

Legends of Video Game Music History

Approaches to technological innovation and compositional design in video games

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Abstract

This master thesis explores how technological breakthroughs have changed the way music is composed for video games. Through analysing audiovisuality, music, hermeneutics and intertextuality in primarily four video games, I research adaptive music and in-game composing and performance to see how it impacts the players immersion. On this basis, the thesis is split into two primary sections: one is focusing on adaptive music in games where I examine *Monkey Island 2: LeChuck's Revenge* and *Sid Meier's Civilization VI*. The second focuses on in-game composing and performance, examining the games *Loom* and *The Legend of Zelda: Ocarina of Time*. I gathered the information presented in both sections through analytical play. The purpose of this master is to better understand the function, and to some extent history, of video game music and sound, as well as investigating the potential that lies ahead for the video game music industry. Although the field of ludomusicology is still small, the video game music industry is growing at a rapid pace. I aim to partake in developing the discipline of ludomusicology to further help narrow the gap between the academic field and the industry.

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Christian Alexander Espeseth
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1. Introduction

Imagine you are a kid once again. It's the weekend and you are done with all your homework and chores. Your parents have given you some candy, and you are finally able to sit down and play your favourite video game. This was the reality for many of us growing up, as the video game industry grew and gained more popularity. Throughout the years, video games became more incorporated in our everyday lives. Super Mario turned into a household name, not that dissimilar from the global cartoon character Mickey Mouse conceived by Walt Disney in 1928, as it became easier to access video games. Whether you owned a games console, a computer, a tablet or even your phone, there is a good chance you tried several games regardless of your age.

Video games have grown from being the new fad in the 1970s, to being the highest grossing media in the whole world, as well as being one of the fastest evolving media technologies of all time (Shirey 2020). It has evolved from simple formats such as bits and simple sound effects to a story-telling medium with real life graphics, where full orchestrated compositions are used to enhance the stories being told, all in a very short period of time.

The story above is an excerpt from my life. I grew up playing video games every waking moment that my parents would allow. When I met my friends either at school or in my spare time, we pretended to be characters from the video games we played. Apart from actually experiencing the adventures in the games, they fed my fantasy and took me on journeys to the Mushroom Kingdom, Hyrule, Johto, Kanto, Melee Island, Hollow Nest and so many more worlds. Video games even helped me learn English. Alongside me growing up, my love and appreciation for video games grew deeper. I started to understand that these video games are art, and the ability they have to mesmerise players is special. Combined with my passion for music, I was intrigued to understand how the world of video games evolved, and how video game music was created.

This is what sparked my curiosity in delving into the field of ludomusicology, with an aim to investigate the history of video game music. The word ludomusicology comes from the study of ludology: The study of games and gameplay combined with musicology. Ludo, not the board

game we all know and love, but the word, comes from the latin word “ludus” which simply translates to game (*WordSense*, s.v. “Ludo,” 15th of April 2022), therefore ludomusicology loosely translates to game musicology. This term was first invented independently by Guillaume Laroche (Kamp 2016). The fact that so much has happened in a short span of time makes it all the more interesting to investigate. I plan to examine game mechanics, which are rules and feedback intended to produce enjoyable gameplay (Kumar and Herger 2012) and systems used in games. Lennart Nacke (2014) explains these kinds of systems in the following way: “Systems themselves are defined as a set of elements that interact with one another to form an integrated whole. A system has a boundary and surrounding elements.” This revolutionised the composer’s approach to writing music for games. I would like to tackle such a task by examining what phenomena revolutionised the industry, both technologically, and how composers have changed their approaches to writing music for this medium. Another interesting aspect of video game music is how it affects us and makes us emotionally invested in the world of the game we play. To understand this, I will analyse compositions with an objective to discover how they contribute to the overall experience of the visuals in the game. Exploring this subject, a passion of mine, has been inspiring and I hope the reader will gain some of the same pleasure I have had during the course of writing this thesis.

1.1 Background

Before addressing ludomusicology, adaptive music in games and music as a game mechanic, I wish to clarify how I use the terms *video game* and *video game immersion*. Video games are a term defined as: “a game played by electronically manipulating images produced by a computer program on a monitor or other display” (*Lexico*, s.v. “Video Game,” 10th of April 2022). There has been some confusion about what is considered a video game and what is considered a computer game, as there was a greater gap between the two before. However, in this thesis I address all games played on electronic devices using a screen as video games, as to avoid any confusion.

Video game immersion is all about drawing players into your world. This could mean creating a real believable open world, with music and sound that suits the graphics. The idea is that the

video game creators make thoughtful decisions considering every aspect of the player's experience of the game to keep them invested in the game. This means that the game does not need an open world to be considered immersive, although it needs captivating parts, in order for people to seek out the game and keep the players attention in the game. By including elements like these, you can craft the perfect video game immersion (Wirtz 2021).

For some time now ludomusicologists have discussed adaptive music as a system and using music as a mechanic in games (Summers 2016). When discussing these topics it is often talked about what benefits it has for the immersion of the player, how the player is acting like a co-composer and how these mechanics can help players understand music even more. However, during my research I have noticed a lack of the full history of video game music. It's always mentioned, but regularly takes a backseat in the discussion as the vocal point has been on the mechanic and the system itself. This thesis is grounded in research already conducted by some of the greats in the world of ludomusicology and popular musicology, but rather than continuing their work, I seek to build a historical foundation to strengthen it.

Ludomusicology is a relatively young field of study, with research starting about 20 years ago. The Ludomusicology Research Group was officially founded in 2011 by Summers, Kamp and Sweeny, with Fritsch joining in 2016 (Ludomusicology 2011). In line with the substantial growth of the video game industry, the world of ludomusicology has expanded rapidly. The North American Conference on Video Game Music was founded in 2014, as well as the Ludomusicology Study Group of the American Musicological Society (Gibbons 2020). During 2016 the Society for the Study of Sound and Music in Games was founded, and The Ludomusicology Society of Australia was launched in 2018 (Gibbons 2020), during the Ludo 2017 conference in Bath, UK (Game Composure 2020).

Now that ludomusicology is well established, there is extensive interest in doing research about game music. Earlier I mentioned that the history is not adequately documented, but this is not to say that the history of video game music is not documented at all. The most recent example of documentation is the documentary *Beep* released in 2019 by Karen Collins, as well as Summers' newly released book *The Legend of Zelda Ocarina of Time*, researching the game with the same

name. It was published in March 2021, and named “The most extensive investigation into the music of a single game yet undertaken” (Adlibris 2021).

However, I still believe there is a gap in the documentation of ludomusicology concerning the history of video game music. It’s a massive field of study, too vast for this master thesis. Therefore, I have chosen to concentrate on the history of adaptive music in games and in-game composing as a game mechanic.

1.2 Research Question

How has the approach to composing video game music evolved in line with technological breakthroughs?

In order to investigate this research question, I have chosen to carry out two different case studies. In the first case study I will be researching adaptive and reactive music, by taking a closer look at *Monkey Island 2 LeChuck’s Revenge* originally released by Lucasfilm Games, now LucasArts, for the PC in 1991 and *Sid Meier’s Civilization VI* released by 2K games for the PC in 2016. In the second case study I will study, *Loom* also released by Lucasfilm Games for the PC in 1990 and *The Legend of Zelda, Ocarina of Time*, originally released by Nintendo for the Nintendo 64 in 1998, to better understand musical game mechanics such as in-game composing. I will also research what kind of technological breakthroughs triggered composing for games to change, and what kind of changes the game composer experienced during the evolution of the industry.

First and foremost, I intend to research how adaptive and reactive music is used to communicate with the player without giving them direct, worded cues. This involves musical cues regarding the players whereabouts, if they are on the right track, if there is danger approaching etc. In turn, this raises the following questions: Is there a form of ludo music literacy that is understood by most people? Are there musical cues that are stereotypical for games that enable the player to understand what is happening in the game, regardless of the gameplay? To address these questions I will examine how the iMuse system used in *Monkey Island 2 LeChuck’s Revenge*

assists the gameplay with musical cues, to define the players location, all the while creating seamless transitions between different locations. I will also examine a similar phenomenon that occurs in *Sid Meier's Civilization VI*, where the music evolves in line with the evolution of the nations through time.

Second, I investigate how musical game mechanics are used, such as in-game composing. Here I seek to understand why developers use music as game mechanics rather than other systems. Is it because music already is an established system, to the extent that the majority of people buying these games widely understand it without any further explanation? Or are there any other reasons why using music as a major form of progress in these games is advantageous compared to other game mechanics? In order to investigate this further I will examine how *Loom* uses composing to interact with the various objects in the world, and to solve puzzles, which in its turn helps the player make progress in the game. Furthermore, I will investigate the game *The Legend of Zelda: Ocarina of Time*. In this classic the player uses an ocarina, which is a flute, to play short melodies to perform different actions such as travel, changing time, calling for your horse, travelling through time and so on. Here the player even uses an instrument to carry out these commands, while in *Loom* the player uses a staff in a more “traditional fantasy-esc” way like a wizard.

1.3 Framing

With video games evolving rapidly, achieving a rich history in all aspects, it would be a near impossible task to cover the entirety of video game music history in this master thesis. That is why I have chosen to direct my attention to adaptive music in games and in-game composing as a game mechanic. That said it will be necessary to visit certain topics, such as classical music history and popular music history to gain a proper historical context. For instance, I need to touch upon music literacy for both classical and popular music history. Video game music is a popular culture phenomenon, and it borrows from and builds on both the classical and popular tradition to create its own. For example, we can look at games like the *Final Fantasy* series with the composer Nobuo Uematsu. He is inspired by progressive rock as well as classical music from the romantic era (Childed 2019), even to the extent of being called the Wagner of video games

for his extensive use of leitmotif in games (Ross 2015). The same applies to rhythm games, which will not be my main topic. However, I feel it is important to mention and briefly discuss some of them, such as *Parappa the Rapper* released by NanaOn-Sha in 1996 and the *Guitar Hero* series by many different developers, but mainly Activision, originally released in 2005 by Harmonix for the Playstation 2, as they are entirely focusing on music and rhythm as a game mechanic.

While acknowledging the predecessors of video game music and composers in other disciplines that have enabled the growth in video game music, I wish to highlight certain techniques used in games. One example is Richard Wagner and how he created leitmotif as a technique that would later become a staple for game composers to use to strengthen the marriage between audio and visuals. Nobuo Uematsu used it in the *Final Fantasy* series (Square/Square Enix, 1987-present), Christopher Larkin used it in *Hollow Knight* (Team Cherry, 2017) and Hideki Sakamoto and Arata Iiyoshi used it in *Pokémon Mystery Dungeon Explorers of Darkness* and *Explorers of Time* (Spike Chunsoft, 2007), to name a few. I would also like to investigate the evolution of popular music to look for similarities between the two disciplines.

1.4 Aims & Objectives

One of my aims in this thesis is to better understand the history and development of video game music. A solid foundation will facilitate such an understanding, and it is why I will thoroughly investigate games that use music-based game mechanics and systems, and try to understand and learn how they function. I intend to record gameplay from *Monkey Island 2 LeChuck's Revenge* (Lucasfilm Games/LucasArts, 1991) and transcribe the music to see how the mechanics and systems transpire. This will give me a visual representation of how these elements work, and what it adds to the game and the gaming experience.

Another aim is to be integrated within the scholarship that has established ludomusicology as a discipline in academia. In Norway the discipline is still young, and I wish to participate in its expansion. I take inspiration from Tim Summers, Karen Cook, Melaine Fritsch, Winifred Phillips, Karen Collins and many more, when digging deeper into a world I love and grew up

with. I am also charged by the sentiments of Phillip Tagg in his chapter “Analysing Popular Music: Theory, Method, and Practice” in the book *Reading Pop* edited by Richard Middleton where he states: “One of the initial problems for any new field of study is the attitude of incredulity it meets. The serious study of popular music is no exception to this rule. It is often confronted with an attitude of bemused suspicion implying that there is something weird about taking ‘fun’ seriously or finding ‘fun’ in ‘serious things’” (Tagg 2000, p.71).

In order to fulfil these aims, my objectives have been to research into the already established literature and interviews concerning the subject. I have also incorporated my own research, which I have referred to in 1.2. To create a solid base for my research on video game music, I have felt the need to consider the field of popular culture and video game history. Through a first-hand experience I have gained a deeper understanding of how the musical mechanics and systems in games actually work. For the sake of maintaining an academic approach to the video games, and avoiding it becoming pure leisure, I have approached games as research objects, and performed ‘analytical plays’ of the four games I discussed during my case studies. To this end, I have formulated guidelines and questions that seek answers during the playthroughs. I remain convinced that further research on this matter will make room for ludomusicology and strengthen its stance alongside musicology as a discipline.

2. Theory

2.1 Discipline

Research into video games started in the late 1990s and experienced an exponential growth through into the mid 2000s, with numerous books and articles forthcoming. Predominantly historical, this work investigated the origin of video game music, or studies comparing video game music to film music. Zach Whalen’s article “Play Along - An Approach to Videogame Music” (Whalen 2004) exemplifies both the historical aspect as well as comparing it to film music.

Karen Collins, one of the pioneers of research in this field, pointed out in 2007 that while the academic research of multimedia areas has increased over the last years, the investigation of video game audio had been left rather untouched (2007, p. 264). This pattern has also been discernible within popular musicology, where music scholars have struggled for the serious recognition of pop music in the academy (Scott 2009; Hawkins 2012; Hansen, Askerøi and Jarman 2021). One of the first proponents for the analysis of popular music was Tagg who argued for critical reflections of popular music alongside classical music (Tagg 2000, p.71). Similarly, Richard Middleton has discussed the historical background to the incorporation of popular music into the academy (2000, p.104-121). For my own part, I have been acutely aware of the lack of research into music for video games and identify similar struggles to those encountered by the generation of popular musicologists before me, such as Tagg, Middleton, Hawkins, Moore, Hansen, Askerøi, and others. In particular I have been keen to address aspects of music analysis in my work that include attention to compositional design. Stan Hawkins identifies this in the song form of the pop text, and argues for “reading the various functions of musical process. In many different ways, as I see it, deriving meaning from forms, styles and processes can offer the musicologist a spring-board for concentrating on the equally difficult problematics of contextualisation” (2002, p.7).

