Key one* which unlocks the door further ahead. A narrow long hole is placed above the skeleton to emphasise the location. A light is placed above the hole to indicate the importance of the location by the change in light. When the test participants reach the skeleton they see the possibility to exit the cave through the hole. The hole is however too narrow to use as an exit and they must keep searching.

The other hallway leads to a large room with a torch and another skeleton. The torch can be picked up and used to light the way in the level. The skeleton holds a steel dagger which the test participant can pick up and use as weapon. In one side of the room there is a large door which is locked. The door can be unlocked with *Key one* which the first skeleton has. When opening the locked door a narrow bridge is crossing a steep gorge. At the bottom of the gorge a troll is wandering around. The troll is placed there to insure the player is not stuck down there and will be killed by the troll. Because the troll is far stronger than the main character can handle the troll will kill the main character if he ends at the bottom.

The bridge leads to a large room with four enormous rats. The room has two exits one leading to a locked door and the other leading to a chest with *Key two*. *Key two* unlocks the second door at the first exit. When the test participant unlocks and enters this door he is on a narrow bridge with a chest. Underneath him is a steep hole and a waterfall is coming out of the wall opposing the bridge. In the chest there is a letter informing the test participant the test is over and he can fill out the questionnaire.
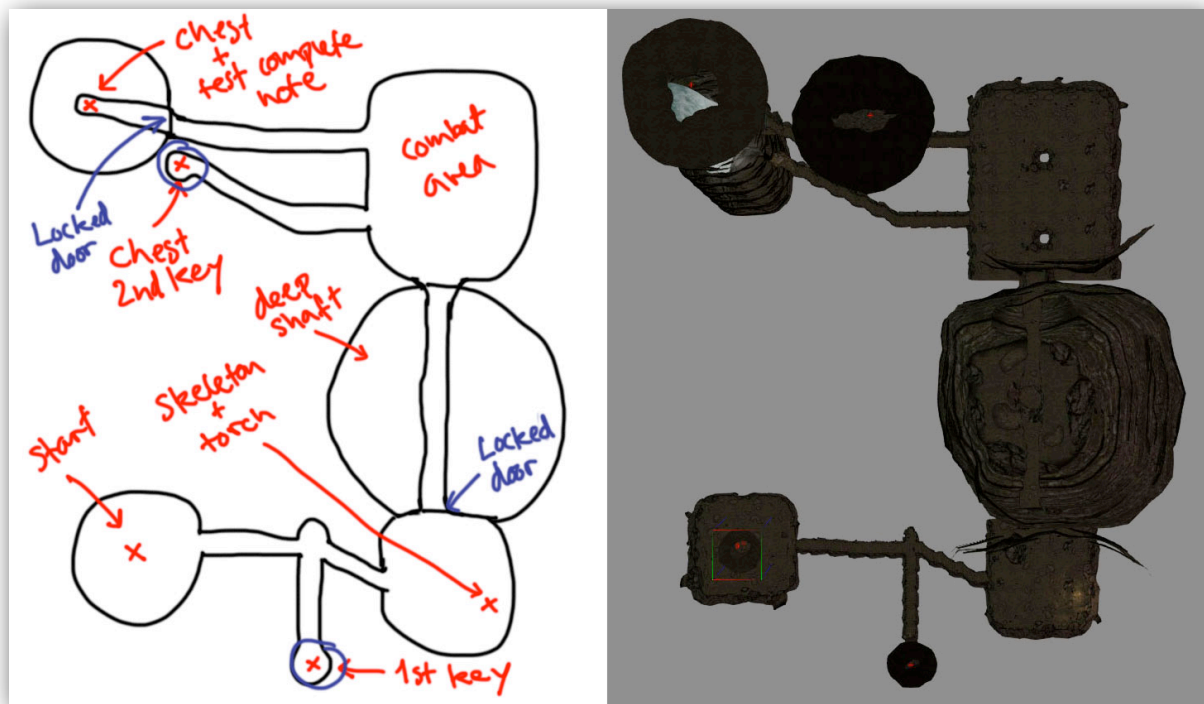

Figure 9 - Test level with explanations and actual test level

9.3 The avatar

The easiest way to create a custom character in the *Creation kit* is to create a new playable race. By creating a new race I can alter it to my needs without affecting other models in the game. Because I am modyfying an existing game I will try not to change anything in the actual game. Meaning when my MOD is installed the test participants can play the game without noticing it unless they specifically travel to the test level. If I did not create a new race and modified an already existing race. People would not be able to play the game with my MOD installed without seeing the altered race in the game. I decided to alter the Breton race from the game since the race is very humanlike and has less fantastical features than other races in the game.

The way the *Creation kit* handles textures and geometric models are through *NetImmerse* Files (NIF) (Gamebryo, 1997). NIF files hold both geometric and textural information in one combined format. This file format can be manipulated in several 3D applications but are difficult to import back into the *Creation kit* afterwards. I will explain how the *Creation kit* handles textures and geometric models.

9.3.1 The file structure of the Creation kit

The *Creation kit* manages textural information in a rather complex way. All textures and geometric models are rooted back to the race that controls all attributes. The race links to other files that manages separate aspects of textures and meshes. The structure of the texture management in the *Creation kit* is as follows:

(Race) BretonRace
      (Armour) SkinNaked
            (Armour Add-on) NakedFeet / NakedHands / NakedTorso
                  (Texture set) SkinBodyMale / SkinHandMale / SkinHeadMaleBreton

