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CREATING AN EFFECTIVE ATMOSPHERE FOR A HORROR GAME SETUP

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Abstract <p>An important factor of what makes a video game memorable and impactful to the player lies within its atmosphere. Atmosphere is not a concept that could be effortlessly implemented into games by just creating content without thought. Building an effective game atmosphere requires thorough subject study and careful technical implementation. One genre where atmosphere plays a central part is horror.</p> <p>This bachelor's thesis explores what is required for the implementation of an effective horror game atmosphere that is both interesting and immersive for the player, as well as able to provoke feelings of fear and anticipation. The study of horror includes research in the fields of psychology and game design alike, which will be explored and discussed in this thesis. In addition to the aforementioned, subject study and analysis is also examined about related media and video games.</p> <p>In support of this thesis study, the author has built a small game in unity engine, comprising of two separate scenes. This thesis follows through the process and study of creating game content and building the game into a playable entity. The outcome of the playtesting is discussed in its designated chapter while keeping in mind the studies and solutions for building atmospheric horror games.</p> <p>With the aim to understand principles of horror game design, the author hopes to provide useful knowledge about the subject to be used in the creation of horror games and game atmosphere in general.</p>		
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GLOSSARY

3D mesh	3D information / entity of a 3D model
AAA game	mid to big budget games
Approachability	factors that provoke interest and will to explore
AR	augmented reality
Body horror	form of horror, focusing on mutations and gore
Cosmic horror	a horror genre originating from H.P. Lovecraft
Full immersion technology	sensory and VR combining technology
Haptic feedback	information through the sense of touch
Indie game	small budget games
Letterboxing	widescreen to standard with preserved aspect ratio
Lore	collection of knowledge and stories of a subject
Metallic, height and normal maps	texture data maps with varying information
Polycount	count of polygons in a 3D mesh
Post processing	changing visuals through filters and adjustments
VHS	<i>Video Home system</i> , analogic cassette system
VR	virtual reality

1 INTRODUCTION

Creating the atmosphere for a game functions as an integral role in forming player immersion and placing the player firmly into a game's setting and story. An effective atmosphere can be achieved by the means of successfully implementing different key aspects in both mechanical and aesthetical game design and by making these elements communicate with each other in the game. While creating an effective atmosphere is crucial for any story driven game to succeed, this thesis focuses mainly on creating an immersive, believable and a compelling atmosphere for a horror game scenario.

When developing a horror game, a thorough research in both psychological and technical fields of the genre are in order. It would also be wise to examine what kind of horror games are generally being enjoyed by players and to possibly break down the elements in existing popular horror games in order to explore what makes them so special (Ntokos 2018, 34). Horror plays with the psychology of fear and anticipation. While a horror game can affect different people in various ways, fear is an emotion generally associated with all living organisms and a natural response to a threatening situation. (Adolphs 2013, cited in Ntokos 2018, 36).

This thesis will attempt to investigate how to utilize the means to build up anticipation and dread in a player. The aim of this thesis is to examine these factors in both horror games and media and to come into a conclusion about what can be done to develop a truly immersive and a frightening horror game experience. In addition, a comparative analysis will be carried out to study the strengths and weaknesses of various horror games, while learning how to avoid common mistakes and errors when it comes to making an effective horror game atmosphere. The thesis project will go through the process of creating a short playable horror game scene in Unity engine, while trying to achieve a positive and a well implemented horror game atmosphere within. At the end of this thesis, a playtest will be carried out and the content of the reports will be based on the players experiences to judge if the thesis project had managed to succeed.

2 A STUDY IN THE PSYCHOLOGY OF HORROR

Horror as a form of fiction can be set apart by a list of defining key features that make it stand out from other genres of fictional storytelling. The most important element of horror is fear. How fear it is built and implemented and how it affects the person experiencing this form of fiction is therefore important. When comparing horror games to horror in other forms of media and entertainment, games possess additional means to generate a positively effective horror experience for the consumer. While movies and series are fixed on specific visual perspectives and may not engage enough with the viewer to create an immersive audio-visual experience, games on the other hand can give the player all the means they need to achieve a truly immersive horror game experience.

There are multiple aspects to take into account about nature of fear in humans and which elements in life make us feel uneasy and uncertain about a situation or an encounter. While different people are prone to different fears and phobias, some general attributes seem to instil fear in most of us. One such a matter is the fear of the unknown. When something we experience does not feel right and a level of uncertainty is present, our creative minds turn to fill in the missing gaps with our own imagination. The term *uncanny valley* refers to an experience that on a quick inspection may feel like a normal situation, but a level of peculiarity is present. It may feel like that as if what we had experienced was in some way sick or twisted (Super Eyepatch Wolf. 2016).

As discussed before, fear is a natural response to an uncertain or a threatening situation. This opens the question about should the levels and the balance of fear be carefully managed and applied in small doses to achieve a cautiously forming and a daunting horror atmosphere. Ntokos (2018, 34-37) writes about the stages of calm and fear and the building of tension in a person, concerning video games. He breaks down the spectrum of fear into seven parts, starting from calmness and ending in relief, while going through growing tension to eventually reaching the climax of terror and panic.

One could argue that a similar structure of emotional experience could be applied to the atmospheric structure of a horror game. Analysing the text reveals that different levels of stress and fear can affect a player's decision-making capabilities on both *Cognitive* and a *Behavioural* level. This could in a sense, escalate the player's level of fear as the hasty decision making could make the said person more worried about the situation (Ntokos 2018, 35).

To add to the *stimuli* of fear, the importance of human senses and the reactions to audio visual effects should not come as understated. While all the known human senses define how we observe our surroundings, only two of those senses can be utilized in media and games: vision and hearing. Since we in this case only possess a limited amount of senses to play with, the importance of vision and hearing becomes even greater in creating horror in a digital format. Visuals and the overall mood of an environment can have a great impact in our minds and expectations. Lighting and colour can instil a wide range of emotions and mental associations and when an environment is lacking in information such as lighting, the human mind may attempt to fill it with imagination.