Given that video games are a screen-based media, strong bonds exist between the study of game music and film, television, and music videos. However, there are major distinctions. Concepts such as diegesis, a style of fiction storytelling that presents an interior view of a world, is used in both film and video games. In films and games the “narrator”, at least in the form of the camera, shows us the world from a specific and guided point of view (deterministic in films, stochastic in games) (Kassabian 2009). Films and games also have acousmatics (acousmatic sounds are the sounds that are heard without any cause presented in the story’s world), which originated in film and film audio studies. These are also used in video game music analysis, with minimal adjustment (Kouvelis 2009). When considering the history of video game music there are clear similarities between video games music and film music. Anahid Kassabian conveys both similarities and differences in her chapter, with an emphasis on the latter. She says that video game and film music can’t be organised the same way given the interactive element present in video games. She then proceeds to tell us that: “Music on websites and in video games, it seems

to me, focuses on two of the categories I discussed above in relation to film music: identification and mood.” (2009, p.51), which I explore during section 4. Which is about adaptive music in video games. Another relevant perspective is offered by Neil Lerner (Golding 2021), who has researched the relationship between music in silent cinema and game music from the 1970s onward. His study is based on the lack of communication through human language, and instead concentrates on communication through musical accompaniment. However, it is well known in the field of ludomusicology that games and film have vast differences. This is mostly due to the passive nature of an audience watching a film, in comparison to the active role a player has when playing a game (Sawicki 2020). Another difference between film and games audio worth stressing, is that film audio is linear, while game audio can increasingly be non-linear (Collins 2007, p.263).

Significantly, David Cooper identifies several aspects that contribute to the narrative in a multimedia production, such as costumes, camerawork and lighting (2012, p.62-63). Cooper makes mention to Charles Morris who wrote that the arts could be considered languages, as they carry meaning with them, to greater or lesser degrees. Ray Jackendoff mentions to Cooper that he has made a distinct separation between languages and “modes of communication”. Often in my study, I find myself siding with Jackendoff, although I question what lies within the word “language”, and why music is or is not a language, as it is a great means of communication. Furthermore, I maintain that the combination of the visual and interactive aspect of video games, makes music work as a language which is directly communicating with the player. As Cooper emphasises, “(...) the expression of meaning through music (...) can range from the entirely unambiguous to the intentionally ambiguous” (2012, p.63). This means that the combination of visuals, interaction and music might reduce the room for misinterpretation of moods in video games, as the music in itself gains support from the two other aspects.

Several approaches to researching ludomusicology are worth noting, including Tim Summers' book *Understanding Video Game Music* (2016). Summers introduces the method “analytical play” (p.34-36), which is when the analyser is overthrowing the games expectations of the players actions. It is a way to test and stretch the possibilities of the game. By analytically playing to investigate the musical system in the game and comparing multiple play sessions, the

musical mechanics of the game programming can be picked apart. Summers places this analytical method alongside more conventional sources of research data, both from inside the game (for example, programmatic and musical information, the latter of which frequently involves the application of conventional musicology and music theory to the video game music text) and from texts and communities surrounding the game.

Furthermore, *The Cambridge Companion to Video Game Music* (2021, p.239) by Melanie Fritsch and Tim Summers, Fritsch suggests an overarching ludomusicological theoretical framework that builds on a subject-specific concept of performance that emphasises the relationship between the two dimensions of performance. This concept is used as the initial step for developing an extended vocabulary on games and computer games, rooted in the relevant discourse of game studies. On that basis, a game performance theory is developed that allows us to analyse game playing as a form of performance, naming the player a performer or a co-composer. In the next section an introduction to the theorization about "Music as Performance", as conducted by researchers such as Philip Auslander (2006) amongst others, is provided. Building on an understanding of music as a performative and playful process, a terminological framework is developed that allows to analyse both games and music as playful performative practices, including questions of embodiment and socio-cultural aspects. Auslander's theoretical model is applied to six case studies to demonstrate how music as a design element in games, music games, and participatory musical practices in computer game culture. Above all, Auslander's theories on performance open up a range of possibilities for comprehending agency and the experiences encountered in digital media (Also see Kjus 2018).

2.2 Interdisciplinary Inflections

Musicology is the foundation upon which ludomusicology is built, and therefore a crucial part of my thesis. However, it springs out of several other interdisciplines, such as popular musicology, historical musicology and even game studies. I view the field of audiovisual studies as the overarching interdiscipline while I carry out my work. Auslander states that: "Technologically driven developments that have challenged traditionalist values, which emphasise the importance of maintaining clear cause-and-effect relationships between the visual and auditory aspects of musical performance (...)" (2013, p.617), which is highly relevant when discussing video game

music. Collins also begs important questions regarding the different roles in video games such as: “What does it mean to interact with sound? Who is the audience, and who is the creator of such co-creative, interactive sonic constructions? How does interacting with sound change our relationship to that sound? How do we begin to discuss these changes in relationship?” (Collins 2013, p. 572). Although she answers the questions throughout her text, I kept the questions informally in the back of my mind, in an attempt at reaching the same level of critical mindset while researching for and writing this thesis. Popular and classical music are present in games, either separate or mixed together. An example of popular music in games is the use of heavy metal music in the game *Doom Eternal* (Bethesda Software, 2020), composed by Mick Gordon. Another example is music in rhythm games like *Guitar Hero* (Harmonix, 2005) and *Sing Star* (London Studio, 2004), using licensed tracks by established artists and bands. An example of the influence of classical music on game music, is found in the work of Nobuo Uematsu, who clearly draws inspiration from the use of leitmotif by Richard Wagner, as mentioned earlier. The music in the *Final Fantasy* series (Square/Square Enix, 1987-present) by Uematsu is a combination of popular music and classical music, with elements from other genres mixed in.

Video game music is ultimately music created for video games, and therefore is created to serve a specific purpose, even though the music created by the composer builds on musical traditions already established. With composers creating music for games that are seeking to achieve a specific mood, they search for what we as humans expect to hear in a specific setting during gameplay. This is a form of literacy, more specifically a form of ludoliteracy, that I seek to expand through my case studies. From these findings I hope to discover that there exists a form of ludo audio/music literacy.

2.3 Literature

In order to gain a better understanding of the growth of video game music, it has been necessary to explore the history of video game music. To accomplish this, I have drawn on the following three books: Tim Summer’s *Understanding Video Game Music*, Karen Collins’ *Game Music* and Michael Kamp’s, Summers’ and Sweeny’s *Ludomusicology*, as well as *The Cambridge Companion to Video Game Music*, edited by Melanie Fritsch and Tim Summers.

When researching how musical cues work in games to help the player progress, setting the scene or a certain mood, it seemed relevant to consider ludoliteracy. I have drawn on *Ludoliteracy* by Jose P. Zagal, which contains early research performed on the specific subject of interpretation of music in games as a form of communication to the player without actually talking with them.

In addition, numerous other scholarly texts have informed the interdisciplinary basis of my work, including *The Bloomsbury Handbook of Popular Music Video Analysis* (Burns and Hawkins 2019), *A Brief History of Video Games* (Stanton 2015), *Settling the Pop Score* (Hawkins 2002), as well as *The Ashgate Research Companion to Popular Musicology* (Scott 2009), *Oxford handbook of New Audiovisual Aesthetics* (Richardson 2013) and *Music as Performance: Living in the Immaterial World* (Auslander 2006). In addition, my work is informed by much of the scholarship emanating from popular musicology (Hansen, Askerøi, and Jarman 2021), which intersects with video game history (Stanton 2015).

3. Methodology

An array of qualitative methods are employed in my study, with an analytical historical approach serving as the overarching method. This can be described as a process by which researchers gather evidence from primary sources and formulate ideas about the past (Thorpe and Holt 2008). In this section I use analysis as my main method concerning the different subjects, which are audiovisuality, the playthrough and the video game music itself. By instigating these analyses, I aim at a better understanding of the subjects at hand and clarify below how I have approached my subject methodologically.

3.1 Audiovisuality

The first method I apply to understand how the making of video game music has evolved in line with technological breakthroughs, is an audiovisuality analysis. This entails performing and recording an analytical playthrough, where the focal point is the marriage between audio and visuals. The objective is to see if they cooperate to immerse the player further into the game, strengthening the player's perception of the virtual world. A major source of my audiovisual

methods is derived from *The Oxford Handbook of New Audiovisual Aesthetics* (Richardson et al 2013). In this collection, Nicholas Cook states:

By implication, we in this field contrast our work to a truncated, narrow-minded musicology that reflects the autonomy-based aesthetic ideologies of the past, rather than the performative reality of music as a vital and unprecedentedly popular cultural practice in today's multimedia-oriented world. We may not spell it out, but our aim is an updated musicology that will do better justice to the richness of music as experienced beyond (and indeed within) the academy (Cook 2013, p.53).

Similarly, Richardson and Gorbman insist that "Audiovisual media give an impression of heightened "presence" and loss of distance; yet paradoxically, in many of our quotidian interactions, we spend much of our day communicating with others who are removed from us in both place and time." (p.11). Both these quotes reflect on the state of our dependency, as well as the importance of understanding and developing audiovisual media.

Notably, Petri Kuljuntausta and John Richardson differ between music and sound:

In practice it is impossible to differentiate between music and sound, because when putting a soundtrack together the priority is always to strive for the best possible audiovisual whole. At times music is prioritised, at others sound. The soundtrack always responds to the corresponding visual track, in which case it makes little difference whether the most apt form of expression is sonic or musical (Kuljuntausta and Richardson 2007, p.76).

This perspective helps underline the relevance of addressing video games in terms of the use of both sound and music combined which create the audiovisual experience mentioned.

3.2 Music analysis

Throughout this thesis, musical analysis aids an understanding of the thought process of the composer. To this end, I intend to use the recorded audio from the analytical playthrough by

transcribing it. This often provides data in the form of notation. The notation reveals the choices the composer made when arranging the music for the different locations, moods and player progression. In *Settling the Pop Score* (2002), Hawkins states: “With the emphasis so often on abstraction, music analysis often renders musical meaning void of any social and emotional effects” (2002, p.1). In my work discussing and analysing music for games aims to give me a standalone insight to the composer's work, at times separating it from the visuals. In addition to Hawkins, my methodologies are informed by those of Tagg (2000), Moore (2003), Middleton (2000), Walser (2003), Summers (2016), Askerøi (2013), and numerous other analysts. In particular, Walser’s “ten apothems” from *Analyzing Popular Music* (Walser 2003, p.22-27), have had significance for my methodological choices for music analysis in this thesis. Ultimately, a variety of music analytic methods have enriched my interdisciplinary perspectives, providing me with greater insight into the complexities of compositional design.

3.3 Intertextuality

Intertextual methods can be implemented in a multitude of ways. Lisa M. Given (2008 p.468) conveys that intertextuality occurs when a text either directly or indirectly references another text. Similarly, Hawkins argues that “for music to signify anything, for it to assume its own set of meanings, it needs to be rooted in an organised system which exposes the traits of the author’s and reader’s identity through the text’s purposive function” (2002, p. 8). From this, it seems the use of intertextuality is unavoidable as creators are, either consciously or subconsciously, inspired by what has come before. This can often be seen in animation movies that are clearly inspired by the animation style that Pixar is known for. Direct intertextuality references a text on purpose, either to make a point, make the audience recognize something, or for the sake of humour. An example is the theme from the old classic adventure game *Space Quest* (Sierra Entertainment, 1986-1995), which is a clear reference to the theme of the famous film-series Star Wars (Lucasfilm LTD, 1977-present). For the purpose of my thesis, I will investigate if the composers use audio intertextuality and how it affects the player.

Hawkins and Richardson’s theory on intertextuality is defined as “(...) the state by which it becomes possible for a text to become a text through a network of relations that define it as text. Moreover, it serves as a methodological tool for identifying the strategies of encoding and

decoding a text.” (Richardson and Hawkins 2007, p.17). Through this definition we understand that a text always stands in relation to other texts. Hawkins has also stressed that “(...) intertextuality is often misunderstood as being only a matter of influence by one author on another.” (Hawkins 2002, p. 28). He underlines that a text is always seen through the lens of the time and place in which it is read, not only by the time and place it was created. Hawkins goes on to state that “intertextuality, in musical terms, relates to the sounding of one text in and through the other” (Hawkins 2002, p.28). During my studies, this methodological approach is applied directly to my analyses of the games *Sid Meier’s Civilization VI* and *Loom*.

3.4 Hermeneutics

I also apply hermeneutics in my interpretive approach, which entails an interpretation of culture and texts with the time it was created in mind (*Merriam-Webster*, s.v. “Hermeneutic,” 7th of January 2022). Kai Arne Hansen has described Kramers perspectives on hermeneutics as open interpretation, which “(...) reflects how a hermeneutic approach can highlight the importance of social and cultural contexts in uncovering the possible meanings of a text, and also draw(s) into question the knowledge or competences of the interpreting subject” (2017, p.17). By this we can understand that by applying a hermeneutic approach we receive a better understanding of the text, because we have more knowledge of the time and place it was created.

Sid Meier’s Civilization VI (2K, 2016) is solely based on cultures and nations around the world, and how we perceive them (Civilization 2020). By using hermeneutics as a method, I will investigate if the music in *Sid Meier’s Civilization VI* fulfils our musical expectations of the different cultures and nations. Zack Bresler (2021, p.4) writes that “(...) each interpretive subject positioning represents a staging of the current listener that is as nuanced and complex as the listener’s competence allows”. From this we can understand that by diving deeper into the hermeneutics of video game music, we can understand more about what the creators assumed about and expected from their consumers at the time when the games were created. This method also gives us insight to what technology the developers had access to at that given time.

Hermeneutics has been a major method in the interpretation of popular music, and brings together the other methods I already discussed, such as music analysis, intertextuality and

audiovisual analysis. I am able to apply this method when I research the music of the other games, although the focal point is how technology has changed through the times. For example, would the music of *Monkey Island 2 LeChuck's Revenge* (Lucasfilm Games/LucasArts, 1991) have been the same if the game was made today?