9.3.1.1 The race

The first level in the creation kit pipeline is the race. The race is the controlling element when creating new or modifying existing models in the game. This level holds all information about the model and its attributes. At this level it is possible to change everything about the model right from the name of the race to the skeleton of the model. I created a new race from the Breton race to have complete control over its attributes. As we can see in figure 10 the race is linking to several files. The one file important to me is the SkinNakedCRMOD file which is the texture component of the file called the armour.
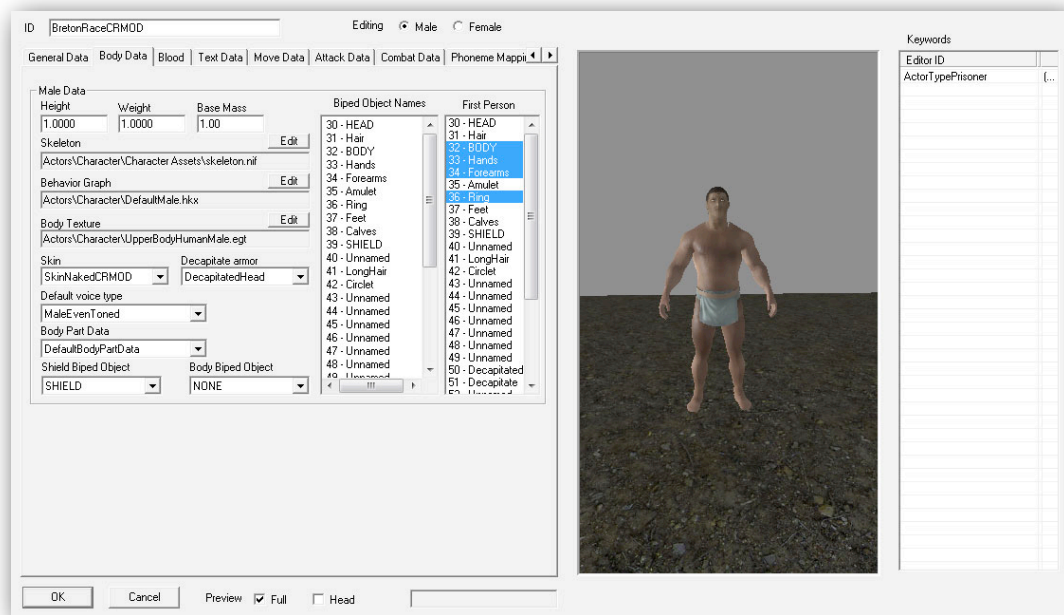
Figure 10 - The race

9.3.1.2 The armour

The next level in the pipeline is called the armour. This level holds information on what files can be applied to the race. The armour does not have many features and only holds information on the armour add-ons that can be used with the race. This file links to three separate files that holds information of the feet (NakedFeetCRMOD), the torso (NakedTorsoCRMOD) and the hands (NakedHandsCRMOD). These files are called armour add-ons and holds information of the separate body parts of the model.
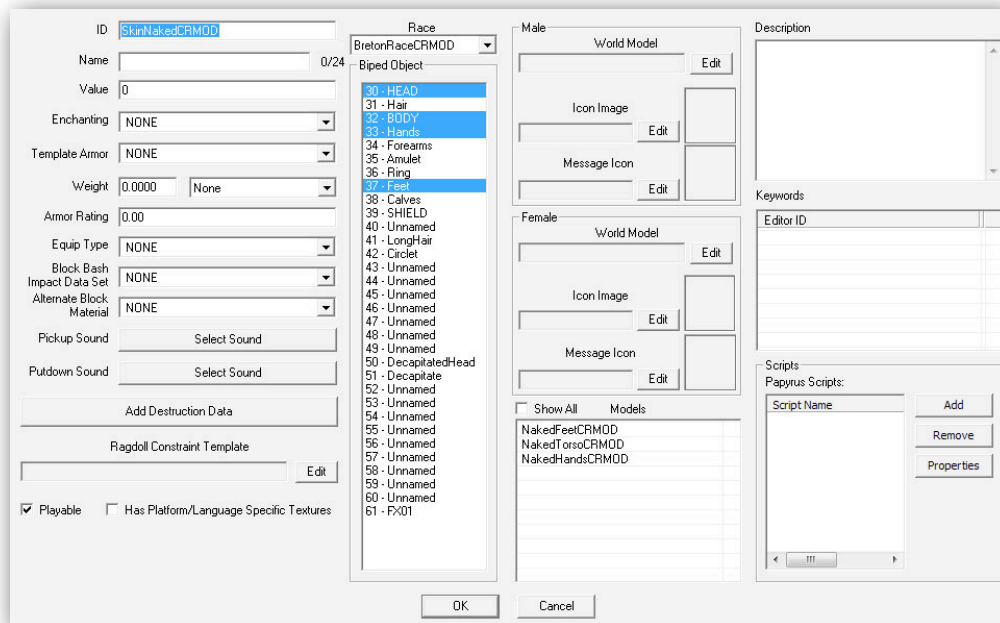
Figure 11 - The armour

9.3.1.3 The armour add-on

The armour links to three files called armour add-ons. The armour add-on holds information of what texture set can be used and the mesh file it can be used on. It includes the different races that can use the armour add-on. The armour add-on links to the texture set (SkinBodyMale_1CRMOD) which is used on the model and is the most important part of the texturing process.
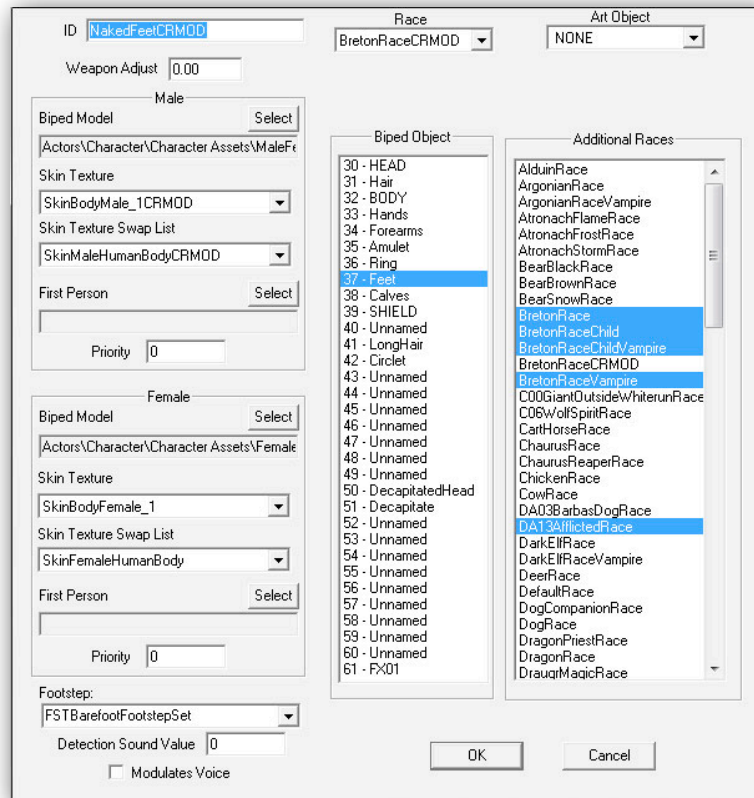
Figure 12 - The armour add-on