Before the time of digital visualization, much more was left to the imagination alone. Literature, theatre performances and even religions played with themes of fear, mystery and salvation. (Suomela 2018, 5.) Visual arts and paintings have also had a great influence in forming the visual appearance, mood and themes of today's horror. Notable credit can be given to many talented painters throughout history for contributing to the look of modern horror in games and media through the proficient use of colour and composition, lighting and shadows in their paintings. (Suomela 2018, 7.)



Figure 1: Rembrandt was exceptionally skilled in his way of portraying shadows. Supper at Emmaus. Rembrandt. (1628)

While a good visual delivery plays an important role in the forming of a horror atmosphere in games and media, it would not be complete without fitting music and sound effects. Music is a part of our everyday lives and affects our thoughts and feelings on a profound level. Due to this, it is apparent that a considerable amount of thought should go into the composition of music for a horror game or any other form of audio-visual media. Music however only covers a portion of the required audio design needed for creating horror in this form. Sound effects, ambient sounds and narrative are also needed for guiding the audience, inducing fear and other emotions, as well as to provide sound cues about what may be happening in a scene.

Chion (1994) explains that in order to build tension and fear through audio, the source of fear should be kept hidden from the viewer as long as possible and instead make use of clever audio effects to give the expression that an unknown danger could be hiding close by (Hiltunen 2016, 29). This method of using audio to compensate for the lack of visual information can significantly accelerate the viewer's imagination and thus increasing the amount of fear in the process (Hiltunen 2016, 29).

Horror does not necessarily have to relate to an ominous feeling of our surroundings and the stimuli of our senses. Horror can also be present in an unsettling experience or a realization that may not hold a threat in of itself but may shock us by giving us a grim realization or an altered point of view about the reality of the situation. Many forms of psychological and existential horror often play with these themes. One good example of such a situation is in the first-person horror game: SOMA, where the main protagonist Simon Jarrett realizes that he is just a brain scan of his own consciousness put into an A.I of a diving suit and that the whole of humanity has perished in an apocalyptic event.



Figure 2: Simon looking through a mirror, realizing that he is a robot. SOMA (2015)

Alas, even if a horror game would manage to achieve a near perfect consolidation in thematical and technical delivery, one thing is for certain. When a consumer makes the conscious decision to purchase a horror game, they are preparing themselves for a horror experience and nothing can erase that knowledge from their set of expectations.

2.1 Horror in films: an inspection into the cinematography of fear

To bring some insight into the creation of horror in games, it is wise to look at a related form of media: films and cinematography. Horror in films comes in many forms and has spawned various subgenres throughout decades.

While the forms and presentation of cinematic horror branches into numerous and very different types of approaches, a number of prevalent thematical and technical aspects are regularly present, as the important goal of instilling fear in the viewer remains the same.

The shift between subjects and direction of horror in different continents is noteworthy. The distinction comes apparent when comparing western and Japanese horror films. The themes and overall tone in numerous films from both places of origin are often very different. In many instances of western horror films, the use of excessive violence and serial killers is more frequent, while Japanese horror has repeatedly been more focused in the topics of ghosts and unnatural atmosphere (Bluelavasix. 2017). Notable reasons for this distinction in horror come from both cultural and historical differences. In Japan for instance, the topic of death and afterlife has been prevalent in everyday life throughout the country's history. Much of this has been due to the historical and cultural influence of Japan's two main belief systems: Buddhism and Shintoism. The aforementioned factors can largely explain the presence of entities such as vengeful spirits; *onryō* in Japanese horror (Bluelavasix. 2017). These cultural differences in horror films have since narrowed over time, as the assortment and amount of various kinds of available horror entertainment has grown exponentially.

There have been a number of important milestones in the history of horror filmmaking. Some of these milestones have set entirely new foundations for unique genres of horror to arise and to later influence numerous pieces of media and entertainment. One of such milestones was the 1979 science fiction horror film: *Alien*, directed by Ridley Scott. The film tells the story of a returning space expedition crew that comes across a hostile alien species that threatens to kill every crew member on board. *Alien* would later become an epitome for other horror films set in space and for the scifi-horror genre in general (Murphy 2017, 42).

Alien used clever technical methods and a distinct visual direction to keep the viewers frightened. The film made excellent use of its ominous low lighting and hiding the film's main monster in shadows at any time convenient. While Alien's antagonist monster *Xenomorph* was a terrifying sight in all its size and appearance, the film also included scenes of graphic *body horror* in the forms of parasitical offspring of the *Xenomorph*. These hatchlings would burst out of a person's stomach after being infected by a *facehugger*, a *Xenomorph* in its development phase. Much of the creature and environmental design of the film was created by the Swiss artist: H. R. Giger, who has left a big footprint in the world of filmmaking, horror and even video games. (Murphy 2017, 42.)



Figure 3: The crew of Nostromo exploring The Derelict in Alien (1979).



Figure 4: The survival horror game: Alien: Isolation (2014) is directly based on the 1979 Ridley Scott film.

As briefly discussed in the previous chapter, technical aspects such as lighting and colour composition play an important part in successful cinematography and scene building. The proper control of lighting and colour in a film is not only meaningful for the film's appearance but acts as a mean to guide the audience's attention towards points of importance, as well as to communicate messages and emotions through the scene. (Fu 2016, 30.) In the case of black-and-white films, colours could not be utilized to achieve the aforementioned, so instead filmmakers had to rely more intensively on the use of shadows, shapes and lighting to compensate for the lack of colour (Fu 2016, 30). This absence of colour would not necessarily mean that the black-and-white film would in that sense become inferior to other films shot in colour.

In fact, black-and-white cinematography is still practiced at the present day, even if being mostly replaced by films shot in colour. One could argue that when a certain element of information is missing, the remaining sources of information will become more efficient in the process.



Figure 5: *The Lighthouse* (2019) excellently utilized its technical combination of black-and-white composition and 1.19:1 aspect ratio.