4. Adaptive Music in Games

In this section I will consider the history and development of adaptive music in video games alongside different types of adaptive music used in video games. First, I will look at the history of *how* adaptive music has changed through games, but also *where* it originated from. A question connected to this issue is: Is adaptive music solely a phenomenon used in games or is it a well known technique applied in other media? The answer to this question will be key in giving me a deeper understanding of how game sound has evolved to the technically advanced point it is today. This will present just how important the role of the score and soundscape is. Second, I need the answer to *why* games have implemented the use of adaptive music. Other questions that arise when asking why, is the following: Is adaptive music important for the player's experience of the game? Will it help the immersion aspect while playing the game? Is the technique implemented by the composers in order for them to feel like they have a bigger part in the development of the game? Lastly, the big question of *how* needs answering. How do the adaptive elements work in the music? How does it work in music specifically written for games? Is there only one way to go about writing this type of music or are there more?

To address these questions, I want to further research into two games from different periods. This way I hope to gain a broader insight into how adaptive music has changed over the decades, and to see if the changes have been for the better. One of the games is *Monkey Island 2, LeChuck's Revenge*, which was released by Lucasfilm Games (later known as LucasArts) in 1991. The game is near and dear to me as I grew up playing it several times, and it is known for being one of the first games to use adaptive music. The game uses a system called iMuse that allows games to alter music seamlessly throughout gameplay, which was developed by Michael

Land and Peter McConnel in 1991 (Mraz 2021). Land, McConnel and Clint Bajakian are the composers for *Monkey Island 2, LeChucks Revenge*.

The other game that helps provide answers to the questions above is *Sid Meier's Civilization VI* (2K, 2016). The Civilization series is a long-running series dating all the way back to 1991, first released for the PC (MicroPros, 1991). The series has been running for 30 years, making it a veteran in the game industry, with a great abundance of credibility in the industry. The game is now on its sixth instalment, originally released in 2016 with continuous updates to this day (Civilization 2021). The Civilization series is a turn-based strategy game that bases the story and gameplay around the nations of the world we live in. I want to investigate how these games use different methods to excel their use of the adaptive elements in their score.

In *Monkey Island 2: LeChuck's Revenge* the game's music is built to change based on the player's movement with locations. There is a clear thematic music piece throughout the different locations of the game. An example of this is when you move around in the town of Woodtick. The theme of the town plays when the player walks around, but changes when the player enters a house. If the player were to enter the carpenter's house, the music then implements a sawing sound into the theme. When exiting the carpenter's house the composition is written to have a couple of bars to transition between the themes, where the sawing sound disappears. I want to further research how they create an understanding of where the player is in the game, using the music as guidance. This creates a type of literacy of the player's whereabouts. The added question here would be to see if the player would know where they are located, even with the visuals turned off. Zagal's work on ludoliteracy (Zagal 2010) might be translatable to game audio. Is there a common understanding of what different elements in music mean in games? If so, where does this understanding come from? People's experiences with games? Movies? Or maybe the comprehension comes from music that is not directly connected to visuals?

Then there is *Sid Meier's Civilization VI*, the game based on history. The game's use of adaptivity is mostly focused on when the player chooses to evolve their civilization, starting all the way back from the ancient era, going to the mediaeval era, to the industrial era and finally ending up at the atomic era (Civilization Fandom a 2022). All 50 nations have their own themes

based on songs from the respective nations that evolve through the times. An example here is Norway's theme, which is a folk song called “Gjendines Bånlåt” (Knorr 2016). In the ancient era the music had a simple arrangement. As time passes, the music progresses with more modern arrangements of the same song. What I want to know is if the music made to represent the different eras and different nations is historically accurate with regard to the use of instruments and different arrangements.

Another interesting aspect of adaptive music that I would like to investigate, is whether or not it makes the player a co-author: Tim Summers explains: “I determine the onward progression of the musical utterance, whether sustained or changed, and when such changes will occur. Thus games can themselves appropriate the power of the musical narration” (Summers, 2016). In an interview with Kennie McAlpine (2017), Summers agrees on calling the player a “sort of co-author”. In the same interview he mentioned that the players are the ones who choose the pace of the game and therefore they choose how the music evolves or rather, adapts. Building further on this theory I would like to compare it to call and response music. Call and response works in such a way that one musician plays or sings a part and another answers with a part that works well with the previous performance. Adaptive music works in a similar fashion. The player is the one choosing when the music is to change. For every action a player makes, it triggers a response, which is a sonic change. The “call” is the action, the “response” is the change in music. These changes need to work seamlessly together to not disturb the immersion of the player.

4.1 History and development of adaptive music in games.

Today, music in games is almost expected to be adaptive, as it has almost become a standard for game music. But this hasn't always been the case. Back in the 1970s when games were new and groundbreaking, and mostly programmers created and implemented the music into the games, the complexity of adaptive music was not yet seen, or rather heard. Most games at the time had a limited sonic soundscape, with either a short loop of music or an intro piece that played when the game was booted up. Other sounds in the games were sound effects with no music during gameplay.

The beginning of adaptive music in games came about in the early 1980s with a well known classic game called *Frogger* (Konami 1981). It is by today's standard a fairly simple game. You play a frog and your goal is to traverse into safety across a street with a great amount of traffic, as well as a river with a powerful current and drifting logs. This needs to be repeated five times to win. The music is programmed in a manner that for every frog that travels from one side to the other, a new variation of the theme plays. In total there are five different themes in a game that takes about two minutes to finish per level, which is a lot of music for a short period of time. Shortly after *Frogger* picked up popularity, selling arcade cabinets for a combined total of 135 million dollars (estimated to be the equivalent of 348 million dollars in 2020) (Tuffcub 2021), and being placed in 12th place of the most popular arcade games of 1981, many started to look to this game for inspiration (Akagi 1982, p.30). What did they do differently?



Scan of paper that placed *Frogger* as the 12th (Akagi 1982, p.30)

It was hard to do something more complex than what *Frogger* did as there were no efficient ways of programming the music, other than abruptly shifting at certain points during gameplay. Around 1990, Michael Land and Peter McConnell from LucasArts created the iMuse system. Their goal was to create something that could adjust the music dynamically depending on in-game events. Some of the inspiration for iMuse was based on the use of music in movies and TV. The music in movies and tv-series already shifted with grace and dynamics, effectively

assisting the mood. iMuse's sole purpose was to help the music play continuously, and not start and stop as *Frogger* and many other games did. This was the start of middleware, which implements the sound and music into the game. Today we have two main middleware programs for music and sound that are recognized as the industry standard. These are Fmod and Wwise (Kelly 2018). These programs allow the developers to take advantage of the sound and music for games to create a soundscape that helps the player to be more immersed in the game, making the overall experience more coherent.

Gradually, more games started implementing the usage of adaptive music. Big games like *Devil May Cry 5* (Capcom, 2019), *Mirror's Edge* (DICE, 2008), *Halo* (Bungie, 2001), *Red Dead Redemption* (Rockstar Games, 2010), *Deus Ex* (Eidos Interactive, 2000), *Mario Kart Wii* (Nintendo, 2008), *Banjo Kazooie* (Rareware, 1998) and *Mario Odyssey* (Nintendo, 2017) are some of them, and I would like to present a few examples of modern use of adaptive music in games from the three latter ones.

Mario Kart Wii was released for the Nintendo Wii in 2008 developed by Nintendo (Nintendo 2008). The programmers choose to make the music build up when picking different options in the menu before starting a race. In the beginning when the game asks you to choose a game mode, the music consists of some hi-hats, bass and synth pads. The next change in music appears when you are to choose your character and the vehicle. At this point the piano kicks in with some staccato hits together with an arpeggiated synth. The last layer in music is activated when you are about to choose which track to race: the full drum kit comes in and the piano voice shifts to a higher octave before going back to the arpeggiated synth.

Banjo Kazooie is a game developed by the British company Rareware (now Rare) and released by Nintendo for the Nintendo 64 in 1998 (Rareware 1998). The game's music was composed by the now famous Grant Kirkhope. The theme for the hub world of this game called Spiral Mountain has a lot of variation depending on where the player is standing. The main theme is a quick, simple drum beat with a tuba and two banjos. One banjo is playing arpeggiated chords and the other one is working the main melody. In the second part of this song, the arpeggiated banjo is exchanged for a marimba and a trombone working an undermelody, while a clarinet takes over

the main melody. At the climax of this theme, the piece returns to the original drums accompanied by the tuba. The trombones keep playing, but now in an off-beat ska-pattern, while a piccolo flute carries the main melody. There is one very notable variation of the theme, which happens when the player jumps into the water. Once the player dives into the water, the whole ensemble is replaced by a marimba playing both the main melody and the bass line. In addition, the theme has a lot of reverb added to the mix to emulate the sound of being underwater.

Super Mario Odyssey, a game released for the Nintendo Switch in 2017 (Nintendo 2017), is a game with a huge variety of music based on different cultures. This includes Mexican culture in the Sand Kingdom, Japanese culture in Bowser's Kingdom and even a city modelled after New York City, called New Donk City in the Metro Kingdom. Mario has a rich musical background that is nostalgic for a lot of people, and the developers do not miss the chance to use this to their advantage. In the Wooded kingdom, when you come to a certain point in the level, the player is able to jump into a warp pipe. These pipes are used in Mario games to help Mario travel from point A to point B. But for this certain warp pipe, Mario travels onto a stone wall which alters both the music and the visuals. The music changes from a grand orchestral piece to an 8-bit rendition of the same piece, and the visuals take the player back to the mid 1980s, pushing those nostalgia buttons of the players that grew up playing the old *Super Mario* games.

At this stage, I want to turn to the different types of mixing encountered while working with adaptive music. There are two ways of mixing adaptive music for games: Vertical mixing and horizontal mixing (Mraz 2021). The latter is what creates smooth transitions between two pieces of music. This is often done by crossfading two pieces of music in settings where the player traverses from one location to another. An example of this is in the game *World of Warcraft* (Blizzard 2004). We find a different example of horizontal mixing in the game *Octopath Traveler* (Square Enix 2018). In this game, right before you enter a boss battle, the piece played is called "For Redemption". It is a 25 second long loop that repeats itself until the player presses the button to move into battle. This triggers a transition which is composed to start at any point during "For Redemption", which in turn brings the player into the sonic landscape of the boss battle theme.

Vertical mixing technique is used to change the already ongoing music to match the environment and events happening in the game. The arrangement changes depending on the player's whereabouts but keeps the composition the same, just to inform the player what is happening in the game, like the underwater-effect in the previously mentioned “Spiral Mountain” theme from *Banjo Kazooie*.

4.2 Function and adaptation of music in games

In my experience, adaptive music can be used for two correlated reasons. The first one is contributing to the construction of the game, bringing a sense of life to the game it is created for; to make the world more vivid and expand its personality. We have numerous associations towards different types of music, and these associations are tools the composer can use to trigger different feelings. It has also become an expectation for games to have a soundtrack that is suitable for the world the player is exploring. This presupposition has existed for quite a while, and even as far back as the 1980s it was a given for games to have a strong soundtrack to back up the gameplay. *Super Mario Brothers* (Nintendo, 1985) and *The Legend of Zelda* (Nintendo, 1986) were two of the pioneering games that set the bar for soundtracks in games. The soundtracks were not only suitable for the games, but it helped the player to be more invested in the game.

This brings me to the second reason, which is to enhance immersion. Immersion is what helps us relate to the media and to feel invested in what is happening. It is the connection between the visual, textual and sonic elements a game consists of (Wirtz 2021). I believe the music is there to help elicit the various emotions that the visuals encourage, whether it is excitement and feelings of achievement when great things happen during gameplay, or sadness, guilt, anger and so on. It is even used when a player loses, to motivate them to continue despite their defeat. This type of motivational music is used in the previously mentioned example, *Frogger* (Konami, 1981), where the music intensifies with each level that is completed (Kähkönen 2021). In these types of games, the goal of the music is to keep the player in the game for as long as possible. I imagine that the worst possible reaction a composer could envision is that a player mutes the game,

because it is a sign that the music is not enhancing the gameplay, and thus not doing its job properly.

4.3 Case studies

Case studies are explained to be an in-depth analysis or rather a study of something. In her article from VeryWellMind, Kendra Cherry (2021) makes the point that a case study is about a person, group or event. On this note, I tend to disagree, as it is possible to carry out a case study focusing on a product, and in this particular case, games. Case studies either take on the whole aspect of the study object or smaller bits of it. It is carried out to understand something about the study object, and it is often highly subjective, although it is not necessarily so (Cherry 2021). In my case studies I wish to understand how adaptive music is used in two games: *Monkey Island 2: LeChuck's Revenge* (Lucasfilm Games/LucasArts, 1991) and *Sid Meier's Civilization VI* (2K, 2016). I will investigate how the music in the games enhance the sense of immersion for the player and what the composers have done to achieve the immersion through analytical play. The hope is that the analytical play will reveal how the use of horizontal mixing with the iMuse system helps the players' immersion in *Monkey Island 2 LeChuck's Revenge*. In addition, I am curious to see if this gives sonic feedback to the player about the progress in the game, and compare the findings to Zagal's work on ludoliteracy. In the analytical play of *Sid Meier's Civilization VI*, I will investigate the use of vertical mixing when the game changes eras and how the composition advances. What's more, I will examine if the progress of the music in the game advances in the same way that music advanced following the technological breakthroughs in the real world.

4.4 Selected games

Monkey Island 2, LeChuck's Revenge (Lucasfilm Games/LucasArts, 1991) was the first game that used the iMuse sound engine. As previously mentioned, the sound engine was created to make the music play throughout the game, without having to pause for sound effects or when changing tracks. The musical changes became seamless and it added another level of liveliness to the games. In *Sid Meier's Civilization VI* my focal point is rather on the instrumentation, than

the use of technology. I am interested in finding out if the composers have been true to the progress of the historical evolution of music, and if it provides a holistic experience of the game.