9.3.1.4 The texture set

The armour add-on defines the texture set which is the lowest level in the hierarchy. The texture sets holds the textures that are applied to the three different body parts of the model; the feet, the hands, the head and the body. In each of the texture sets there is; a texture, a normals map, a subsurface map and a specular map. All the texture files creates the colour and detail seen on the model in the game. These texture files are the focus of my implementation. The upper levels must be altered to include the right texture set, but the texture set is the main focus for modification.
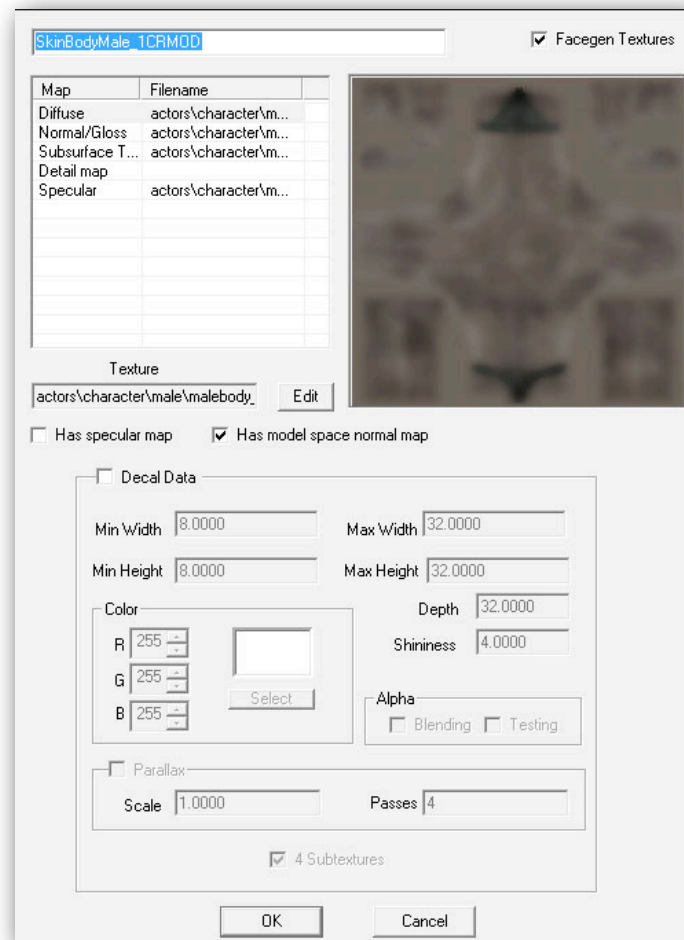
Figure 13 - The texture set

The low detail avatar is made by altering the texture and normals map of the model already existing in the *Creation kit*. Hair, eyebrows, mouth and eyes are applied to the character in the game via the character customisation. I choose the standard hair (HairColor09DarkBrown), eyes (MaleEyesHumanBrown), eyebrows (BrowsMaleHumanoid01) and mouth (MaleMouthHumanoidDefault).

All inventory items are removed from the avatar so the test participants cannot put on cloth or draw a weapon be default. The only item in the inventory when starting the level is a torch (Torch01) which the main character is holding and the introduction letter (figure 7).

The mesh model is cut up at the wrist, ankle and throat to separate the body, which can be scaled in the game to fit different body sizes. This is done by the creators of the game to make customisation possible. Body, hands, feet and head can be mixed and matched because of this separation. The technique however creates visible lines between the hands, feet and head to the body when the textures are altered. The seams must fit exactly for them not to be visible. Since the textures are being altered they are not perfectly matched and the seams are visible. I decided not to correct the seams since it would take a long time and it would create a none reproducible workflow because of the manual nature of the correction.

9.3.2 Modification of textures

The Creation kit engine uses the *DirectDraw Surface* (DDS) file format to store textures. This is a format for texture compression for real time graphics (Microsoft, 2000). In order for me to alter the files I need to install the *Nvidia DDS plugin* (Nvidia, 2012). This plugin allows me to open and alter the textures in Photoshop (Adobe, 2012).