The previous statement about missing elements of information could be applied to audio design as well. It is remarkable how much sound and music alone can affect our imagination and emotions. Just by well thought audio design can the feeling of dread and incoming danger be inserted into the minds of the listeners. Steven Spielberg's film: *Jaws* (1975) joined the elements of a well-considered audio direction with interesting filming techniques and formed it into a terrifying combination. The film combined the use of first-person camera shots, ominous orchestral music and scene-related sound effects to give the impression of a dangerous Great white shark hunting for humans to consume, even when the shark would not be seen in the scene (Fu 2016, 38). Another great example of sound used as a warning and a source of fear is in the Japanese horror film: *Ju-On: The Grudge* (2002), by the director Takashi Shimizu. In *Ju-On*, a cursed onryō: Kayako Saeki would produce a ghastly death rattle sound when present somewhere nearby.

2.1.1 From films to video games: elements to improve upon

With all the aspects of cinematography in mind, important lessons can be learned from films to further apply into the development of video games. There are a few key factors that separate these two forms of media apart and while games may possess the advantage of sheer amounts of content and player freedom, films and series can act as a practical source of reference for the technical and thematical development of a video game.

Films have already given great contributions to the field of video game development. This comes particularly apparent with story-driven single player games, as well as in the development of story and narrative for games in general. Cutscenes are a clear example of the film industry's influence on video games, with a variety of different in-game cutscenes baring a striking resemblance to the cinematic storytelling reminiscent of films and series. With techniques such as *letterboxing* and a change in the player's perspective, games can emulate the feeling of a cinematic experience taking place within the game's own setting (Haverinen 2017, 7).



Figure 6: Letterboxing technique used in The Evil Within (2014)

The mutual influence of modern games, films and series can be identified in all these forms of media. While many films and online series being based on different video games, so have films and series sparked the creation of numerous games in return.



Figure 7: Twin Peaks (1990) is said to have been a great source of inspiration for the horror game: Silent Hill (1999)



Figure 8: Silent Hill's iconic welcome sign in Silent Hill: The Arcade (2007)

For a long time, games have struggled to reach the level of cinematic realism that is quintessential for many films and series. While in-game narrative and the flow of story in a number of video games may have been able to reach a cinematic level of delivery, the general level of in-game graphics still hasn't been able to accurately capture the realistic look of a live-action film. (Suomela 2018, 11.) This obstacle may be a subject to change in the near-future however as the continuously evolving technology and software behind computer graphics enables for progressively better depictions of the real world to become possible.



Figure 9: Mads Mikkelsen starring as Cliff Unger in Death Stranding (2019)

When comparing video games to films and series, it becomes clear that the level of interactivity in these forms of media is very different. The high level of interactivity emblematic to video games is perhaps the very central attribute that sets this form of media apart from the rest. Player choice is an important game

design element that for the most part does not appear in other forms of media. The fact that a person can be in charge of a character's own actions in a piece of consumable media gives a whole new dimension to the world of storytelling and immersion. Different games utilize different perspectives and whether a game is played from a first, third or even an isometric perspective, the player's impact on the flow and the story of the game is ever present. Compared to literature and films, games can offer us an expanded level of visual immersion as the player's attention to a playable character creates a form of connection to its movement and actions. (Salminen 2014, 19.)

There have been various attempts to bring video games into the world of cinematography and vice versa. While some successful game adaptations of known films exist, the overall success of film adaptations about video games has been considered low. This raises various questions about the reasons behind this disparity. While exact reasons may be unclear and are likely the result of multiple factors, some of these elements may be able to shed some light into the frailty of video game films. One reason behind it could be the fact that some video game elements seem to be more difficult to adapt into the film format in comparison to others.

The *Resident Evil* video game franchise has spawned multiple film adaptations of which some could be considered more successful. This is much in contrast with the two existing *Silent Hill* film adaptations, of which the success can be regarded as less substantial. A reason behind this could be that the games in the Resident Evil franchise have had a higher emphasis on action, an element that could have been easier to implement into a film format, compared to the highly psychological and analytical nature of the Silent Hill games. (Salminen 2014, 9.)

If important elements are removed from something to fit to a new form of expression, a level of depth is bound to disappear in the process. While replicating the aesthetics from games into films may not be too difficult to implement, attempting to illustrate another layer of interaction into a form of media that is usually lacking it, is not a simple endeavour to accomplish.

While video games and films are two very different forms of media, something can be learned from both fields in order to improve immersion, atmosphere and the overall consumer experience. Perhaps the answers to these issues can be found in the future as both video games and the film industry continue to develop and explore new techniques to evolve them into new dimensions.

2.2 Horror in video games, a comparative analysis on Darkwood and Mists of Aiden

After assessing the previous theory about the essentials of creating horror, it is good to move forward to analyse and compare how horror is formed in different games and how do these games utilize the earlier discussed methods in their gameplay and aesthetics. This chapter will go in depth into comparing two very different horror games and to break down their differences and important game-technical and thematical elements. The games in comparison are: Darkwood (2017) from Acid Wizard Studio and Mists of Aiden (2020) from Steppe Hare Studio. The author of this thesis has played both of these games.

Darkwood is a survival horror game played from the top-down perspective. Set in a mysterious forest somewhere in Poland, the game has a heavy emphasis on exploration, crafting and solving mysteries. At the very beginning, the game greets the player with a message which includes the lines; "Respect the woods. Be patient. Focus". This message encapsulates one of the very fundamental ideas of the game. Darkwood is a game meant to be played with patience and careful observation in mind. After finishing the prologue of the game, the player is set to control another character. This nameless character is the main protagonist and the player character for the rest of the game. As Darkwood is played from the top-down perspective, the observational focus expands from the main character to the surrounding environment as well. This plays a very important part in the game, as the observation of the game environment for points of interest and hazards is very crucial.

Darkwood's core gameplay loop consists of the player finding information and paths about how to progress in the game, crafting and then coming back to a safe house every night to defend oneself from any danger that may crawl out from the woods. Most of the exploration happens during daytime as the dangers of traveling in the forest at night will eventually become unbeatable for the player to overcome. Darkwood is a rather brutal game, not only due to its graphic violence, but also due to the game's difficulty. The game has three available difficulty options to choose from and regardless of the choice of difficulty, the game will punish the player for not taking time to observe and think ahead. Crafting new gear and weaponry is also essential and will force the player to explore and scavenge the game map in search of equipment and tools.