4.5 *Monkey Island 2: LeChuck's Revenge*

4.5.1 The Creator

Monkey Island 2: LeChucks Revenge is the second instalment of the long running computer game series *Monkey Island*. It consists of 5 games: *The Secret of Monkey Island* (Lucasfilm Games/LucasArts, 1990), *Monkey Island 2: LeChuck's Revenge* (Lucasfilm Games/LucasArts, 1991), *The Curse of Monkey Island* (LucasArts, 1997), *Escape from Monkey Island* (LucasArts, 2000) and finally *Tales of Monkey Island* (Telltale Games, 2009). The creator of the *Monkey Island* concept was Ron Gilbert. He had previously developed games like *Maniac Mansion* (Lucasfilm Games, 1987) and *Zak McKracken and the Alien Mindbenders* (Lucasfilm Games, 1988). He also created the script language SCUMM, which is short for Script Creation Utility, for *Maniac Mansion* in (Hatfield 2012). This script language was used for nearly all of the upcoming LucasArts adventure games to come, with some exceptions. Gilbert had a very successful career creating more games, both for educational purposes and leisure. His latest work was *Thimbleweed Park* (Terrible Toybox, 2017), where he was clearly inspired by his earlier work of *Maniac Mansion* and puzzle solving games like *Monkey Island*. *Thimbleweed Park* quickly became a hit selling well over 200.000 copies. Even though Gilbert is known as the man who created the *Monkey Island* games, he only participated in the making of the first two games before venturing to create Humongous Entertainment. Despite his departure from LucasArts, he has mentioned that he sees *Monkey Island* as a trilogy, and that he would love to buy the rights and create the third game in his own image (Mäki 2015). Since I started writing this thesis it has been announced that Ron Gilbert in collaboration with Lucasfilm Games and Disney, are creating the true third instalment in the series, *Return to Monkey Island* (Terrible Toybox, 2022). It is set to be released in 2022 (Carson 2022).

4.5.2 The game: point and click

The game is a point & click adventure game. In this genre you control a character that has an underlying goal throughout the game, which consists of puzzles the player must solve in order to complete the story. This is executed by collecting items that help out in different scenarios, although, not always in the most logical way. During the game you meet other characters with vivid personalities. Looking at figure 1. you can see a typical screen from the *Monkey Island 2: LeChuck's Revenge*. At the bottom left you see the different commands you can choose between when interacting with either the environment or the characters in the game. On the bottom right you see an array of items which are used to solve puzzles. These items change throughout the game, along with the puzzles. Above the items and commands one sees the visuals of the game. In this screenshot you are presented with some of the characters from the colourful cast that you meet and talk to during gameplay, some who are there to help you, give you hints, perform tasks and so on, and some are there to fill the gameworld with life. This specific scene is from a spit contest. It is a puzzle in itself, as every little detail has to be perfected for you to be able to win the contest. First of all, you have to go to the bar and get some grog that makes your spit thick. Second, you need to pay attention to the hat of the character at the end of the line, because the feather in it has to blow in the correct direction to make your spit go further (pretty funny that they use aerodynamics in a game that looks this simple). Lastly, you have to get a hold of a horn. When you blow the horn, the postman fires a cannon that acts as a distraction to the other participants. This distraction gives you time to change the flags that estimate the length of the spit, making yours the winning one. All of these choices might be part of what draws the player into the game. The fact that there are several elements that need to be “just right” in order to succeed, might motivate the player to investigate all components of the game, i.e. the point and click part of the game. These are the kinds of puzzles you have to solve throughout the whole game.



Figure 1. (Lucasfilm Games/LucasArts, 1991).

The premise of the story connects to the previous game, where Guybrush Threepwood has killed LeChuck. In the beginning of the game, our hero Guybrush Threepwood is hanging from a rope over a bottomless pit, with a chest in his hand. Shortly after, his love interest of the game, Elaine Marley, comes down on a separate rope and asks him what he is doing down there. Guybrush explains that he has been hunting the treasure of Big Whoop. This takes us back in time, allowing us to move him around and play the game. Without spoiling any more of the game, we know that our main goal is to find the treasure of Big Whoop, and that we have to solve puzzles to get there. Early in the game we meet Largo LaGrand, an old minion of LeChuck. He manages to resurrect LeChuck using voodoo magic, who wants to avenge his own death, hence the title of the game, LeChuck's Revenge.

4.5.3 Applying ludomusicliteracy to *Monkey Island 2, LeChuck's Revenge*

I now want to extend several of my ideas above in an attempt to understand this case study. First and foremost, I ask: is the iMuse system built to enhance the holistic experience of the game, through seamless changes in music? Are the composer and developers aware of how this seamlessness impacts the experience of the game, and is it intentional? Another feature I intend to investigate is if there is literacy connected to the music in the game. If the music is attached to a specific area in the game, will the player recognize their whereabouts from the music alone? As

mentioned earlier, I will be seeking answers to these questions through analytical play, which is explained by Tim Summers like this:

Just as those studying film must engage with films as critical viewers, so we must engage with video games as critical players. We need to be both players and analysts of the games we discuss; it is through playing, listening and interacting that we come to know and understand the music we research... Recording gaming sessions is a useful way to document play (...) Through analytical play, a foundational model of the game's musical processes is usually easily made. (Summers 2016, p.34-36).

Furthermore, Jose P. Zagal argues for ludoliteracy in the following way:

For simplicity, we can consider video games as a singular semiotic domain. The ability to decode is analogous to the ability to access the "content". For games being able to decode is thus analogous to being able to play. Gee's second element, understanding meanings with respect to a semiotic domain, becomes understanding meaning with respect to games, and the third, produce meanings with respect to a semiotic domain, can be expressed as the ability to make games. Thus games literacy can be defined as: 1. Having the ability to play games. 2. Having the ability to understand meanings with respect to games. 3. Having the ability to make games. (Zagal 2010, p.23).

I endeavour to find out if there is literacy in the music in the game, which I refer to from now on as ludomusicliteracy. An example of this would entail players knowing where in the game they are simply by listening to the music. "Where they are" could be tied to a specific place in the game, or say, a certain point in time in the game. The following section comprises my findings from the analytical play mentioned in the introduction and method section of this thesis, in a bid to consider if the composers are able to execute the described use of adaptive music.

4.5.4 Analytical play

While I conducted the analytical play to collect the data I wanted to understand better, I strived to be on the lookout for hidden gems within the music. In the analytical play for this study, I used the version of the game called *Monkey Island 2 LeChuck's Revenge Special Edition* (LucasArts, 2010), which was released by LucasArts in 2010 and is a remaster of the original game released in 1991. A remaster is described by Devin Sauve from CBR as: “When something is labelled a remaster, this generally means it retains most of the original content with modern touch-ups to its visual and mechanical fidelity, due to newer technology at developers' disposal. Aside from these updates, remasters leave most of the base game intact” (Sauve 2020).

I selected this version of the game because it was easy to get a hold of, and it made the task of recording gameplay while performing analytical play easy as well. This version has the original version of the game built into it, and lets the player switch between the original version and the remastered version by the press of a single button. I chose to use the original version in order to hear the original soundtrack, and thus analyse and understand how iMuse adapted the music to the different scenes in the game. Although the game has been remastered, the creators have preserved the soundtrack and compositions. It seems the remastered soundtrack is mimicking the sonic representations from the original 90s-soundtrack, projected through something in between a Roland MT-32 and an AdLib. This is quite interesting, seeing as the creators could have re-composed and re-recorded the soundtrack with non-digital instruments. I believe they kept the soundtrack as it was in the special edition version, in order to preserve some of the nostalgia from the original game. Underneath you can see a visual comparison (figure 2.) of the difference between the original version (on the right side) released in 1991, and the special edition (on the left side) released in 2010. The sonic alterations are similarly contrasting.



Figure 2. (IMDb a 2022).

After playing through the whole game I chose to focus on one specific area, to show some examples of how iMuse was used to create a more lively world for the player to explore. The first area players wander into is called Woodtick. It is the major hub of the first part of the game, and the players spend a large amount of time there, which makes it a rather important part of the game. From the creators point of view, it is essential to seize the players interest from the first second of the game, in order to keep them playing. At the time this game was released the technology of adaptive music was young. Therefore it became very noticeable that the music continued playing at the same time as the sound effects were triggered. In figure 3. you see an overview of the different locations in Woodtick, which I visited during the analytical play. I have transcribed the music from the analytical playthrough into a score, where each section in the score is named after the locations in the town of Woodtick (see attachment 1 for complete score).

Locations



Figure 3.

4.5.5 Playthrough and characters

As I have already mentioned, the player arrives in the hub Woodtick when starting the game. It serves as a portal to the different locations in town. I chose my second location to be the Cartographer's Hut. The cartographer is named Wally. B. Feed, and he plays one of the major parts later in the game. At this early stage you have to steal his monocle to make progress in the game, which always made me feel bad since he is such a lovely character. The third place we visit is the Woodtick Woodshop, home to Woody the Woodsmith. Woody provides you with a pack of nails, a hammer and some wood polish, but does not serve the story much after this. However, you can learn the answer to the famous children's tongue twister "*How much wood could a woodchuck chuck?*" from him. For our fourth location I chose The Bloody Lip Bar & Grill, the workplace of the pleasant and law abiding character accurately named Barkeeper and his not so pleasant cook, Bernard. The place gives off old-time vibes, as Barkeeper uses his own spit to clean mugs and glasses, not considering today's hygiene standards. The location with the most characters in it is the fifth one, the Woodtick Laundry. It houses four different characters: the almost blind laundry shop owner Mad Marty, the three pirates Frank, Fin and Fred, as well as their rat Muenster Monster. For those of you that have played the first instalment in the Monkey Island series, you might remember Frank, Fin and Fred from the first game on Melee Island, where they explain how their circus went under because Muenster scared away their elephant. The sixth and last location from this playthrough is the Swamp Rot Inn, which is run by Innkeeper, together with his pet alligator Pegbiter. With the Innkeeper having a pegleg, we can imagine how the pet alligator got its name.

4.5.6 How does *Monkey Island 2: LeChuck's Revenge* use adaptive music?

During the next pages, I will guide you through the transitions and use of different instruments the composers chose to differentiate the locations in the town of Woodtick. I urge you to look at the provided score while watching and listening to the video captured during my analytical play. A link to the video can be found under attachments (attachment 2). This may help you understand both the transitions and the composer's choices. The score is an arrangement from the footage captured during my analytic play session.



Screenshot of the score (full score is attached).

When I entered Woodtick for the first time, the music kicked in right away. The most prominent sound of the piece is the bass presenting a rhythmic pattern with two staccato notes before ending on one legato note, before continuing in the same rhythmic pattern. An instrument that sounds like an organ or a piano plays chords on the offbeat, and we hear what sonically resembles a kick drum. Beneath these, there is a string instrument, which is either a lightly played banjo or mandolin. At first I thought this element was a piano as the instruments in old games do not always sound like the instrument they are trying to portray. The last element in this composition is bongo drums. This is the full arrangement for this location, and the simplicity of the piece cleverly helps the transitioning between the different variations of the piece. Not only that, but the modesty of the Woodtick theme enhances the variations and traits of the sub areas, and makes them stick out.

In the transitioning from Woodtick to the Cartographer's Hut, a violin is responsible for the change in music. After the transition, the music quickly shifts to a melody played on a harp or a violin playing pizzicato style. However, as mentioned in the previous section, it is difficult to guess what the composers wanted the instruments to sound like, and it could easily try to resemble a banjo or a mandolin. There is also what sounds like a double bass being bowed to create some weight on the beats. Furthermore, we can hear the organ play the offbeats as the first location's piano, as well as keeping key and time. In doing this, we apprehend the piece as a

prolonging of the music from location 1, with changes in melody and instruments, but yet as part of the same musical piece. The music at the cartographer has a much calmer feel and more mellow sounding, something which seems perfect for a place where one needs to concentrate when working. When reentering Woodtick, we hear the transition back to the Woodtick theme. It is simple but very effective. As you can see in bar 12, it finishes the phrase started off in the previous location's theme. The music then precedes for about one or two bars before we hear two hits on a couple of floor toms on the last beat of the phrase. Thus, we are introduced to the Woodtick theme once again.

After a short time spent in Woodtick, we ventured into our third location, the Woodtick Woodshop. I find this one particularly interesting as it has some unusual musical elements to it. Walking into the woodshop we are met with the same transition played walking into the cartographer's hut. Thereafter we hear a theme resembling the one from the cartographer's hut, played by a clarinet or maybe even its a cor anglais? The similarities to the theme from location three are many, in sound and tonal choice, but it is more energetic. This could mirror the activity in the woodshop, as Woody is working on something as we enter. An element is kept from the Woodtick theme in this piece as well: the bass. Even though the vibe is a bit more energetic in the woodshop, the main rhythm is kept and added upon. On top of the bass are some lightly played broken chords on violin in pizzicato style, while the drums are hard hitting in their groove. I believe that the focus on rhythmic instruments in the woodshop is no coincidence. In addition to the instruments, there are tools being used to add rhythm elements, which is perfect in a woodshop. A hammer hitting nails and a saw working its way through wood to be more specific. You can see in the score during the section named 3. Woodtick Woodshop that I have added the saw and the hammer under the rhythm section, as they are part of the rhythm section during this variant of the theme. After leaving Woody to his work, we get the same kind of transition to the Woodtick theme as we did from the cartographers place: Two bars are played before the two tom hits on the last beat of the second bar, but the melody of the woodshop ends off in the third bar this time to create the smooth transition to the Woodtick theme.

Walking into our third location, The Bloody Lip Bar & Grill we are greeted with the same transitions as we are for the other locations. This time around our melody instrument is a very

midi-sounding saxophone or a trombone. I believe one of these was chosen to give it that smokey jazz bar feeling, seeing as later in the game there is a monkey playing jazz piano in the very same bar. A busy rhythm is joining us when walking into the bar making it feel rather rowdy. Adding to the rowdiness is the sound of the barkeeper's questionable washing of the glasses, which is indicated by a loud squeaking sound that stands out like a sore thumb, not being either in the same key or rhythm as the rest of the piece. The element that continues from the Woodticks theme and into this one, is once again the organ playing on the off-beat. The organ also joins in with the melody towards the climax of the piece, to help build momentum in the transition when leaving the Bloody Lip Bar & Grill. Even if we walk out of the bar before the melody ends, the programmers let the piece finish before introducing the Woodtick theme again, giving the player a feeling of closure. This is done with some longer notes played on the trombone together with the organ. Layered on top is a rather hectic drum fill, followed by our famous two tom hits on the last beat of the fourth bar, which brings us back to the Woodtick theme.