9.3.2.1 The high detail model

The high detailed model is already existing in the *Creation kit* no alteration of this model is needed. I have included pictures of the model (figure 14) so it can be compared to the low detail model
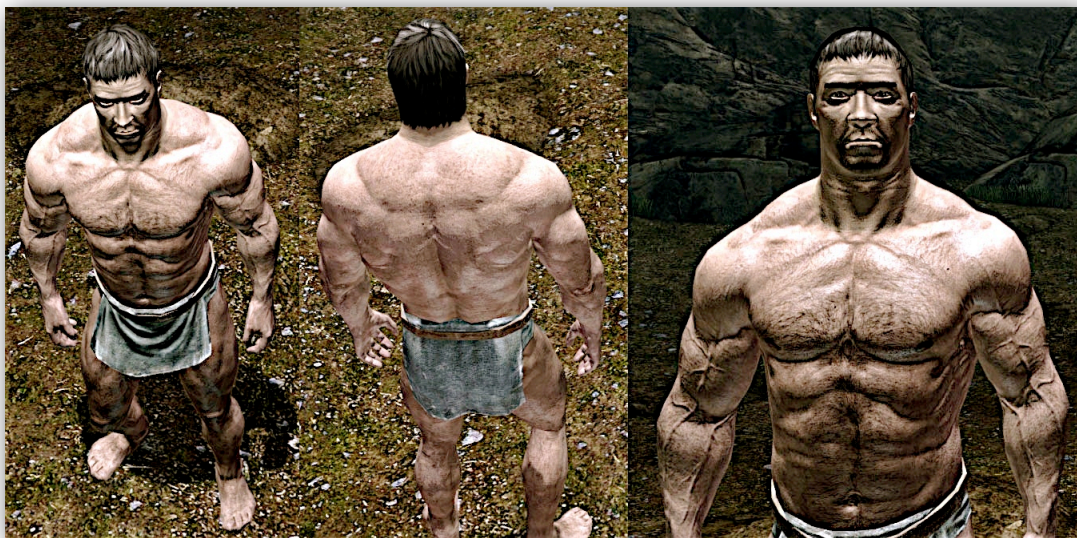
Figure 14 - In-game pictures of the high detailed model

9.3.2.2 The low detail model

The low detail model is created by altering the texture and normals map of the high detail model. The model consists of a skin and underwear texture with applied normals map on both. The textures are modified in *Photoshop CS6* (Adobe, 2012) by blurring them with smart and surface blur filters. The filtering is applied three times. First surface blur is applied with 10 radius and 15 threshold (10/15). Next a 50/50 smart blur is applied and lastly a 40/50 surface blur. These blurs are applied to decrease the detail of the texture but still keep some of the colouring from the original file. The underwear of the model is also modified. The underwear texture is the

only texture that is altered on the underwear. When I altered the normals map of the underwear the light did not reflect correctly of the material in the game. After some trial and error I left the original normals map on and only altered the texture. You can see the filtered texture of the body in figure 15.
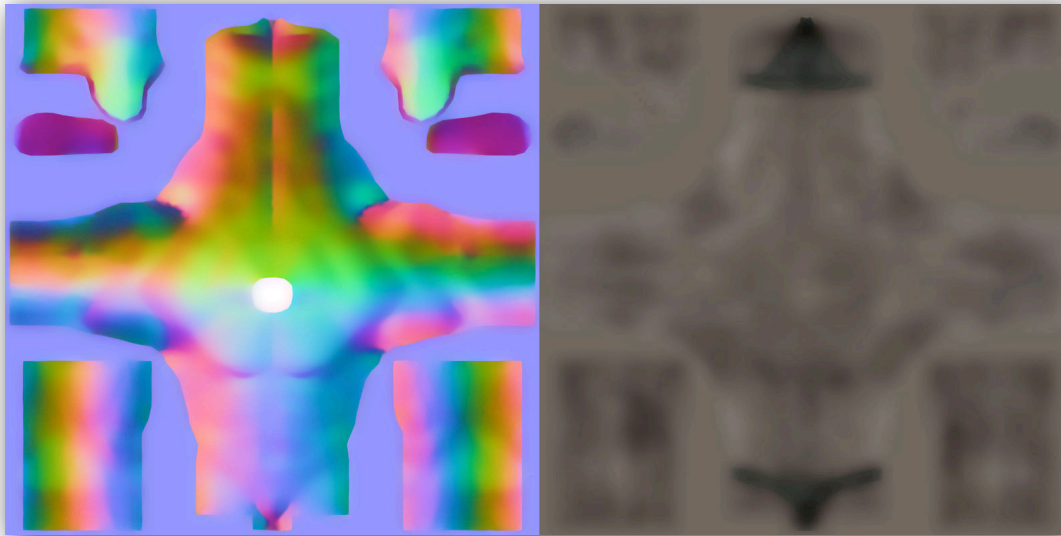
Figure 15 - Filtered normals map and texture of the low detailed model

The normals map of the model is treated similarly to the texture in *Photoshop*. Except the order and magnitude of the blur filter is different. First a 50/50 smart blur is applied, next a 10/50 surface blur and lastly a 40/50 surface blur. This is done to keep some of the detail of the original model but decrease it to a level equal to the raw geometric model. I cannot remove the normals map completely because the lighting in engine not functioning without the normals map. The filtered normals map can be seen in figure 15. The end result can be seen in figure 16. As you might notice there are some problems with the throat, wrists and ankles. This is where the seams between the different body parts are located. I tried to fix the mismatch but after several failed attempts I left the seams as they were. The perfect match the seams need is near impossible to correct with the workflow I have. If I could alter the textures directly on the geometric model it would have been possible to correct. As you see in figure 16 the model is less detailed than the high detail model.

Figure 16 - In-game pictures of the low detail model

9.3.3 Modification of the model

The geometric mesh files are saved in NIF format and a plugin for 3D Studio Max (Max) (Autodesk, 2012) exists that can handle import and export of this format. I did however have difficulties importing and exporting files from Max and decided not to use Max for import and export. Instead I used the program *NifSkope* (Open Source, 2012) to alter the NIF files. It is not possible to change the texture association within the Creation kit so *NifSkope* is used for this purpose. In *NifSkope* it is possible to change the texture association and replace the geometric mesh if needed. I however only need to alter the texture linking and save the file anew. When the NIF file is loaded back into the *Creation kit* it has the altered texture files linked to it.

The implementation have now been explained and the test method will be the next section in the project.