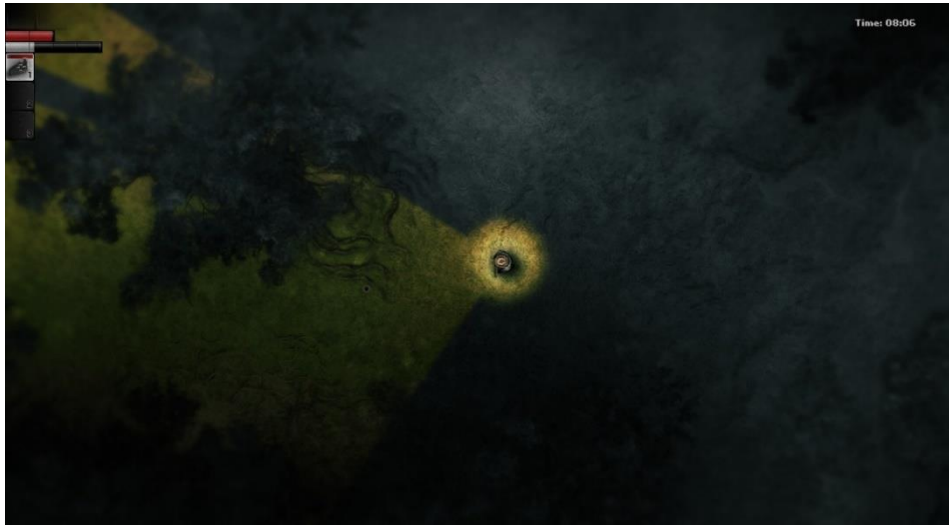


Figure 10: Darkwood's top-down perspective helps to observe the surroundings.

The game map generates randomly for each new game but the game content itself remains the same even as the order of the map layout changes. The map is split into multiple areas, each blocked from one another by an obstacle. This means that the player will have to explore and solve puzzles in each area before they can figure out a way to progress to the next region. This method of progression proves to be very beneficial to the pacing of the story, as well as for exploration and discovery.

As each area and night will become increasingly challenging, so does the story open itself more to the player in the process. Each area in the map contains its own mysteries and gloomy atmosphere while the story begins to unravel itself slowly and carefully during progression.

Much of Darkwood's true story is hidden inside its deep in-game *lore* that is very much tied into the game's environment, characters and dialogue. It is a game that requires thinking and analysing in order to fit all the pieces of the puzzle together. This adds a level of depth into the game's mysterious atmosphere and indirect storytelling. The eerie atmosphere is a considerable focus in Darkwood and it is achieved through carefully handcrafted art style, animated 2D character conversations, as well as a finely composed music and ambient soundscape. Additionally, the game's pacing and variety in enemy encounters and events offers for a very good balance in horror and exploration. To consider that Darkwood was the debut game of a small indie game company is quite respectable.

Mists of Aiden is a unique horror game in many ways. In contrast to Darkwood's top-down perspective, Mists of Aiden is played from the first-person perspective and has quite a different approach to its storytelling and gameplay. The game revolves around a sizeable manor and seemingly takes place sometime in the 1990's. The playable protagonist is a thief who has been struck with a streak of bad luck in his life and has resorted into acts of burglary to stabilize his monetary problems. Not much is told about the character at the beginning, except that he has a lover in his life and a wealthy father who is more than willing to exploit them both, should they agree to his monetary aid.

The core idea of the game is to venture to the manor, follow the partner's instructions through a headset and to steal the appointed valuable item inside. It is a very clear setup for a story but turns into something completely different as the game progresses. The manor where most of the game takes place, is a rather luxurious and sizeable estate with seemingly Victorian era style interior. Aside from a few disturbing looking paintings and questionable choices in interior

items, nothing else seems to stand out as odd in the estate. This illusion then slowly starts to crumble as peculiar occurrences begin to take place in the manor. Early in the first chapter, the player will discover a television with a *VHS* set attached to it. What the player may not know is that the same *VHS* set will act as a crucial storytelling and gameplay component later. As it is discovered at the end of the first chapter in the game, the *VHS* player will in fact record the protagonist's journey in the manor while preventing their escape by rewinding the player back to the start of the heist after each level is completed. Instead of the game then starting over, the game objectives and the map layout are altered as the story takes a completely new direction compared to the previous playthrough.

Mists of Aiden is an intriguing horror game in the sense that it is not inherently tied into a single genre of horror but instead presents different scenarios with varying forms of approach into horror storytelling and gameplay. In the first chapter, the player must escape from a seemingly insane, gas mask wearing murderer, while the following chapters will delve into completely different genres of horror, with scenarios ranging from supernatural encounters to even surreal psychological horror. *Mists of Aiden* is a fascinating horror game for the fact that the whole game takes place in the same location but provides a distinctively different take on various genres of horror with each level. Placing these games into comparison should reveal information about their different methods of approach into creating horror. While the games in comparison are quite different in numerous ways, important key elements reminiscent to the horror genre are present in these games, which through a proper comparative analysis can then be discussed.

Darkwood and *Mists of Aiden* offer quite different and in their own ways unique horror game experiences. In both games, the player is progressing in a story through the actions of a nameless protagonist. This game design choice of protagonist anonymity builds a layer of mystery over the protagonist's background and thus provides a space for imagination for the players to fill in.

Imagination and indirect storytelling are important components of worldbuilding and lore in video game production for story rich games. Some of the most substantial differences between Darkwood and Mists of Aiden come in the forms of storytelling, lore and pacing.

While Mists of Aiden being very direct in its ways of communicating the story to the player, Darkwood requires a more profound inspection into the lore behind its setting. This ambiguous approach into storytelling is supported by Darkwood's open world with a heavy focus on exploration and discovery. When comparing these two games, Darkwood offers a larger amount of playable game content with a noticeably slower pace in progression, as well as a deeper reaching structure in its story.



Figure 11: The first chapter of Mists of Aiden ends with the protagonist burning down the manor.