As to be expected, we are once again greeted with the same transition as in the other locations, while walking into the Woodtick Laundry. Here the violins take the place of the organ from the Woodtick theme, making a smooth transition into the Woodtick Laundry variation in pizzicato style. We are now introduced to a trumpet playing the melody. Beneath the trumpet, there is a simple bass paired with a mellow snare rhythm played with brushes to make it sound tranquil. The violins continuing from the Woodtick theme are quite vague in this piece, but it serves its purpose of tying the two places together. I think the reason for the instrumentation in this piece, is that there are pirates sleeping in the Laundry. The trumpet has a round and warm sound, paired with the easy going bass and calm rhythm of the whisky snare and the pizzicato violins on the offbeats. I think the music aids in painting the scene of what we are experiencing at the Woodtick laundry and the characters present. Our walking out of the Woodtick laundry sets off the genius and well known transition. The music uses two bars to round up the melody line already started, and at the last beat of the second bar the two tom hits show us the way back to the Woodtick theme.

The last and final of the six locations is the Swamp Rot Inn. The same transition used for the other four locations brings us there. Taking the spotlight at the end of this transition is a pan flute playing in the lower register, providing an airy feeling. Compared to the other locations, the pan flute stands in contrast to what is happening on screen. On one side we see the Innkeeper working at a high tempo, sorting paper with no signs of slowing down. On the other side we see his pet alligator Pegbiter sleeping, which might be what the pan flute represents. The other instruments could represent the Innkeeper. The bass and drums create a busy rhythm section giving us a sense of urgency whilst we stand in the stairs of the Inn. The element kept from the Woodtick theme is the off-beat piano, here replaced by an organ, which is put far back in the soundscape. At this point we know what is happening as we walk out of the Swamp Root inn: The theme of this location gets a couple of bars to finish off before it is interrupted by our famous two tom hits, which leads us back into our good, old Woodtick theme.

Discernible in the playthrough description, is one main use of adaptive music in *Monkey island 2 LeChuck's Revenge*, and that is the transitions that create a seamless experience. The use of iMuse only works as well as it does because of the compositions: The composer(s) have chosen to make music with the same tonality, similar rhythms, and kept some musical elements from one location to the other, which creates a holistic experience for the player throughout the game.

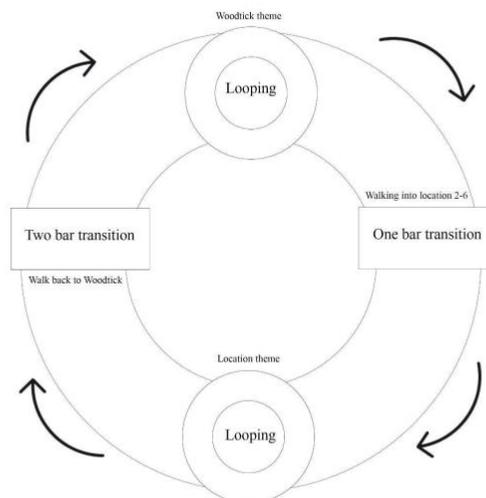


Figure 4.

The iMuse system is interactive and it adapts to the player's choices. Figure 4 illustrates how the music is adapted to the different scenes in *Monkey Island 2 LeChuck's Revenge*. The Woodtick theme loops and acts as our main theme which we return to in between the other locations in the game. When moving from the Woodtick area and into a new location, there is a one bar transition into the new variation of the theme. This new theme variation then loops until the player decides to return to the Woodtick area. This happens through a two or four bar transition, giving the theme of the new variation a chance to “end”, and transition into the Woodtick theme again. The music is programmed to tie all loose ends before moving on to another theme. These transitions were created to make the experience more seamless and realistic, and with them, iMuse hides that the game is loading a new location visually.

An analytical play session will never be the same sonically, because the analyst will most likely never make the same decisions at the same time when playing the game again. As mentioned earlier, Summers agrees that the player somewhat becomes a co-author (McAlpine, 2017). In *Monkey Island* we can understand this concerning the music and the unravelling of the story, because the player chooses when to move on from one location to the next, and the player is not forced to follow a given path. Peter McConnel, one of the creators of iMuse explain it as follows:

So, our metaphor was a pit orchestra. I played in a pit orchestra in high school for musicals, and there's a score that everyone's reading in the pit orchestra, but the conductor's always looking over his shoulder to see what's going on on the stage. And, every so often, it'll be like, “OK, measure 32.” It's usually not that dramatic, but the tempo, whether or not to take a repeat, all those kind of things, those are judgments that the conductor makes based on what's going on on stage, and show music has little pieces that can play while they're waiting for something to happen, like a curtain call or something like that. (McConnel on Mackey 2016, p.2).

4.5.7 Communication through soundscape

Video games are crammed with sound effects for every minute action the player undertakes in the game, such as opening doors, picking up items, completing quests, and so on. In addition to

the sound effects, there is often a soundtrack that backs up the narrative. Which brings me back to one of my main questions in this thesis: Now that video games are a part of the consumer market and a normal addition to most homes, is the music and sound descriptive enough to understand what happens in games without the visuals being present? I would claim that ludomusicliteracy is possible to achieve in *Monkey Island 2 LeChuck's Revenge?*

Again I argue here the case for ludomusicliteracy. As we can see from the score of Woodtick and its five other locations, there are characteristics that give us clues as to what type of environment we are in. First of all there is the main theme of Woodtick. It is easily recognizable, and every time we exit one of the other locations in the game, we are presented with it. The themes of the other locations in Woodtick are all variations of the same composition. There are changes in voices, instruments and melodies, but there is a strong foundation that the melodies build upon. Furthermore, the transitions from Woodtick to the other locations have been cleverly produced. By using an element from the main theme Woodtick and adding it to the theme we are entering, it enhances the smooth transition provided by the iMuse system. The compositional design is without doubt a big part of what also makes this possible, and the way Land, McConnel and Bajakian have composed the pieces to transition into one another without fail is an extraordinary feat, and was not seen before at the time. It was groundbreaking given the technology back then, and it set a new standard. This was the power of the iMuse system, but more importantly the power of adaptive music and just the start of what it had to offer.

4.6 Sid Meier's Civilization VI

4.6.1 The Creator

Sid Meier's Civilization VI is, as the title suggests, the sixth game in a series that originally started out in 1991 with a game simply titled, *Sid Meier's Civilization* (MicroPro, 1991). The other four games were released in 1996 (MicroPro), 2001 (Infogrames Interactive), 2005 (2K) 2002-2013 and 2010 (2K), followed by the one up for discussion, *Sid Meier's Civilization VI* (2K), released in 2016. These games are often referred to by the shorter name of Civ and I will refer to them as the same throughout this section as well. There were other games that were not

part of the main lineup, often referred to as side games. Some better known are *Colonization* (MicroProse, 1994), *Civilization Revolution* (2K, 2008), *Civilization Beyond Earth* (2K, 2014) and *Civilization Revolution 2* (2K, 2015).



Sid Meier, the creator of the Civilization series (Ars Technica 2019).

The mastermind behind these games is the now legendary, Sid Meier. Meier started off in the world of game development in 1982 forming the company MicroProse together with Bill Stealy. In the beginning they focused on flight simulators and military strategy software, but got inspired and saw the success of what is known as God games, such as *SimCity* (Maxis, 1989) and *Populus* (Electronic Arts, 1989).

A God game is explained in the Next Generation Magazine. Issue number 15 by Imagine Media.

God games, a sub-genre of strategy games in which you run a civilization or small tribe, often with the tribe represented by tiny, on-screen animated people. The prototypical god game is *Populous*, although the definition has been stretched to include titles like *SimCity*. Usually the perspective is isometric or overhead. (Imagine Media 1996, p.34).

Meier, motivated by these types of games, set out to create something that was along the same lines (Gamespot 2011). One of the main inspirations was that these games were a demonstration that games didn't have to be about destruction all the time. Together with the newly hired Bruce Shelley who was a former board game creator from Avalon Hill, they set out to create something

different. Meier drew inspiration from the boardgame Risk, as well as the city management in the turn-based wargame *Empire* (New World Computing 1977) by Walter Bright (Edwards 2007). After some revisions of their prototype, Meier and Shelly presented it to the rest of the company. The team approved and continued their work, which led them to the release of the original *Sid Meier's Civilization* in september of 1991. Prior to the release, the team had decided to call the game Civilization. However, before the game was released, they learned that there was a board game with the same name. Luckily MicroProse were able to come to an agreement with Tresham to gain a licence for the name from Avalon Hill. They decided to add Meier's name to the title to both distinguish it from Tresham's board game of the same name, as well as diverge Civ from MicroProse's combat simulators. Another reason for adding Meier's name was that he had created other popular games. By adding his name to the new one, they could pique interest in people who had played the old ones. It was a proven success, therefore Meier kept using his name as a part of the series branding (Molus 1992, p.48).

Christopher Tin is known for being a part of the roster of composers working on both Civ IV and VI. Considering the focus of this thesis is the music, I thought it noteworthy that one of the greatest achievements was in relation to the release of Civ IV, when Tin's score Baba Yetu feat. Soweto Gospel Choir for Civ IV soundtrack, was awarded a Grammy (Grammy 2022). This made it the first piece of music from a video game to win a Grammy award. This achievement aided video game music in being considered a serious force to be reckoned with in the world of music.



Christopher Tin, Composer (Grammy 2022).

4.6.2 The game

The main plot of the game is to create a nation from scratch and build yourself an empire. You do this by continuously expanding your borders, building mines, farms, universities, hospitals and other buildings needed in a growing community. When exploring your borders you meet other nations. Here the real challenge is revealed. Politics is a big part of how you play the game, and you are able to either befriend other nations or go to war. If you decide to befriend them, you create a friendship with donations, creating trading routes and free passing through your empire. However, should you decide to go to war, not only will you fight the opposing nation, but you must keep your peoples' morale high as well. When building your empire, you must make sure there is enough food and wealth, or else your empire might slowly decay. One must think thoroughly through the options, and be aware of making hasty decisions. Too quick, and your nation could get wiped from the face of the earth. The game is built on a turn-based system, which is the system used in most board games. As the name suggests all the players take turns in commanding their settlers, builders and armies.

4.6.3 Applying Ludomusicliteracy to *Sid Meier's Civilization VI*

One can argue that the music in Civ is merely background music in comparison to the music in Monkey Island. The soundtrack is created to grow with the advancements of the player. However, a round of Civ can last from everything between two hours to days, depending on the number of nations, size of the map and the difficulty level chosen. This means that the compositions must be able to loop for hours on end, only interrupted by either sound effects or battle music. In turn this means that it needs to be well composed, without seizing too much attention. My main inquiry while investigating this game's music, is to see how the composers have solved the evolution of a nation's eras through music, without disrupting the players immersion. If we look at our own history, music has grown through time together with our inventions and life changing research. Have the composers considered the evolution of music in the process of writing the music for the game? The music also needs to change in a subtle way so

that the player notices the change, but is still immersed in the game. How did the composers solve this through composition and implementation of the music in the game?

Another issue I have been curious to consider deals with historical accuracy. After all, we play a game that is based on history, real life location names, people and inventions. Throughout a game of Civ if you don't either lose or win before going through the game you will go through nine different eras. I will only focus on the four that do have original arrangements that belong to them. These are the ancient era set from 4000 BCE to 1000 BCE, then evolving to the mediaeval era set in 500 to 1350, then we come to the industrial era that happens in 1725 to 1890 and finally ending up at the atomic era going from 1945 to 1945. I am also eager to see if these eras correspond with our own.

4.6.4 Analytical play

The game version used for this analytical play was the *Sid Meier's Civilization VI Anthology* (2K, 2021) version. It includes the original version released back in 2016 as well as seventeen DLC's. Earlier they were referred to as expansions, which were content made for the game after its release, that you could install to make the game add it into the original version. These days it is referred to as DLC's as games are transferring from physical to digital pretty form at a rapid pace. DLC's as it stands for downloadable content, which effectively makes them digital expansions.

In the game, the player has to choose a nation to control while playing a game of Civ. For this playthrough I chose Norway based on a set of predetermined criteria: I wanted a nation with a rich music history that had existed since the mediaeval era, and progressed according to the four eras portrayed in the game. The game is set as far back as the ancient era, and spans beyond our own time until the atomic era. This means it dates back to before Norway was an official country. However, humans have been inhabiting the land since 1800 BCE. Part of the reason why I choose to play as Norway during my analytical play, is that I want to know more about the musical history of the country I live in and this seemed like a great opportunity to do just that.

The first image that is introduced to the player, is a group of people on an empty map, waiting for orders. The game then suggested some spots to settle and build the first town of Norway, which ended up being Nidaros. Note that the game chooses names for both the places you build and discover, as well as the co-nations of the game. This means the map will most likely not resemble any map you have seen before. After building Nidaros, I chose to explore the map in the northern direction to build my second town, given the name Tromsø. As I build the city of Tromsø, the map exposes what lies to the north east. My first alliance is with France. I chose to be a friendly neighbour, and rather than invading them, I explored the shores instead. As I move through the different eras I build some new cities, Sarpsborg, Trondheim and Oslo. I even take a neutral city by force, and at this point everything goes wrong. During the game so far, I have discovered four more nations. To the South east of Norway I find South-Korea, and on another continent Kabul (representing Afghanistan), China and Persia are located next to each other. As I take the neutral city, France feels like Tromsø is not pretty enough to be close to their border, therefore they declare war. I disagree with their reasoning, and choose to fight back. This all takes place in the Mediaeval era. I am able to protect Tromsø, and attack some of their cities in return. This makes France ask for peace and I accept it. Continuing the game, I keep taking over neutral towns, which leads to the other countries wanting nothing to do with me. South-Korea breaks up our union and France declares war against me three more times during the game. Except for understanding that I should never be the leader of a nation, as the whole nation would go down in a matter of hours, I made some exciting discoveries of how the music is used around the map, during the evolution through the game and throughout the more calm periods of the game. While playing the game I had some concerns regarding the historical accuracy of the music. The developers took great liberties allowing almost silly placement of countries, which made me think that their attentiveness might have been limited when composing the music for the different eras. The game created stereotypes that play on the history of the country, as well as the history of the character chosen to represent the country. But it is just that, a stereotype of what is often used to represent the countries based on normality. Thomas Hylland Eriksen (normalitet 2006, p.15) explains that the term normality is created to easily recognize a person or a group of people. In Civ VI the creators have used stereotypes sonically, in order for the player to easily understand where they are located at any given moment.