10 The test

10.1 The creation and distribution of the test

In this section I will explain how the test was performed and what questions were. As mentioned before I decided to run the test as a field study. I published the MOD in the *Creation kit* via the *Steam Workshop* (Valve, 2012). The *Steam Workshop* is a platform where users of the gaming community *Steam* (Valve, 2012) can submit and download MODs for their games. It is easy to download a MOD which is done automatically by subscribing to the MOD in *Steam*. This makes it an easy tool for publication of MODs and one of the main reasons I chose to use it for the test.

10.1.1 The questions

The questions for the questionnaire are focused on immersion and character identification. We have already established some of these questions in the analysis (7 Analysis). I include basic information questions to enable comparison of test participants in age and gender. I will go through each question and argument why they are in the questionnaire and what they indicate.

The first seven questions are included to see if all test participants reach the end of the level and if they played solely in 3rd person. If they switched to 1st person while playing I cannot use the results and they are excluded from the test. I ask if they saw the main characters face not to know if they did, but to know how much attention they payed to the main character. I loaded the scene with the camera facing the main character so every test participant should have seen his face. I also included this question to have an indication of where the test participants had the camera while they were playing the level. The normal placement of the camera is an over the should point of view (POV). If they did not spin the camera around the character they could only create character identification visually by looking at the back of the main character.

How familiar they were with the controls is included because they need effortless access to the medium to experience any kind of immersion. The test participants that have no or little experience with the controls in the game might not reach any stage of immersion or gameplay enjoyment. The questions I have just explained can be seen here:

1. How old are you?
2. What is your gender?
3. What save file did you use?
4. Did you play through the whole level in 3rd person?
5. Did you reach the chest at the waterfall in the level?
6. Did you see the main characters face?
7. How familiar are you with the controls in the game?

The next group of questions relate to immersion and character identification. By question 8 I ask if they enjoy the atmosphere in the game because atmosphere is a key component in the last stage of immersion, total immersion. By asking this question I can indicate if the test participants reached this stage of immersion. They can enjoy the atmosphere without being total immersed. If the test participants enjoy the atmosphere they will have easier access to total immersion. By questions 9 I ask if they forgot about themselves while playing the

level, again to indicate immersion. This is a general indicator of both presence and immersion (Lee, 2004), (Brown & Cairns, 2004). It is likely the test participants felt either immersion or presence if they forgot about themselves. Question 10 is related to gameplay enjoyment and immersion. If they forgot about their everyday concerns they might be enjoying the experience and will indicate immersion.

Question 11 and 12 are indicators of character identification. If the test participants feel any emotional connection with the avatar identification should be present at some level.

Questions 13 is an gameplay enjoyment and immersion indicator. If the test participants are not challenged they are less likely to enjoy the level and feel any form of immersion while playing.

Question 14 is another character identification indicator. If the goals of the main character becomes the goals of the test participant he has some degree of character identification with the main character.

Questions 15 is an immersion indicator and very much linked to gameplay enjoyment. If the test participants enjoy playing the level they are also more prone to be immersed in the world.

Question 16 is relating to the same element of immersion and enjoyment. It is difficult for the test participants to know if they lost track of time while playing and can therefore not be 100% reliable.

8. I enjoyed the atmosphere in the level
9. I forgot about myself while playing the level
10. I forgot about my everyday concerns while playing the level
11. I felt emotionally attached to the main character
12. I felt as I were the main character
13. I felt challenged while playing the level
14. The goals of the main character became my own
15. I enjoyed myself while playing the level
16. I lost track of time while playing the level
17. Comments

10.1.2 The test execution

The alternative test execution is performed at the homes of the test participants. This creates a control issue. Since I cannot control the environment the test is run in or how the questionnaire is answered. The loss of control might generate a reliability problem for the test. It however gives the test participants are more normal testing environment. As controlled laboratory test can evoke abnormal behaviour and a field test might remove this validity barrier. Another problem that rise by doing the test in the field is the test is going to be run on very different computers with different hardware setups. I write in the instruction to the test that all test participants must be able to run the game at the highest graphical setting. This should make the game experience equal for all test participants. I can, however, not be certain all test participants followed the instructions (Lauritzen, 2012). This might prove problematic when analysing the results and must be considered there. Some test participants might cheat and play the control test first and then play the real test which will create inconsistency in the results. Time might be an issue because the test participants can fill out the questionnaire some time after they have completed the level. This might affect the answers and create inconsistency in the results.

The ideal run of the test is the test participant downloads the MOD (Appendix E) and one of the two save files (Appendix D) I have provided. The save file loads the high or low detail model into the level and are ready to play. When they have reached the end of the level they fill out the questionnaire.

11 Results

11.1 Initial questions and results

In this section I will present the results created in the test. I will go through each question or statement from the questionnaire and present the results. Question **Q1**-**Q6** are demographic and group deciding questions that only serve as initial conditions and will be explained first before moving on to the more important ones. The test was conducted on 78 test participants split up into two groups. One group testing the low detail version of the avatar with 39 test participants. The other group testing the high detail version of the avatar with 39 test participants. Three test participants were excluded due to playing the level in first person. One from the low detail group and two from the high detail group. The two groups is separated into age and gender groups as can be seen in table1.

Age	Low G1	High G2
10-15	2	3
16-20	13	15
21-30	17	12
30+	6	7
Gender	**Low G1**	**High G2**
Female	3	6
Male	35	31
Participants	**Low G1**	**High G2**
Total	38	37

Table 1 - The two groups consistency

The results are analysed by using the average (μ), standard deviation (σ) and the t-test (*a*) to establish statistical significance (Cozby, 2008 p. 250). It is common practice in psychological experiments to use a significance level of 5% meaning an *a*<0.05 as the threshold for statistical significant difference and so will I (Cozby, 2008 p. 248).

In the table 3 the statistical significant questions are highlighted in green while the almost significant is marked with yellow. Simplified binary results can be seen in table 4. I will go through the questions one by one and present the data from the test. The question, purpose and outcome of the results can be seen in table 2.