The term *Lovecraftian horror* sees frequent use in many horror games and media. While defining the cornerstones for Lovecraftian horror may be difficult, clues about the definition can be uncovered from the term's etymology. The term originates from the author H.P Lovecraft, who originally created the term *cosmic horror*. Lovecraftian horror literature followed the traits of cosmic horror and was born as the result of Lovecraft's own fictional world, its entities and storytelling detailed in his literature work (Ghodrati 2013, 6). In Lovecraftian horror, the protagonist is often thrown into circumstances in which they have very little

impact on their existence and the surrounding universe. With little care about the humans living on earth, the deities in Lovecraft's horror literature are extremely powerful and many of them too complex for the human mind to safely comprehend. (Ghodrati 2013, 8.) Darkwood's world lore plays with themes similar to the aspects of Lovecraftian horror.

The division between Mists of Aiden's and Darkwood's pacing and progression is notable. While one essentially consisting of five different horror stories and the other of a single lengthy exploration journey, these differences in pacing come with their own strengths and weaknesses. To further analyse both technical information and horror design in these games, a comparative chart about their technical statistics is included at the end of this chapter, alongside a SWOT analysis comparing the advantages and disadvantages regarding the content of these games and how well they manage to deliver an effective horror game experience.



Figure 12: Technical comparison between Darkwood and Mists of Aiden.

As the preceding figure about the basic technical statistics of these games demonstrates, both Darkwood and Mists of Aiden can be considered as indie horror games. Their largest differences come in the forms of player perspective, amount of game content and the choice of graphical style (Figure 12).



Figure 13: SWOT analysis about game content and its relation to horror in Darkwood and Mists of Aiden.

What figure 13 manages to clarify is that the games in comparison hold a degree of contrast when it comes to their strengths and weaknesses. Darkwood for example benefits from its vast amount of content, whereas Mists of Aiden may suffer from relatively limited game content and exploration. On the contrary, Mists of Aiden eludes the risk of sluggish pacing by splitting the game's story into five very different chapters. It is also clear that Mists of Aiden's greatest opportunities come from its ability to utilize different stories and forms of horror. This can keep the player on alert and provide a fresh start with each chapter (Figure 13).

In conclusion: It seems that when it comes to depicting horror and utilizing it in gameplay, both games offer a drastically different form of approach. Darkwood's strengths come from its amount of game content and space for building horror with a steady pace, while Mists of Aiden excels in giving the player an adrenaline-fueled horror experience with little expectations on each chapter.

2.3 Avoiding mistakes in horror game development

Before delving into the production of a horror game scene, it would be wise to look back into what has been discussed in the previous chapters of this thesis. As it comes clear, creating a horror game with an effective atmosphere and a consistent structure comes with its own set of challenges. As is the fact with any other games, it is important to keep the player engaged in the experience and to prevent them from getting bored or lost. In addition to this, for a horror game it is vital that the player will also stay frightened throughout the whole experience. In order to avoid falling into pitfalls and clichés of poor horror game design, a horror game designer should pay attention to both thematical and practical building pieces of effective horror, as well as on how other successful horror games have adopted this information in their game design.

Frictional games, the creators of Amnesia: The Dark Descent realized that they could make the player be frightened of essentially nothing by implementing a sanity system within the game. This would make the players question their own senses while experiencing threatening hallucinations through the eyes of the player character (Ars Technica. 2019). Creativeness is a key for both horror and game design in general and its importance should not be undervalued in any event.

The topic of creativeness brings along questions regarding player expectations and innovative game design. With horror games, one should always pay attention to the pacing of horror and anticipation. While frightening someone is not inherently a difficult task to accomplish, a competent horror game should never resort into just scaring off the player without substance or context.

Jumpscare is a term used to describe a sudden moment of shock or terror that often captures the viewer's full immediate attention. Jumpscare have their own place in horror but can easily flatten the horror experience if used too extensively (Salminen 2014, 22).

In his writing about levels of fear and anticipation in horror game design, Ntokos (2018, 41) concludes that horror game developers could take use of his measuring scale to define and adjust the levels of fear and anticipation in their games. When balanced correctly, a seamless flow in different levels of fear and calmness can result in a positively terrifying and an immersive horror game experience.

Building immersion is not an easy task but a worthwhile endeavour to spend time on. For a video game to achieve immersion, it should be believable and to not break the connection between the game and the player by any inconvenient, immersion-breaking means. If a game's setting and characters enable the player to relate themselves with one another, the chances for the player to immerse themselves with the game's events should increase in the process (Haverinen 2017, 14). If done correctly, immersion can establish a unique connection between the player and the game which in turn can enhance the experience of horror even further and make the whole gameplay session feel more impactful and frightening. To achieve a truly immersive and an atmosphere-rich game setting, the developers should aim to conduct subject-related background research and to put effort into making the game as engaging and convincing as possible in both thematical and technical terms.

3 TECHNICAL ASPECTS OF CREATING A HORROR GAME SCENE

After having explored various topics about creating horror and how it can be implemented into various forms, the next step in creating an atmospheric horror game is about assembling everything together into a playable game scene. This includes the creation of all required game assets, as well as forming them into a coherent entity. This chapter has been divided into separate topics regarding necessary sections of level design, while concurrently following the creation

process of the thesis project. The following chapters will attempt to answer the questions about how to create a horror game scene that is immersive, atmospheric and frightening, all the while being technically functional. While keeping in mind the previous research of this thesis about creating horror, the author of this thesis will attempt to utilize the information into the practice of level design. The thesis project is planned to be a short playable game scene of approximately five minutes worth of game content. It features an underwater game scene that consists of an exterior area, as well as a building with an interior area that the player gets to explore. Playtesting and reporting for a number of players will take place after the game scene has been fully assembled in Unity game engine. Through playtesting the author will attempt to see if the set goals for the project have been accomplished.

3.1 3D design and indirect storytelling

A 3D horror game would be nothing without appropriate direction in 3D design. This means being loyal to a coherent art style, as well as assuring that the game is cleared of any technical issues before its release. The game should also be able to maintain the player's interest to keep playing the game further. Haanpää (2018, 16-20) discusses about the importance of *enrichment* and *expression* in a 3D environment of which more will be examined in this chapter.

The basis for the game scene of this thesis was a deep-sea location, where the player would wander in a diving suit. (Appendix 1) The scene would then guide the player to take refuge from a seemingly abandoned underwater facility where unpleasant events would take place. The creation of this scene was heavily inspired by the horror game SOMA, along with visual references and the author's own imagination.