Starting point when playing *Sid Meier's Civilization VI* (2K, 2016).

4.6.5 Music in the game

While I anticipated that the theme of the nation would play the majority of the time, I noticed that the game makes use of a lot of ambience as well. Ambience is described by Lexico as “The character and atmosphere of a place” (*Lexico*, s.v. “Ambience,” 15th of April 2022), while ambient music is “a form of instrumental music that accentuates texture, tone, mood, and atmosphere. It does not contain the formal melodies or steady rhythms found in most popular music, opting instead to craft ambience from waves of aural textures” (Masterclass Staff 2022). With these two definitions in mind, I understand that the creators of Civ VI chose to use ambience to break up the nation's theme. Considering the game is based on making tactical decisions and critical thinking, other types of music could end up requiring another level of concentration from the player. The nation's theme is not only disrupted by ambience, but also smaller themes from other nations. If the player ventures close to another nation, instruments different from those in their nation's theme will play, to alert them that they are closing in on someone else's border. Other interruptions from your chosen nation's theme is ambience from humans, wildlife, cities, construction and other nations around the map. Depending on where the cursor is, we can hear ambience from all mentioned above, either with a musical track going or by itself. Curiously enough, there is a lack of combat music, and the battles rely on sound effects to give the player a notion that something irregular is happening. These are some of the ways Civ VI uses adaptive music during gameplay. However, what I want to understand about the use of

adaptive music in Civ VI, is how the composer has created the different versions of the nation's theme to signal to the player that they have evolved into a new era.

4.6.6 How does Civilization VI employ adaptive music?

A fun fact about Civ VI is that it implements old folk songs from the real nations that are represented in the game. The same old folk songs evolve alongside the nation through all the four eras, making use of newer instruments as time passes. Several composers have been involved in the process of rearranging the pieces. Sissel Morgen Gullord arranged the Norwegian theme for the ancient and Roland Rizzo is responsible for arrangements accompanying the mediaeval era, the industrial and with help from Phill Boucher the atomic era (Civilization Fandom b 2022). The rearrangements are there to give the player a holistic experience of the advancement, both visually and sonically. It seems the composers have used a pattern when composing the themes for the different nations. For instance, the music that represents the ancient era is for most nations a single instrument, playing its piece freely. There is an extensive use of reverb, as to reflect the darkness surrounding the player, and the use of reverb on a single instrument makes the world feel vast and empty.

Arriving in the mediaeval era the singular instrument is changed out for a group of musicians, which reflects the advancements made in the nation. As the nation becomes more crowded, so does the music. It seems like in order for the music to evolve, your empire needs to expand. As the player moves into the industrial era, the theme expands again. This is the biggest leap in evolution we experience in the game. An example of this advancement is the change in tools: The mediaeval times allowed us to use swords and fire, while the industrial era presents us with an arsenal full of inventions like the lightbulb, the engine and guns. In the same manner, the music leaps from a small group of musicians performing folk music to a full symphonic orchestra performing a more elaborate piece. In the Atomic era, which is the last era we enter, the theme is still played by an orchestra, only now it has electronic elements, making it sound more like a pop song. The bass is often joined by a deep synth and as an addition to the percussion we hear an electronic drum kit in most of the themes. The use of electronic elements are used to different extents depending on the nations.

Norway's theme is based on the old Norwegian lullaby "Gjendines Bådnåt" (old Norwegian name), which was originally written by Edvard Grieg in 1891 (Tidsånd 2022). Many of you will notice a resemblance to the old Swedish lullaby called "Trollmors Vaggsång" written by Margin Holmberg and published in 1943, by the way the main melody moves.

Throughout the game, the piece centres around the main melody, which is performed on a goat horn. The goat horn is a wind instrument made from a hollowed goat's horn, with three to four finger holes used to change between different notes. As you can see in figure 5 the melody is moving quite little throughout the main melody. I speculate that the composers found a folk song that fit the use of a goat horn as it has a bit of a limited register.

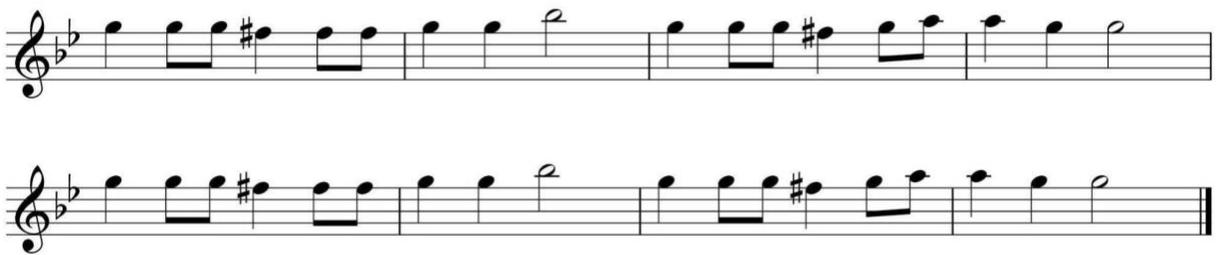


Figure 5.

Our first encounter with the goat's horn is in the ancient era. As mentioned earlier, the arrangement is stripped down to one single instrument at this point in the game, which supports the notion of starting with next to nothing. When you start playing you see a pack of settlers waiting for commands, with a tiny part of the map visible. There is a windlike ambiance in the background, that is until they chose the placement of the first city. When the city is built, the goat horn makes its sonic appearance for the first time. The choice of instrument here is a clever one, as the goathorn gives a warm, rounded sound that acts well with the visuals presented. Because of its subtle sound, it does not break the immersion of the game. Unfortunately, not all tracks in the game do this to the same extent. Scotland uses bagpipes as their main instrument, which in my opinion is too intrusive to listen to for several hours of gameplay. On one hand I understand the choice of instrument as it is very representative for Scotland, but on the other

hand it counteracted what I feel is its intent: which is to immerse the player into the era, nation and game. Luckily most of the nations do not have this problem, and follow the same recipe as described earlier: One instrument with a lot of reverb to reflect the vastness of the undiscovered map.

Once arriving in the mediaeval era, we are introduced to the first variation of the nation's theme. The goat horn is joined by other musicians: two cellos and a mandolin. This signals the population growing, and their ability to create and perform music. The piece starts with one of the cellos playing an interlude, quickly accompanied by the second cello and the mandolin. After the interlude, the newly introduced instruments play through the main melody once, before the goat horn makes its reappearance. This melody is repeated one time, before it transitions into a B section, which is a welcomed variation. I think the B section makes the piece easier to listen to in a longer period of time, and the piece in its entirety reflects what is happening in the game quite accurately: Not too many political and technological evolutions, yet something has changed.

In the Industrial era, we face the biggest change in the game. Not only progress wise, but also sonically speaking. The theme of our nation makes its biggest leap yet, as the small group of musicians are changed for a full symphony orchestra. We are introduced to the orchestra with horns and trombones, followed by strings and a harp in the interlude. The horns present our main melody with support from flutes, which climax with a percussional hit with hand cymbals and timpani. This marks the beginning of the piece. The main theme is played by the harp, supported by some mellow strings and flutes. As the piece moves forward, we hear a small cello passage, which acts as a bridge between two variations of the main theme. Then, the strings and horns play the main theme before the whole orchestra transitions us into a short passage of one bar. The one bar is a crescendo that climaxes in a hit using hand cymbals, timpani and tubas to mark the beginning of the main theme one last time. Furthermore, the whole orchestra joins in once again to finish off the main theme, before entering the B section. The B section consists of a tuba, timpani and snare arrangement which can remind you of a marching beat. After two bars the strings join in on the off-beat, and there is a sense of call and response between the instruments. At this point the horn section joins in with the main melody and the flutes unite with the aforementioned strings, which provides another level of expansion of the piece. With all

these elements present at the same time, it feels like the composer wanted to show the player the power of the full symphonic orchestra, and through it demonstrate the power of the industrial era. The next passage presented to the player is a flute performing the main theme over the sound of marching snares. At the end of this passage the whole orchestra joins, in one last crescendo. Making sure the transition between the end and beginning of the piece is not too abrupt, the main theme is repeated calmly on a piccolo flute, accompanied by a triangle. Other than introducing the symphonic orchestra, the most important change in music in the industrial era is the use of apex of interest and emotion. The way it varies dynamically is greater than what we have seen in the two previous arrangements of the theme. I understand this as a means to show the player the evolution of the nation through the music, with more sophisticated writing and arranging of the music.

At last we reach the Atomic era and the music has made a leap again. Electronic instruments are introduced, such as synths. The production has evolved as well, and you can hear the use of different types of samples throughout the arrangement. Other than these additions, the arrangement is nearly a repetition of the arrangement from the industrial era with some adjustments, and it is still based on the symphonic orchestra. Early on we hear that tubular bells and chimes have been added in the interlude. In the main theme the composer makes use of delay on the harp, which is now playing the melody one octave higher than in the industrial era. Further into the arrangement we are introduced to the first electronic element, which is a sample of a kick drum pattern and a snare with a marching beat. The snare drum has a synthetic sound, which informs us that they have not been recorded at the same time as the orchestra. The kick drum is combined with horns, which made me mistake it for a thick bass synth sound. As the arrangement continues, the strings play eights instead of fourths in what was the small cello passage in the industrial era. This figure in the cello continues underneath the main melody played by violins, and is perceived as a fresh addition to the piece. Once again the music builds up to a hit where the cymbals and horns are able to demonstrate their intensity.

Entering the B section of the piece, this time with the addition of tubular bells and a percussive sample with lots of reverb. The extensive use of reverb on the samples, is one of the elements that enhances the move towards a modern time. As heard throughout the whole arrangement, and

especially noticeable in the B section, is how the production expands the soundscape, compared to its industrial predecessor.

So far, there have only been smaller alterations in the arrangement compared to the industrial version. While the piece as we know it from the previous version ends, the new version representing the atomic era is prolonged with seven bars. In these seven bars the whole orchestra reenters, and the intensity rises and heads for a climax, before landing on a two bar ritardando. This gives it a Hollywood-esc finish. Although the Atomic era is followed by two other eras, this is the last era that has its own arrangement of the Norwegian theme. Therefore it has the responsibility to show the progress of the nation at its fullest. With the use of the apex of interest, the interchanging instruments performing the melody, the heavy use of percussion, and the increased focus on production, the arrangement remains compelling. The extensive use of dynamics builds tension and release during the composition, and through this arrangement and production the player can recognize the progress made in the history of the game.

4.6.7 Summary

Some of the questions I have dealt with from the outset of this section involve a consideration of why the game developer decided to ask the composers to arrange these four variations of the same theme? What effect does it have on the player? Is it helping with the immersion during gameplay? Is it to give the player feedback about the progress made in the game without the visual feedback? So far I have found that the answer is yes to the last two questions. I believe that the composers have chosen four similar, yet different arrangements for the eras to create a notion of evolution in a holistic manner. Furthermore, I think the player experiences the game as more enjoyable, because the arranged music immerses them deeper into the game in a subtle way.

The music is adaptive in the way that the player chooses to make progress through the different eras of the game. While the player explores the map, the music changes as the nation progresses through the times. This way, the player does not have to stay at the earlier settlements, but is free to roam new areas, gaining feedback about progression through the music. Should the player

want visual feedback in addition to the music, they can zoom in on their settlements at any time to inspect the architectural progress made, as seen in figure 6.



Figure 6 (2K, 2016).

Another question I set out to answer was the notion of historical accuracy: Is the music historically accurate? Is the instrumentation used connected to the eras they are introduced in? Or have the developers and composers taken a bit of artistic liberty with the soundtrack? I will not discuss the historical accuracy of the other aspects of this game.

Mentioned earlier, this game takes us through nine eras. However, the musical changes are connected to the four eras discussed above. The four eras I talk about are the ancient era, set to be from 4000 BC to 1000 BC, the mediaeval era, set to be from 500 to 1350, the industrial era, set to be from 1725 to 1890, and at last the atomic era, set to be from 1945 to 1995.

The first thing I investigated was if the eras coincided with our own. Based on the definition of an era given by Britannica (*Britannica*, s.v. “Era.” 11th of April 2018) which states: “Era, a very long span of geologic time; in formal usage, the second longest portion of geological time (eons are the longest).”, there are a total of ten eras that are recognized by the International Union of Geological Science (IUGS), with the shortest being the Cenozoic era lasting around 66 million years. None of the eras that are used in the game are mentioned in the chart provided by the IUGS, and none of them lasts even remotely close to what the eras provided in the chart do.

Therefore, we can without a doubt say that the game has not followed real world eras when creating the ones used in the game.

Even though the game has not been true to the progress of eras in real life, I was still curious to investigate the probability of correct use of instrumentation throughout the eras in the game. I chose the ancient era as my subject for investigation, which consists of the goat horn in the Norwegian theme. As mentioned earlier, the goat horn performs the piece solo, with a lot of reverb. Now, the reverb could easily be thought of as a large space that the goat horn is performed in. Sadly, the goat horn like the one we hear in the composition was not present as an instrument in the period between 4000 BCE and 1000 BCE. It was first introduced as an instrument in circa between the year 800 and 850 and was more used as a means of signalling before that (Nyhus & Aksdal 1993, p.42-44). It is worth mentioning, because the goat horn used in Norway's theme has blow holes. If the goat horn used for the piece was without the blow holes, it would have fitted the time it represented in the game, as that iteration of the goat horn was said to be from the stone age. This tells us that the composers have taken some liberties when creating the soundtrack for *Sid Meier's Civilization VI*. It's worth noting that although the creators haven't stayed entirely authentic in regards to instrumentation for the different eras, they have applied direct intertextuality throughout the game. They have used musical pieces that belong to the nations they represent, as well as stereotypical instruments, meaning instruments that are often associated with set nations.