No	Question	Purpose	Outcome
Q3	*Which save file did you use?*	Separating the test participants into two groups one testing the low detail avatar test (G1) and the other testing the high detail version (G2).	

No	Question	Purpose	Outcome
Q4	*Did you play through the whole level in 3rd person?*	Test concluding condition. The test participants that did not play the entire level in 3rd person was eliminated and did not answer any further questions in the test.	
Q5	*Did you reach the waterfall in the level?*	To see how many test participants reached the end of the level thus playing for the maximum amount of time. Time that can affect the character identification and immersion.	Four test participants did not reach the end of the level and all of them testing the low detail version (G1).
Q6	*Did you see the face of the main character?*	To see if the test participants saw the main characters face and was included as a test condition. The camera in the test started out by facing the main character. The test participants that answered no to this questions might have had less focus on the visuals in the game and could affect the end results.	Nine from the low detail test (G1) and three from the high detail test (G2) answered no to this question.
		Immersion questions	
Q7	*How familiar are you with the controls?*	Investigate how familiar the test participants are with the controls of the game and can effect immersion since they will not reach any stage of immersion without being familiar with the controls. There should be no real difference between the groups since this condition is global to all test participants in the test.	The μ in both groups are somewhat similar (**3.8947** and **3.7568**) and no significant difference were detected following the t-test with an *a*=**0.73130** between the two groups.
Q8	*I enjoyed the atmosphere in the level*	Investigate if the atmosphere in the level was well executed and if the test participants enjoyed it. This condition is a precursor to total immersion and serve as barrier control for immersion.	G1 μ=**3.6579** are somewhat more inclined to like the atmosphere in the level than G2 μ=**3.2162**. The significance *a*=**0.06376** is not strong enough for the result of this question to be used as a fact but will still serve as an indicator.
Q9	*I forgot about myself while playing the level*	Is an indicator of total immersion, if they forgot about themselves total immersion were present to some extent.	No significant difference can be seen between the two groups *a*=0.48845 and the μ are quite similar G1 with **3.1579** and G2 with **2.9459**.

No	Question	Purpose	Outcome
Q10	*I forgot about my everyday concerns while playing the level*	Is supporting Q9 and indicating total immersion in the test participants.	No significant difference were detected between the groups with *a*=**0.95779**, G1 μ=**3.6053** and G2 μ=**3.6216**.
Q13	*I felt challenged while playing the level*	Is another check for immersion and enjoyment. The level is more likely to be enjoyable if they felt challenged while playing it. Thus raising the overall enjoyment of the test.	A significant difference were detected between the two groups with an *a*=**0.00174**. That makes the question important in the context of the project and will be used as a key component in the conclusion.
Q15	*I enjoyed myself while playing the level*	Is indicating the level of enjoyment the test participants felt while playing the level. It indicates if the test participants felt one or the other level more enjoyable due to the changed variable, the avatar.	However no significant difference were detected between the two groups.
Q16	*I lost track of time while playing the level*	Indicating the felt time loss while playing the game and will support total immersion if a high score is achieved.	No significance were detected between the two groups and therefore will this question only be used as a supporting argument in the conclusion.
	Character identification questions		
Q11	*I felt emotionally attached to the main character*	Indicating character identification the test participants felt while playing.	Significant difference between the two groups with *a*=**0.01085** and G1 μ=**2.6053** and G2 μ=**1.9459**.
Q12	*I felt as I were the main character*	Is furthermore supporting the character identification.	Was seen as significantly different between the two groups with *a*=**0.01099**.
Q14	*The goals of the main character became my own*	Indicating if the test participants felt the goal of the main character became their own and indicates their state of character identification.	There are however no significant difference between the groups and it can therefore not be used as a concluding component.

Table 2 - Results split into question, purpose and outcome

	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
	Low detail model group (G1)									
μ	3.8947	3.6579	3.1579	3.6053	2.6053	2.9474	2.5000	3.3947	3.6842	3.4211
σ	1.7153	1.0813	1.4292	1.4470	1.1330	1.3230	1.3098	1.1603	1.2221	1.5295
	High detail model group (G2)									
μ	3.7568	3.2162	2.9459	3.6216	1.9459	2.1892	1.6216	2.9730	3.4865	3.1892
σ	1.9097	1.2370	1.3416	1.4639	1.1557	1.3044	1.1027	1.4571	1.2684	1.4497
	Alpha values of the two groups									
a	0.73130	**0.06376**	0.48845	0.95779	**0.01085**	**0.01099**	**0.00174**	0.13590	0.43697	0.47197

Table 3 - Results with mean, standard variance and significance

In table 4 the binary results can be seen. I used a likert scale of 5 points to measure the answers from the test participants. I have condensed them down to negative (**-**), neutral (**/**) and positive (**+**). I have merged the option 1 and 2 into negative responses, left option 3 as neutral and merged 4 and 5 into positive responses.

	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
	G1									
-	9	4	14	10	**20**	16	**20**	9	5	12
/	2	9	6	4	7	5	5	5	5	4
+	**27**	**25**	**18**	**24**	11	**17**	13	**25**	**28**	**22**
	G2									
-	11	10	**15**	9	**27**	**25**	**31**	14	7	12
/	1	9	7	3	6	5	1	6	7	3
+	**25**	**18**	**15**	**25**	4	7	5	**17**	**23**	**22**

Table 4 - Binary results for G1 and G2

These results will now be discussed and explained in the discussion. I will argue why the results ended as they did and what factors could have had an influence on them.

12 Discussion

In this section I will discuss the results and argue why I believe they turned out as they did. Some elements in the execution and testing environment must be mentioned since they could have affected the results as well. The test was conducted as a field study and it was conducted at the homes of the test participants. This however introduces some issues for the reliability and reactivity of the experiment. The test participants could have read the questions in the questionnaire before playing the level. They could also have played the level multiple times before answering the questionnaire. I do not know if this happened but I am assuming that the test participants performed the test as they should, but I can never be certain. A factor that can affect the reactivity of the experiment is the other MODs the test participants could have had installed on their computer while playing the level. Other MODs of the game can affect graphical settings, animations or any other element in the game and would make the experience completely different from test to test. I included in the description of the test that other MODs should be turned off while testing but there is a possibility this was not followed.