The chosen art style for the thesis project was targeted to be as realistic as possible while maintaining a polycount that would not exceed the amount which would negatively affect the game's performance. In order to achieve a satisfactory outcome, the 3D game assets were optimized so that no unnecessary polygons would remain in the models. To compensate for the

relatively low polycount in the 3D meshes, high resolution textures, including *2K* and *4K* textures were made, along with *normal*, *height* and *metallic maps* connected to the texture sets of the required 3D assets. All the models and textures were created in Blender and Substance Painter with additional animations created using Maya 3D and Blender.



Figure 14: This underwater 3D scene by Shubham Kumar was used as a reference for the creation of the thesis project.

A game scene should never be dull or result in the player getting lost or stuck. It would also be desirable if the environment was able to deliver a story indirectly. Haanpää talks about enrichment and expression and their impact on a game environment. Visual enrichment means that a space is provided with interesting visuals and details with the aim to spark the viewers interest in the scene. Proper enrichment can add more *approachability* into a game scene, which can in turn make the game feel more believable and mysterious and to encourage the player to investigate for points of interest within the game. *Novelty* is another element that should be utilized in environmental design but used with caution as it can easily break immersion if practiced extensively. Novelty refers to small details that stand out from the regular scene composition. In films and games, this can for instance refer to a pathway or an item that is highlighted in a manner that captures the viewer's attention and signals of an element of importance related to the scene.

Expression plays an important part in world design when attempting to portray the overall theme and mood of an environment within a game. It relates very closely to the art of indirect and environmental storytelling. Expression can also be tied into culture, history and even symbolism. It can help the viewer match this visual experience with their own knowledge about culture and history, along with what can be interpreted from the setup of the scene. If a player for instance stumbles upon an abandoned camp with traces of blood, torn banners and crude weaponry, they may get the expression that the camp was ransacked and the attackers were brutal in nature. This thesis will aim to apply these studies into practice in the project. In a 3D scene, enrichment and expression can be built by taking use of 3D visuals, different types of lighting and other means of indirect visual storytelling. It would be desirable if a game scene could be able to portray a story without portraying a story.

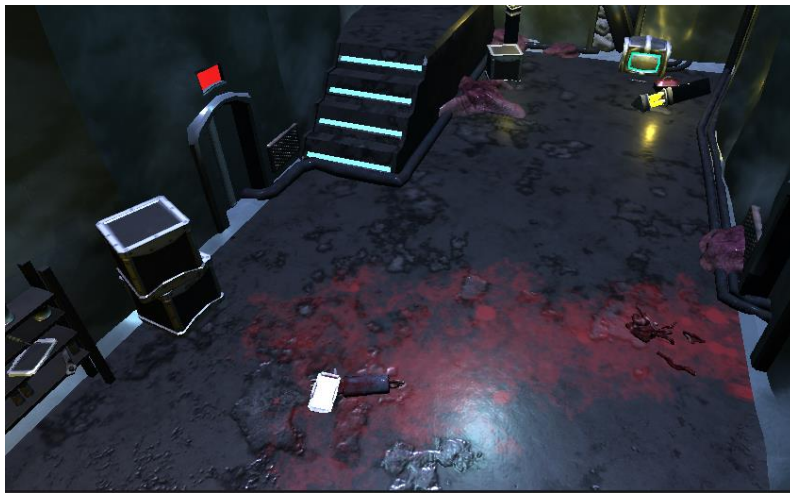


Figure 15: The thesis project uses environmental storytelling as a form of expression about what may have happened in the game's setting.

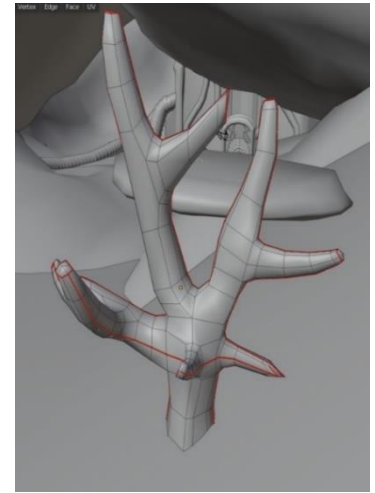


Figure 16: The project's 3D assets were optimized to prevent performance issues.

3.2 Lighting and mood

The next logical step towards immersive 3D worldbuilding comes in the form of lighting. In a 3D game scene, lighting and 3D assets will mutually benefit from one another, thus once again highlighting the importance of appropriate 3D and texture design. When the lighting in a game scene is done adequately, it can not only enhance the atmosphere within the game but also provide guidance for the player. Haanpää (2018) states that lighting and color are also important for

setting up the overall mood and expression for a scene. The adjustment of lighting and shadows can have a considerable effect on a person on a subconscious level. Direction, contrast, subtlety and the color of lighting can immensely change what kind of a message the scene sends to the player (Yot 2011, 150-151).

There are numerous methods for setting up the lighting for a game. Before starting to examine the process of creating lights however, one should take some time to explore how lighting appears in real life, equivalent of the game scene's environment under development. Games often aim to imitate real life and thus this sort of observational research is always useful. Creating games is a process that broadly involves tricking the player into believing in the scene setup while building immersion via game assets and audiovisual information. It is important that a scene remains coherent so that the visual expression remains consistent and doesn't break immersion.

While it is possible to create lights externally, game engines usually include their own lighting systems and options for scene lighting. Unity engine includes various methods for setting up the scene lighting. Firstly, it is important to adjust the general lighting settings related to the whole scene setup. In addition to this, Unity's default asset list includes a set of lighting options that can be placed locally and adjusted independently. One can for instance combine point and spotlights to achieve satisfactory lighting results locally.



Figure 17: Unity Engine's lighting tools proved useful for setting up the mood and expression for the thesis project scene.

Unity is well known for its extensive asset store, which also includes a range of free to use assets. This is a good opportunity to test out these assets for one's own scene and to take use of them if needed. A developer should not use these assets too extensively however to maintain the integrity and personality of one's own game in development. In relations to lighting and rendering, an important technical plugin to mention here would be Unity's own *Universal Render Pipeline*. This plugin is an inbuilt rendering pipeline that can be enabled through Unity Engine's list of packages. It includes a set of workflows and additional settings for graphics and lighting. Through this the author of this thesis was able to setup a *post processing* system within the thesis project, which greatly improved the overall graphical fidelity of the scene. When the lighting in a scene is refined and well put together, it can add to the illusion of a real scenario taking place in a realistic or a fictional world, immersing the player further within the game.