I am quite content with my overall experience playing the game, and felt like the music changed according to the progress in time. I am glad they chose to diverge from reality when composing the pieces. I am also pleased with the fact that they rearranged old folk songs from the respective nations represented in the game, using instruments with origins from the nations.

5. In-Game Composing and Performance

5.1 Introduction

My main objective in this section is to discuss why music is employed as a game mechanic. By game mechanics I am referring to the rules and feedback that intends to produce enjoyable gameplay, which is in-game composing and performance in the games I chose for this thesis. Throughout this research I turn to various methods such as audiovisuality, as well as intertextuality. In certain games the player is afforded total freedom to compose original music, and to use music as a sense of progression. What I seek to comprehend is if it is beneficial for the player to develop stronger bonds with the game itself, its world, the story, the music and so on. What are the reasons for using music as a game mechanic? Will the player, when presented with a fully functioning instrument, attempt to learn and explore its possibilities, or would they rather focus on the story of the game? Why have they chosen to use an instrument to perform magic, rather than something familiar, like a wand? Isn't it more of a hindrance for the player to have to perform a melody to activate specific actions in the game? Before addressing these questions, one needs to grasp how music functions as a game mechanic, rather than a soundtrack in the background. One way to explain this is that the game uses music in an interactive way to drive the gameplay forward. There are mainly two different examples of this phenomenon.

The first and most famous example I will present is the rhythm game. It comes in many different shapes and forms, such as the widely international hits *Guitar Hero* (Harmonix, 2005) and *Rock Band* (Harmonix, 2007). These are games that have created a simplistic way for the player to fulfil their lifelong dream of being a rock star. The games are based around performing songs on a guitar. There are notes coming at the player on the screen that pass over a set of circles. Here the player is expected to strum and hit the circle at the same time as the note passes through it. This is done on a guitar shaped controller by pressing down buttons on the neck of the guitar that simulate the frets and simultaneously push down the "strum button" at the right moment to hit the note. The games sign licence deals with labels and artists to use their songs in the games, and sometimes they even make special versions of the games that centre around a band or an artist such as *Rock Band Beatles* (Harmonix, 2009), *Guitar Hero Aerosmith* (Neversoft, 2008), *Guitar*

Hero Metallica (Neversoft, 2009) and *Rock Band Greenday* (Harmonix, 2010). *Guitar Hero* as a series has sold over 40 million copies (last updated the 16th of October 2019) (VGS 2021), which makes us understand what an advantage it is for artists to sign their rights off to *Guitar Hero* in order to gain massive exposure, as well as a huge economic benefit. There are players of the game that have found their favourite artists and bands through the series, myself included, discovering bands such as Rage Against the Machine, Pearl Jam, Dream Theater and many more.

Another notable rhythm game is *Dance Dance Revolution* (Konami, 1998). It started out as an arcade game released in Japan in 1998 by Konami, and to the rest of the world in 1999. The arcade version got updated machines through the years, and home versions started to gain popularity. The home versions are controlled by either a specialised gamepad or a mat made for the game. Even a home version of the arcade machine is sold to real enthusiasts.



Dance Dance Revolution at home (Amazon 2022) (Consolevariations 2022).

The core gameplay involves the player stepping their feet to correspond with the arrows that appear on the screen and the beat. During normal gameplay, arrows scroll upwards from the bottom of the screen and pass over a set of stationary arrows near the top (referred to as the "guide arrows" or "receptors", officially known as the Step Zone). When the scrolling arrows overlap the stationary ones, the player must step on the corresponding arrows on the dance platform, and the player is given a score for their accuracy of every streaked note (From highest to lowest: Perfect, Great, Good, Boo and Miss (Chmielowiec 2022)).

The second example, and the one I will discuss throughout the rest of this section, is the story-based games that heavily rely on music as a mechanic during the game. The player is provided with a full set of notes that can either be performed in a pattern created by the developer, or used

freely to compose or perform whatever they like. This type of game chooses to focus mostly on the story aspect of the game, and spends a lot of time building the story in order to capture the players interest, and make them invested in the world created. Even if the music takes a back seat to the story, it serves a critical role to the progression of the story. An example of a game that allows for this is *Goetia* (Square Enix, 2016). It is a dark atmospheric story driven game that is filled with puzzles. During the game the player enters a room with a piano on the far right with a page from “La Nocturne”. When they press the piano they are presented with one octave range worth of the piano. The game lets them play around with it as much as they like, with a few limitations. The first of the limitations is that the player is interrupted from playing the piano if they solve the puzzle. The second limitation is that the player can only play single notes, not chords. Even if the game doesn’t use music in its puzzle throughout the whole game, the player needs to solve the piano puzzle in order to progress and finish the game. While the player moves around the mansion the game is set in, they collect clues for different puzzles, the same goes for the piano puzzle. The player finds two notes that correspond with the piano puzzle. The first one reading 1-DAF# and the second reading 2-CBB. For a musician this would seem rather easy to solve, but not for the everyday gamer. The solution ends up being DAF#CBB, played in that order. As long as you don’t play that pattern on the piano, you are able to freely compose single note melodies using the in-game piano of *Goetia*.

Another game series that uses music as a game mechanic is *The Legend of Zelda*. Throughout the series several of the games have used music either as a big part of the story, like in *The Legend of Zelda: Link’s Awakening* (Nintendo, 1993), or as a tool to control different aspects of the world we play in, like in *The Legend of Zelda: Wind Waker* (Nintendo, 2002). *The Legend of Zelda: Link’s Awakening* uses music as a mechanic to teleport around the map. This is done by selecting one of three pieces of music that sends the player to one of three locations. It also uses music or rather musical instruments as a part of the story. In order to fulfil the main quest of the game, the player has to traverse through eight dungeons and collect the eight instruments hidden there. The player needs these instruments to perform a piece to wake up the Windfish. In *The Legend of Zelda: Wind Waker*, the developers have used music as a game mechanic that is slightly similar to the mechanism I want to investigate further. In this game, music is used to teleport around the map, and make time pass from day to night and vice versa, as well as change

the direction of the wind. This comes in handy as your main method of transportation throughout the game is by sailboat, controlled by the use of a magical conductor's baton. The system allows the player to perform three, four or six beat melodies and it has a register that consists of five different notes. Even if the player is able to change the tempo of the performance, it's still a rather limited system that doesn't allow for the musical freedom I am looking for in games. A game that does allow more musical freedom is *The Legend of Zelda: Majora's Mask* (Nintendo, 2000). It is similar in many ways to one of the games I will discuss during my case studies, therefore I won't break into too much detail. The way the game uses music as a game mechanic is through making the player perform short melodies. Throughout the game you can transform between four races of species using magical masks. They use different instruments to perform the melodies that are needed to make progress in the game. Your Hylian form, which is when you are not wearing any masks, uses an ocarina flute to perform these melodies. The Deku form performs the pieces using a set of brass horn looking instruments. When using the Goron mask the player uses a set of djembe looking drums in different sizes, and at last when the Zora mask is equipped the player now uses a guitar shaped instrument made out of fish bones. See figure 7 for visual representation made using official artwork.



Figure 7 .(Nintendo, 2000).

Even though the main use of music as a game mechanic in *The Legend of Zelda: Majora's Mask* is similar to the other games in the way it is used: as a means of transportation, travelling through time, changing weather, calling for your horse etc, it is the sense of musical freedom presented for the player in this game I want to research. In this game the player is presented with four fully

operational instruments. The player can use them freely, as long as they do not play any of the patterns of the twelve melodies used for performing actions. The registers range from B3 to F5 (excluding the sharp and flat notes).

5.2 History and development of in-game composition

Some games use music as a mechanic throughout the entire game. An example of this is *Otocky* (ASCII, 1987), where different notes are played when the player fires bullets in different directions. A modern counterpart is the *Sly the Raccoon* series (Sucker Punch and Sanzaru Games, 2002-2013). When you sneak past or nearby an enemy, a bassline plays with every step you take. Some games feature instruments as part of the visuals, but are set to do one limited task, such as in *Super Mario Bros. 3* (Nintendo, 1988). Here a flute is used to travel through worlds. There has even surfaced a multiplayer RPG game called *AereA* (Triangle Studios, 2017), where the characters and enemies are based on instruments. Some of the characters are the Cello knight, the Lut Mage, the Trumpet gunner and the Harp archer. These are a few ways music is featured or presented in games, without the player having creative freedom or control to compose and perform music.

The main theme of this thesis concerns games that use music as a game mechanic that allows the player to have creative control. One of the first games to feature music as a mechanic in this way is *Loom* (Lucasfilm Games 1990). It introduced a simple system that allowed the player to perform magic spells using a combination of musical notes performed on a staff, where different keyboard keys corresponded with different musical notes (see figure 8.). It presented the player with a full C-major scale, which seems a bit limited compared to *The Legend of Zelda: Majora's Mask*. However, the sheer musical freedom given to the player in *Loom* was in many ways revolutionary at the time of its release. Many seemed to like the idea of using music as a central mechanic to build the story and games inspired by the premise became increasingly more common to find.

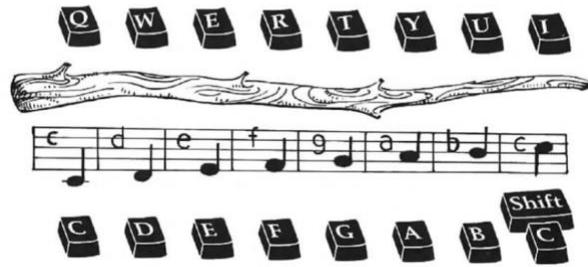


Figure 8. (Mark 1990, p.8).

Developers embraced the idea of music as a mechanic in games, and in 1998 Nintendo released the behemoth that is *The Legend of Zelda: Ocarina of Time* for Nintendo 64. The game became the epitome of using music as a game mechanic with its popularisation of the odd flute instrument known as the ocarina. It ended up receiving scores like 99 out of a 100 by Metacritic (Metacritic 2022) and 10/10 “MASTERPIECE” by IGN (Schneider 2021), and sold over 7 million copies (Carter 2005). The console it was released for sold around 32 million units, which tells us that just about a fifth of the console owners bought the game. These numbers tell us that using music as a game mechanic was a popular addition to the world of video games.

Briefly after the success of *The Legend of Zelda: Ocarina of Time*, several other games using music as a game mechanic were released. One of the games drawing inspiration from this use of music is *Wandersong* (Dumb and Fat Games 2018). It was developed and released by Greg Lobanov in 2018, and is a musical platforming adventure game. The storytelling is central and has emotional depth. The game is about a bard being asked to save the world by learning the Earthsong. This is done by travelling around the world and learning pieces from the song by characters named the Overseers. The story develops quickly in a dramatic manner. During the game the bard works as a wandering instrument and the way the bard performs songs is through singing. Instead of giving the player a scale which you choose notes from, like in *Loom*, the game has a simplistic approach to teaching music, and the player can easily recognize notes using a visual aid which is a coloured circle (see figure 9.). This makes the game easy for anyone to pick up and play, without needing any prior musical knowledge. Below you can see which

colours correspond to what notes, and you'll notice the register spans from C to C. This is similar to the register provided to the player in *Loom*.



Figure 9. (Dumb and Fat Games, 2018).

The developer of the game, Greg Lobanov, confirmed that the inspiration behind the musical system in the game is indeed drawn from the all time classic, *The Legend of Zelda: Ocarina of Time* (Greg Lobanov, personal correspondence by email, 9th of March 2022). The musical freedom is similar to what we experience when playing *Loom*, as the tonal register is the same. What differs is the way it is produced. In *Loom* the player produces melodies via a magical staff, while in *Wandersong* it is simply sung by the bard. The rhythmical freedom is greater in *Wandersong*, as the time it takes to play a note in *Loom* is longer.

5.3 Functionality with in-game composition or in-game performance

In a sense one can say that all games feature a form of in-game composition or in-game arranging. This is because with the press of a button or the push of a joystick the player moves the character from one sonic landscape to another. For example, in the core *Pokémon* games (Game Freak, The Pokémon Company, Nintendo. 1996-present), where the player can move from one screen to another, which in turn changes the music. This is because these areas have their own music. Another example would be when the player enters a battle with an NPC (non

playable character). The NPC first notices the player when they walk into their field of sight, which triggers the pre-battle music. The time of the interaction is chosen and controlled by the player. It might be that the player has to fight the NPC to progress the game, but the player can choose not to do it. However, this will hinder the progress of the game's story. After getting noticed by a NPC that wants to battle, there is yet another layer of control introduced. The pre-battle music is repeated until the player chooses to finish the conversation with the NPC, which in turn triggers the battle and kicks off the battle music. Again the player could choose to stay in the pre-battle phase for as long as they'd like. See figure 10. for a visual representation.



Figure 10. (Game Freak, 1996).

However, this is not the sort of in-game composing I am investigating in this thesis. My focus rather falls on how games use composing and performance of music as a key component of the game, not something that can be done by manipulating the sound mechanics put into the game by the developers.

The in-game composing method I seek to clarify and explain, is done by relying on a performance aspect from the player. It is created to make the player participate and perform short melodies that affect the game in various ways, such as those explained above. Some games have built a reward system where the player gets a sense of achievement when performing melodies, thus making it feel less like a chore when the melodies need to be repeated (see figure 11.). The reward system encourages the player to be excited when performing melodies. This can in many ways be compared to real life experiences of learning songs.



Figure 11. (Nintendo, 1998).

This approach creates a ritual for the player, and replaces the simple press of a button when performing actions. It has become a well known game mechanic and is used by many renowned franchises.