To my surprise the results show that some elements of the low detail model test (G1) were more enjoyable than the high detail model test (G2). One might argue that the standard deviation is rather large on all the results. Being on a 5 point scale a deviation of 1.0 to 1.9 will include almost all possible answers in the questionnaire if the mean is around 3. This means that the answers are not completely uniform and there are different opinions within the groups. Not many women participated in the experiment and this might affect the results in one direction.

I put in a check condition if they reached the end of the level. This check can however be misleading since the test participant could have spend longer time playing the level without reaching the end of the level. Therefore it might not have functioned as a time indicator as expected. It does give us an indicator that they minimum played for three minutes. I could not have asked the test participants to state how long time they spend playing the level because of the loss of time condition defined by immersion and gameplay in general. I could have created the level longer so I knew they minimum had to spend 10 minutes or more playing to complete it.

Since the test was not run in a laboratory environment I did not have control over how long the test participants played the level. It is therefore difficult for me to judge if the test participants lost the feeling of time passing and the reason I included a question in the questionnaire. It is however also difficult for the test participants to know if they lost track of time while playing. This makes the question of time an important issue that must be evolved in future research in this field. This is something for future perspectives and will be further discussed there.

The sample size could be one aspect that contributed to the results. The target group is a rather complex group and contains many different kinds of people. The target group of people that play *Skyrim* may be ranging from 10-60 years old persons with many different background and life views. This making the group a difficult group to identify as uniform. As I do not have concrete information on the target group I can only guess on its consistency. This could be one of the important factors affecting the study. If the target group were more uniform more consistent results might have been revealed. I personally doubt people prefer less detailed avatars compared to more detailed ones. The character identification were stronger with the low detail avatar in this study, but this study only had a sample size of 78 people out of the around 10 million people that play the game. If a larger sample were retrieved I believe differently shaped results would emerge.

I find it peculiar that Q13 are so different between the two groups. It is indicating that G1 found the game harder than G2. The average is however not passing the "3 undecided" mark but ranging between "somewhat disagree" and "undecided" in G1 which is the better result score of the two. G2 has an average between "strongly disagree" and "somewhat disagree" indicating the difficulty of the level was not high enough. This is an important factor that can be affecting the results. Some participants found the level too easy and might have effected how the test participants played the level. Because G2 found the level too easy they might feel the level as less fun to play compared to G1. Since challenge is related to enjoyment according to the flow theory (Nakamura & Csikszentmihalyi, 2002). This can be related to the time issue the level suffers by. Some participants commented that they found the level far too short "*Nice level, but a little bit too short*", "*I do not know why you have such sophisticated questions about where the game itself is so short. I mean, the game was quite short and offered little content. What has surprised me most is the fact that the game was so unexpectedly fast to end, without being able to achieve target.*" If test participants only spend 3-5 minutes playing the level the immersion and character identification will also be less noticeable in the results.

Some participants found the story problematic because the story did not have a concluding chapter. "*I was expecting more of the story to be playable, such as getting out of the cave and finding the alleged bad guys.*" The test participants found the end of the level unsatisfying and might also have affected the results. Since the story element plays an important role in immersion. It could have negatively affected the narrative immersion the test participants felt during the test.

The point of view of the main character was to some extent a problem to the test participants. In the original game you can play in first person and third person most people however play in first person. "*I never usually play in third person which made me feel distance from the character not to mention you showed us his face which caused me to see him as an individual. Overall, I like the atmosphere.*" Because some of the test participants are not used to play in third person the whole gameplay and controls experience might be effected. The test participants overall were confident in the controls of the game with a mean value around 3.7-3.9 indicating that they "somewhat agree" to them being familiar with the controls.

I was surprised by the difference between the two groups and was expecting them to be equal. I have wondered why the groups were different and why the G1 had a higher score in all questions I asked. It was brought to my attention that the uncanny valley could be a factor in this equation. Because of the higher detail level of one of the avatars the test participants would have more details to disagree on or dislike. The low detail avatar did not hold much resemblance with a real person and the test participants did probably not compare it to a real person image. Since they may not have compared it to a real person fewer details could be critiqued and disagree on. The higher detail level of the other avatar might hold visual information the test participants disliked or disagreed on. They might think that a muscle were poorly displayed or the skin texture were not realistically looking and therefore have a lesser character identification for that reason. Stimuli dependencies play a role in that context (5.1.2 Understanding visual information). The test participants may have experienced this when playing as the high detailed avatar. They may have become more aware of errors in the animations or other factors that was not visible in the low detailed avatar.

The test participants might also be affected by imagination and would be less prone to add imaginative details on the high detail avatar than the low detail one. The test participants had more opportunity to add their own thoughts and feeling to the low detail avatar and imagine him as a person because he is less defined visually. Personal taste and appeal could also be an influencing factor in the character identification. Because of the bulky nature of the avatar some might find it unattractive or unappealing and would lessen the identification for that person. This is something I could do nothing about except letting the test participants create their own avatar

and customising it to their desires. As this was not possible in the test it can still be influential on the character identification.

The character identification questions are almost all significantly different between the two groups. The score of them are not confirming the test participants had strong character identification but is displaying a difference between the groups. Overall G1 answers between "2 somewhat disagree" and "3 undecided" on the questions Q11 and Q12 regarding character identification. This is displaying that they were not strongly attached to the main character but they are still more attached than G2. The high detail group were even less attached to the main character with a mean score around "1 strongly disagree" and "2 somewhat disagree." I will argue that these results could be caused by a mixture of the uncanny valley and the power of imagination. Also the factor that G1 enjoyed the level more than G2 in all categories could influence the more positive results from G1. Since the gender and age difference between the groups were none-existing this cannot be a cause of the different result in the two groups.