3.3 Sound design

To achieve an immersive atmosphere in any video game would be exceedingly difficult without music and sound effects. As mentioned in chapter 2 of this thesis, music can have a strong impact on our feelings and emotions and when combined with apt sound effects and ambient sounds, the mixture can directly feed into the imagination of the listener. When talking about horror games, this can mean that a person may begin to form feelings of fear and anticipation even if nothing had yet been shown visually in the game at that point.

Sound can and should also be used as a tool for providing environmental information and guiding the player to points of interest and progress in games. Tolonen (2020) mentions *obstruction*, *occlusion* and *propagation* in his bachelor's thesis about sound as guidance in nonlinear game environments. These terms are greatly relevant in the practice of 3D sound design for video games. They refer to the flow of sound in relation to obstructions and objects in a 3D scene. While obstruction means that there is a blockage between a source of sound and the player, occlusion means that the blockage is so sizeable that sound cannot travel around it. Neither of these do not however mean that sound would be entirely muffled due to the blockage but could still be heard by the player even if

less clearly. Propagation on the other hand means that a sound cannot be heard from its original source but can be observed as less distinct through the first open indirect path to that source of sound (Filion 2018, 280-283, 300).

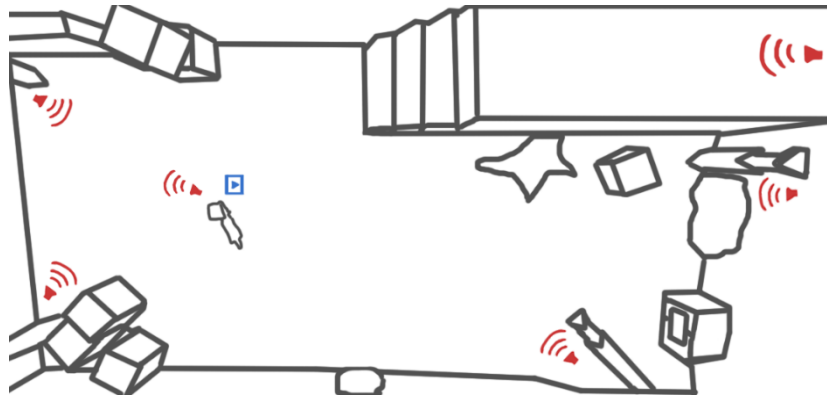


Figure 18: Sources of sound and video in the thesis project's scene 2, from top-down perspective

The project of this thesis utilized both 2D and 3D sound sources. Whereas background music and ambient sounds were set on a 2D sound layout to be heard generally from no specific direction, some 3D assets were set to have their own local 3D sound sources. The use of 3D sounds and obstructions was concentrated solely for the second scene of the thesis project, where the player would enter an interior area from a previously experienced exterior underwater game scene. Some of these sounds were set to play continuously such as the humming from electric lamp posts, while other assets had their own set triggers to activate an audio source when the player would enter a certain radius. Sound in games and media can be divided into different subsections. The main components of sound in games consist of music, sound effects, ambient soundscape and voice. It is not necessary for a game to contain all these types of sound assets but if an aim is to achieve immersion, it would be advisable to take use of all possible sound resources available. Building the soundscape for a horror game can be a rather discreet endeavour and one should avoid using sound assets excessively in any horror game project. Sometimes it is good to give the player some space to breathe from audio stimuli so that the next planned sound output can feel more impactful.

Sound alone can be used as a tool for creating a sense of space and scale with seemingly nearby or distant sounds and voices (Fu 2016, 41). If for instance a player hears a distant echo in the audio, they may begin to think that the game level is larger than observable and will most likely extend further with distant unknown threats. It is through the use of this kind of 3D audio and environmental sound design, when a player can be surrounded with a truly immersive set of sounds and a 3D environment that doesn't only look gorgeous but sounds the part as well.

3.4 Additional means to achieve player immersion

With the main aspects of creating an atmospheric horror game now having been discussed, what remains for this thesis is to go through possibilities and ideas about modern horror game development and what can be contributed to the immersion of future games.

The scope of the thesis project was set to meet the given time and deadlines for the thesis, as well as the author's own game design skills and personal schedules. While the thesis project mostly managed to meet its requirements set by the author, more content and detail could always have been made for the project scene. There were ideas for content such as a full body first person model and cinematic cutscenes to be used in the scene, which were left out due to the time restrictions. While more time could have been invested in the 3D sector, the author was satisfied with the project results in general. To enhance the overall immersion and mood of the thesis project by other means, the author was able to take use of game elements such as particle systems, 3D animation and physics to improve the project's immersion.

The future of horror games is looking both very promising and slightly worrying. With new technology and ever improving fidelity in game graphics and quality of content, big AAA companies keep pushing the boundaries and setting the bar higher for future horror games to come.

This is happening all the while the genre keeps facing a threat of growing staleness and repetition. As more innovative horror games are being developed, the amount of uninspiring content is also accumulating in the horror game market.

Virtual reality keeps appearing in conversations about video game immersion. It seems to contain a valid point of argumentation. Perhaps one answer to improving video game immersion lies in the visual technology similar to what *VR* and *AR* have managed to accomplish. To push the VR technology even further, new possibilities are rising in the field of *full immersion* and *haptic feedback* technology. Some developers of this technology even investing in the research and production of full body suits with inbuilt sensors to utilize haptic technology to enhance immersion. (Brian 2019.) Perhaps one day we can experience the full sensation of being inside a game world as technology goes forward.



Figure 19: Capcom's Resident Evil Village is an example of what modern big budget horror games can achieve today.

As for now, what can be done for game immersion is to focus on employing available resources for creating as immersive and polished video games as possible. Creating video games takes time and effort and through careful consideration and open-mindedness, concepts and implementations can be pushed further.

An effective horror atmosphere requires careful setup and delivery and when all components of impactful horror are in place and polished, the rest is up to the player to experience.

4 PLAYTEST REPORT

Initial playtesting took place on the 18th of March 2021 and was attended with five people. The results from the playtest proved very useful and the players were generally open and willing to share their honest opinions about the game scene. The testers were friends of the author but their opinions were handled anonymously for the study of this thesis. (Appendix 2) While the results from the testing varied, a common set of critique was present with almost all of the testers. Perhaps the most commonly shared opinion about the game was about shadows and the level of darkness. After the testing, it became quite clear that the game scene should have been darker and more limiting on the player perspective. The common consensus was that the players were not genuinely scared during the play sessions and the most substantial reason being the aforementioned.

Aside from the criticism about the levels of darkness in the game scene, the thesis project managed to receive a fair sum of both positive and negative criticism. One of the most important achievements regarding the thesis project was the positive criticism about immersion and sound design. The overall feel during the underwater exploration in the first game scene was generally regarded as positively immersive and further positive feedback was given about the audio-visual design of the underwater diving portion of the scene.

When players reached the second scene of the game, taking place in an underwater research centre, the overall criticism of horror atmosphere turned more positive. Lighting was darker and the atmosphere felt more like there was a looming threat within the scene area. Positive feedback was given about the interior 3D assets as well with one player saying that the interior felt 'alien' and 'eerie' in nature. This was one of the reached goals set by the author of the thesis. The attention to detail in the interior was generally admired by the players.

There was a monster encounter set at the very end of the game scene. (Appendix 3) When a player would walk in front of a slide door, a monster would appear behind it. This encounter proved to be both an excellent test about player fears and the effectiveness of a subtle, less aggressive approach to a jumpscare. This encounter came to be very useful in terms of subject research. It appeared that the encounter itself did not manage to scare people and much to the authors surprise, players would have liked the encounter to be more aggressive and direct, reminiscent of an actual jumpscare. This general feedback managed to change the author's perception about jumpscares in horror games. The author had originally argued against jumpscares and their nature of exploiting suddenness to provide cheap moments of terror within players. After playtesting, it came apparent that an aggressive jumpscare would have been suitable for the cycle of anticipation and fear in the thesis project.

Overall, the playtesting sessions proved to be particularly helpful for providing perspective about how to build an effective atmosphere for a horror game and what kind of aspects are needed to make the players experience fear and anticipation. It also highlighted the undeniable importance of playtesting in game development. Playtesting stands as a fundamental phase in game development for all types of games. It provides much needed audience perception about a game and what can be done to improve it. This fact was further solidified with the author of this thesis after the project playtesting sessions.

5 CONCLUSION

For the final chapter of this thesis, a reliable conclusion can be established about the goals and achievements of the thesis work as a whole. The subject for this thesis was chosen due to the author's personal interest in horror and atmosphere creation in video games. The author has always considered the design of game atmosphere as a key component for building impactful and memorable video game experiences. As the thesis subject focused on the atmosphere in horror game design, suitable research and practical development was carried out to see if the author would be able to establish an efficient horror game atmosphere within a game scene, supported by the subject research in this thesis.

The end results of the thesis project were mixed but at least partially successful in meeting the goals set by the author. Much of the testing results of the thesis project were on par with the theory discussed in the thesis. While managing to reach a set of satisfactory results in the thesis project, some less successful features in the thesis project agreed with their related research and theory written in this thesis. It seems that chapters 2 and 3.2 were more important for the thesis project than anticipated. Where the project excelled in 3D and audio design, it fell short in lighting setup and the study of human psychology. Chapter 2 highlighted the importance of imagination and the restriction of reliable human sensory feedback when creating horror. Indeed, it seems that a key component and an answer to creating tension filled horror atmosphere laid in the control of lighting and feeding player imagination through the adjustment of sensory stimulation. Darkness is perhaps one of the most ancient sources of fear and definitely not to be underestimated. Whatever lies in the dark is always left for our imagination until light has cleared the path between our imagination and actual information.

In conclusion, this thesis had managed to answer questions about what to focus on and what mistakes to avoid when creating an atmospheric horror game. Hopefully this thesis has given useful information for anyone with the intention of creating atmosphere-rich horror games in the future.

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SCREENSHOTS FROM THE GAME

Player perspective in the first game scene (Allén 2021)



Player perspective in the second game scene (Allén 2021)

PLAYTESTING QUESTIONS AND ANSWERS

	<ul style="list-style-type: none"> - How well did the horror atmosphere work in the game? - How believable was the game thematically and by its implementation? - Did you feel scared or anxious at any point during the game?
<p>Tester 1:</p>	<ul style="list-style-type: none"> - The water was scary. - The sounds could be adjusted but the interior had a frightening feel to it. - An intro or a brief story summary would have been a nice addition. - Not exactly AAA game quality but quite nice little game project.
<p>Tester 2:</p>	<ul style="list-style-type: none"> - I could have gotten more out from a more lengthy game experience. - The game scene could have been a lot darker and if I saw less further, I would be more scared. - Movement was generally very nice and well implemented. - The interior felt more scary and had a cool alien-like feel to it.
<p>Tester 3:</p>	<ul style="list-style-type: none"> - The start had a bit generic feel to it. It didn't feel like any game genre in particular. - The atmosphere was otherwise quite nice. Improved a lot on the interior part, which included some nice little details in it. -->The shift in atmosphere was impressive when entering the interior area. - Post processing and depth of field worked really well and brought more to the underwater exploration. - There could have been a <i>water monster</i> or a similar threat in the first scene.
<p>Tester 4:</p>	<ul style="list-style-type: none"> - Being underwater felt good. - The game was not scary at all. - There could have been something lurking in the water area. - As for the monster encounter: I believe that a more narrow space and louder sounds would have made it scarier. The encounter could also end suddenly. - More and more darkness needed.
<p>Tester 5:</p>	<ul style="list-style-type: none"> - Scary sound effects and music. - The grass was a bit irritating. - First scene was too bright.

Playtesting results from the playtesting day (Allén 2021)

3D CHARACTER DESIGN



3D render of the monster at the end of the thesis game scene (Allén 2021)



The monster encounter within the game (Allén 2021)