Overall the test participants liked the atmosphere in the level and enjoyed playing it. As mentioned before some found it too short but in general the test participants found themselves entertained. "*Loved how you built up the level but a bit too short, emotionally unsatisfying but the atmosphere was amazing. I loved how there were these really tight spaces that you could almost feel claustrophobic in. I did end up by jumping off the cliff at the end though when I got the finishing letter because I felt no more obligation to keep him alive. I would say that the character meant very little to me. Really nice test.*" This is positive feedback and confirms the execution of the test level.

By looking at the binary results it is possible to form an opinion on how spread the responses were in the groups. In almost all questions the larger part of the test participants responded positively to the questions. They did however respond negatively to the most important questions. Question 11 both groups responded negatively meaning they did not feel an emotional attachment to the main character. This was not expected cause by the show length of the test did not facilitate the attachment to form. The important fact that can be taken away from this result is that G1 had 11 participants respond positively and G2 had only 4. Even though the participants mostly responded negatively there are still a significant difference between the groups. Question 12 shows larger difference when looking at the binary results. G1 has almost an even split in participants responding positive and negative, however with one more participant in the positive. This question addresses if the participant felt as the main character. Q13 is important to the immersion of the test and can be seen with the majority of the participants responding negatively to the question. This could be an indicator that the participants never felt challenged and therefore were less immersed.

13 Conclusion

In this section I will answer the problem statement and present my findings. I investigated if a higher detailed avatar would induce stronger character identification than a less detailed avatar. I investigated the question by performing a field study on an existing game (*The Elder Scrolls V: Skyrim*). I used an existing game as research platform because I could reach a wider group of people that way. Because I used an existing game I already had a target group for the test. I created a test level and two version of an avatar. A highly detailed avatar and a low detailed one. I wanted to investigate if I could measure a difference in character identification between the two avatars. I tested the two versions of the avatar with the target group and measured how well they identified with the avatar. I used the theory about character identification defined by *Hefner et. al.* and used that as base for my research. I used theories for immersion to measure the gameplay experience. My initial thoughts on this matter was that there would be no difference between the two groups. I believed better graphics would not yield stronger identification from the player. To my surprise the low detailed avatar induced more character identification than the high detailed. The low detail test group (G1) displayed higher immersion than the high detail group (G2). G1 were between "undecided" and "somewhat" immersed which is not much. This is less important and the important element in the study is the difference between the two groups. G1 experienced higher levels of immersion, stronger character identification more challenged in the level than G2. This indicates that G1 had more fun and thereby a better gameplay experience than G2. The problem statement questions:

"To what extent does the visual detail level of the avatar in computer games affect the character identification?"

The simple answer to the problem statement is that the visual detail of the avatar in a computer game effects the character identification of the avatar. The more detailed answer is the target group and sample size might have affected the results into a skewed format. To answer the problem statement properly:

"The visual detail level of the avatar in a computer games is somewhat affecting the character identification."

The answer to the problem statement is not completely uniform. The avatar is but one thing in the massive world of computer games. Changing this one element might improve identification and heighten enjoyment of this connection. It cannot however be the only item to affect the overall experience of the game. Since so many other factors play a role in the enjoyment of computer games. The other elements important to games such as animation, narrative or mechanics etc., must equally be considered to create a compelling gameplay experience. My assumption may be correct and the visual detail of the avatar plays a significant role in the complex system of a computer game. This study however needs more research to establish validity of the results. The conclusion must therefore be that these findings are indicatory and further research is necessary to establish a valid ground.

14 Future perspectives

In this section I will review the methods I used in the project. The reviewed methods will help in future research and to replicate the experiment. I will discuss the troublesome aspects of the test material and the applied research method.

14.1 The test environment

I chose to use the Creation Kit as development tool for the level and avatar. Based only on the easy distribution an already established target group. I should have chosen an environment that could facilitate more options for the player. For instance the quest system never came into being and would have made the experience far more intuitive for the player. Even though the development tool was not as easy to use as I hoped. I still believe the target group was a good place to test identification. Because the player base of the game was already used to identifying with characters in the game due to the roleplaying nature of the game. The development tool was very difficult to handle textures and meshes in. The cumbersome process and structure of the texture assets would have been easier in one of the previously discussed development tools. If I had used the Unreal Engine or the CryEngine the process would have been easier. Furthermore would I have had more freedom to alter the avatar as I wanted and not be restricted by the complex texture management.

14.2 The Story

The story was not compelling according to the participants. They found it too abrupt and without a proper conclusion. The factor of the compelling story was very important to immersion and to some extent identification. The lack of the compelling story might have been a reason why one of the groups were less immersed and in future perspectives this must be improved on.

14.3 The quest system

The quest system would have made the test experience must more focused and enjoyable. In future perspective the quest system will be important and should be helping and guiding the test participant.

14.4 The test level

The test level made it hard for the test participants to immerse themselves in it. The level was simply too short. For further research in the field a longer exposure to the medium is necessary. *Hefner et. al.* tested for a very short time (around 6 minutes) but their focus was also different form mine. They focussed on the adoption of attributes and measured the self-discrepancy of the test participants. As my focus was not on adoption of attributes the test was very different from theirs and would require prolonged exposure to the medium.

14.5 The test method

I chose to use a field study approach instead of a laboratory approach. This fact might have caused the experiments outcome to differ from reality. I gave away the element of control in trade of more natural testing environment. The loss of control was however an issue that might have effected the outcome. If a laboratory experiment had been conducted instead more measures could have been taken. I could for instance have stopped the test participants to stop playing in the middle of the test and ask if they wanted to stop. Their response would indicate if they were enjoying themselves and could have been a strong indicator of immersion.

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