5.4 Case studies

In my case studies I wish to understand how in-game composing works and how the developer has created musical tools that help the story progress when used. In addition, I would like to know why the players don't play around with the musical tools more? Therefore I have chosen two games that I believe will give me an understanding of how this type of in-game composing is carried out in a successful way. The games are *Loom* (Lucasfilm Games, 1990) and *The Legend of Zelda: Ocarina of Time* (Nintendo, 1998). I want to investigate how the use of in-game composing as a game mechanic enhanced the experience of the player, and helped create a sense of achievement, instead of being an annoying element or an extra obstacle. I want to see if there is a psychological element in regard to how the player reacts to the game and having to make music to progress. What separates the games is technology and I want to see the evolution of using this kind of mechanic in games, and how it was introduced versus how it became popularised. I want to address this through analysing both the statistics on how the games did commercially. I will perform analytical plays for both the games selected, in the same manner as in the previous section.

5.5 Selected Games

As mentioned earlier, the first game I will discuss during this section is *Loom*, developed and released by Lucasfilm Games in 1990. I chose this game because it is one of the first games that relies on music as the main game mechanic. I believe it can provide insight into if music as a game mechanic was successful or not, and reveal reasons why. I also hope to collect information about how players experienced the use of music as a game mechanic.

The second game I dwell on is the *Legend of Zelda: Ocarina of Time*, developed and released by Nintendo in 1998 for the Nintendo 64. It is famous for being one of the best-selling Zelda games and ground-breaking games at its release for its sheer size. Earlier I mentioned *The Legend of Zelda: Majora's Mask* as an example, and I want to explain why I chose *The Legend of Zelda: Ocarina of Time* instead of *The Legend of Zelda: Majora's Mask*. Although the latter has more instruments available throughout the game, *The Legend of Zelda: Ocarina of Time* was a more successful game, and thus it has a lot more data on how the music as a game mechanic works, and data on how it was received by the audience. Tim Summers released his book named after the game, which has been referred to as the biggest collected work ever written about music from a game (Summers 2021).

5.6 LOOM

5.6.1 The Creator

The man behind *Loom*, Professor Brian Moriarty, was a game designer at Lucasfilm Games, later LucasArts (Moby Games 2011). Before his days at the company he worked in another game studio called Infocom, with several titles, and amongst them the classic *Beyond Zork* (Infocom 1987). He joined Lucasfilm Games in 1988 by an invitation from Noah Falstein, and his first game designed there was *Loom*. Although it was recognised as a commercial success and he had ideas for sequels for the game, the sequels never saw the light of day. Moriarty opted out to work on other projects at Lucasfilm. One of the more noticeable collaborations he participated in from his time there was between Lucasfilm and Steven Spielberg, on a game called *The Dig*

(LucasArts 1995). After leaving Lucasfilm in 1993, Moriarty joined Rocket Science Games which closed their doors in 1997 (SegaRetro 2022).



Professor Brian Moriarty, the creator of *Loom* (Kadenze, 2018)

Today, Professor Moriarty is hired at Worcester Polytechnic Institute in the field of computer science. He teaches digital game design using minimalist, practice-oriented techniques. Outside of this he sometimes holds public lectures on game design. One of his more popular lectures is his postmortem on *Loom* from 2015 at GDC (Game Developers Conference) in San Francisco. There he discussed his choices and restrictions during the development of the game, as well as what he wished he had done differently (GDCvault 2020).

5.6.2 The Game

Loom is a point and click adventure game. It was released by Lucasfilm Games in January of 1990. *Loom* has a more complex and serious story than other games released at this time, and the interface using music to interact with its world was regarded as experimental. This was one of the aspects that separated *Loom* from other Lucasfilm adventure games (Fernández-Vara 2020).

The gameplay centres around four-note tunes created by the magic of a distaff, which is similar to a wizard's staff. The tunes are called drafts and are performed by our protagonist, Bobbin Threadbare. Each of the drafts functions as a spell and has a certain effect, such as “Opening” or

“Night Vision”. Some of the drafts are possible to perform backwards to the opposite effect, such as “Untwist” which becomes “Twist” when played backwards. Other drafts are made into palindromes. For instance, the draft called “Terror” is performed using either EFFE, DFFD or FCCF. The drafts that are palindromes do not have the quality of changing when played backwards, because it is the exact same pattern backwards as forward. Bobbin can learn drafts by observing objects that have the qualities of the desired draft. An example is when Bobbin examines a blade being sharpened. After seeing this, he can learn the “Sharpening” draft. At the start of the game, Bobbin is limited to cast drafts using the notes C, D and E, making it impossible for him to cast drafts intended for events that happen at a later stage in the game. As the player progresses through the game, the notes to complete a C-major scale unlock, allowing for new drafts to be performed.

The game itself can be played in three levels of difficulty, each level differentiating how easy or hard it is to click on the right notes on the distaff. In “Standard difficulty” the notes of the scale are indicated, while in “Expert difficulty” the notes are hidden, meaning the player has to recreate the drafts by ear (see figure 12.). In the original release of the game, expert players were rewarded with cutscenes that didn’t appear in the two other difficulties. However, the CD-rom release, which I played, showed the cutscenes no matter what difficulty was chosen.

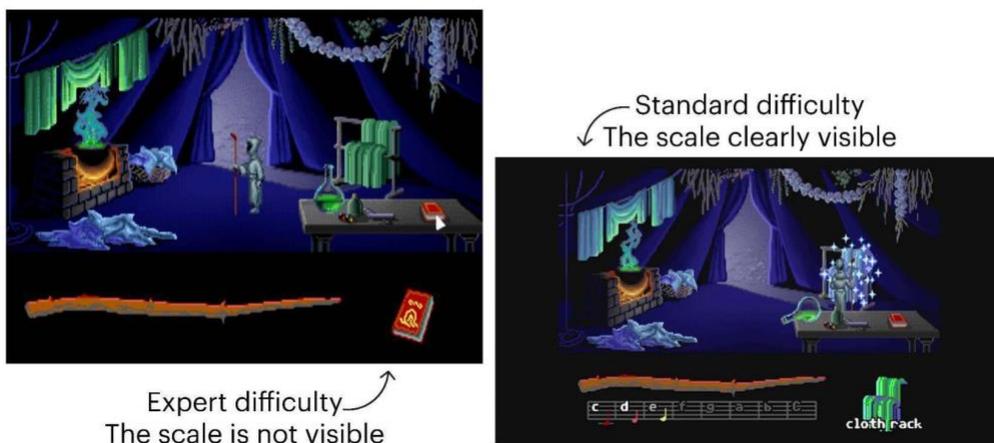


Figure 12. (Lucasfilm Games/LucasArts ,1990).

The premise of the story of *Loom* is that on Bobbin's birthday, he is summoned by the elders who will determine his fate. When he arrives at the Sanctuary, he witnesses his caretaker Hetchel being punished by the Elders with the "Transcendence" draft for educating Bobbin. Instead of having the desired effect, the "Transcendence" draft reverts her to a swan's egg. As they try to understand this sudden turn of event, a swan crashes through a window in the Sanctuary. It casts the "Transcendence" draft on the Elders, as well as the rest of the villagers, transforming all of the guild of Weavers except Bobbin into Swans. They all fly off and leave through a rift in the sky, leaving Bobbin behind. He finds one of the Elders distaff and uses the "Open" draft to release Hetchel from the swan's egg she is trapped in. She has been transformed into a cygnet and tells Bobbin the swan that visits him every year on his birthday is the same swan that crashed through the window. It transformed everyone into swans to save them from the Third Shadow that was about to cover the world. This urges Bobbin to find the flock of swans to join them, and this is where we start our journey.

5.6.3 Findings

I have been keen to investigate how the mechanic works and if it benefits the player or the developer. My hypothesis is that the mechanic itself works in ways that make the player feel like Bobbin. In the article "How musical training affects cognitive development: rhythm, reward and other modulating variables" by Ewa A. Miendlarzewska and Wiebke J. Trost (2014) tells us that learning music creates a sense of reward. This means that each time the player learns a piece of music in the game, they would experience a sense of reward, in addition to solving the puzzle. Moreover, the feelings created by the sense of reward keeps the player wanting to play the game. In Professor Moriarty's postmortem lecture in 2015 at GDC, he mentions that *Loom* was specifically designed to be completed. This is also mentioned in the official instruction booklet that came with the game. "Most important of all, *Loom* is designed to be completed, not played halfway through and then thrown on a shelf and forgotten" (Shepard 1990, p.3).

During Moriarty's postmortem lecture from 2015, he mentioned that he first wanted to implement a gestural interface. The way it would work was that the player would draw previously learned shapes with the computer mouse, and Bobbin would move correspondingly.

This would give the player a feeling of performing magic together with Bobbin. The problem here was that during the time of development, the principal customers were running an operative system called DOS 3, and at that time many DOS users did not yet have a computer mouse available. Therefore, the game had to work by only using the keyboard as its interface. This is where the concept of using a musical interface was conceived. Previous Lucasfilm adventure games used a verb system to make the character perform different actions, like in *Monkey Island 2: LeChuck's Revenge* (see figure 1. for reference). The way it worked was that the player first selected a verb and then pressed the object that they wished to interact with. For example, to open a door the player selected “open” and pressed the door they wanted to open using the mouse. But in *Loom*, Moriarty wanted the player to feel even more connected with the character, like they were solving puzzles together with Bobbin. In “The Digital Antiquarian” Jimmy Maher writes

He (Professor Moriarty) envisioned music as an important part of his game: the central puzzle-solving mechanic would involve the playing of “drafts,” little sequences of notes created with Bobbin’s distaff. But he wanted music to be more than a puzzle-solving mechanic. He wanted the player to be able to play the entire game like a musical instrument, wordlessly and beautifully. He was thus thrilled when he peeked under the hood of Lucasfilm’s SCUMM adventure-game engine and found that it was possible to strip the verb menu entirely. (Maher 2017).

Moriarty used his love for music and Tchaikovsky. Even though his first idea wouldn't work for practical reasons, he still ended up creating something he was passionate about. Moriarty is a big fan of Pyotr Ilyich Tchaikovsky's work (Maher 2017). He was especially fond of the three ballets written by Tchaikovsky: *Sleeping Beauty*, *Nutcracker* and *The Swan Lake*. Therefore, he chose *The Swan Lake* as the soundtrack of the game. George Sanger was tasked to transcribe the sheet music into MIDI (musical instrument digital interface) in order to add it into the game.

One can imagine that the process of transcribing the ballet was lengthy. First, the traditional transcribing itself could be considered a big task. Luckily, Moriarty, being an avid lover of Tchaikovsky’s music, had the whole work as sheet music (Mixnmojo 2022, p.5). Therefore,

Sanger's main task was to transcribe the music into the program itself. Considering the games were developed between 1988 and 1990, we can only assume that the software used to transcribe was limited, unlike today where we have notation software like Sibelius and Dorico etc. Today it would be quite easy to write it directly into the program, then extract the MIDI from the notation software and implement it into a DAW (Digital Audio Workstation). Sanger had to go with a different approach, and at the time he settled for using the software Performer. As you see in the screenshot from the software (figure 13.), it is not visually pleasing, and compared to Sibelius, not as visually intuitive (figure 13.). In some ways it bears resemblance to both a DAW and a notation program. It reminds me of the DAW Logic Pro X, with the possibility to add music notation and being able to choose between a selection of MIDI-instruments. Furthermore, without having tried Performer, I can only imagine that the process was limited, even though its appearance is similar to Logic.

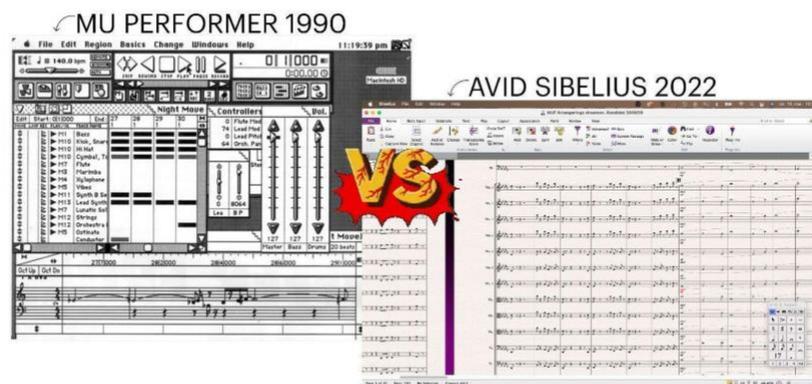


Figure 13.

5.6.4 Analytical Play

For my analytical play of *Loom* I chose to use the CD-ROM version of the game which has been digitised and is now sold on major digital platforms, such as Steam and GOG. I chose this version because it was the easiest one to get a hold of, instead of tracking down an old physical copy that has become rather rare with time.

During my analytical play I wanted to have the full experience, therefore I decided to play through the whole game. I wanted to know what it felt like using the music as the main mechanic during gameplay. I think it was important to have a first-hand experience instead of reading about it, and recite what others had experienced in their playthrough.

As I played through the game, I was put off by its lack of a user-friendly interface, by which I mean a place where I could look up the melodies I had learned throughout my play. I learned a total of 26 melodies, some completely new and some backwards to reverse spells. For example the spell OPEN had the melody ECED throughout my playthrough, which meant that DECE was the spell for CLOSE. This made it easier to remember and keep track of the spells. I liked that there was considerable variation in the spells. The fact that I didn't have to repeat the spells a lot made it more fun. However, I would have appreciated the opportunity to check the spells I had already learned in a handbook or menu of some sorts. My approach was writing the spells down on a piece of paper that I kept next to me while I played. On one hand, some might argue that writing the melodies and spells down would help them learn the melodies quicker and more thoroughly. On the other hand, one could argue that it takes longer to learn the melodies since you have to write them down as well. Either way I enjoyed the story and I felt like I really participated in it, using the music to cast spells. Moreover, I felt limited as a composer in the game, and was not encouraged to explore the instrument presented. It was not that I felt completely immersed in the game, but rather that the instrument was slow and tedious to use. The game would also break me off after I had played a melody of four notes, which in itself was limiting.

5.6.5 Evaluating the Effectiveness of the System

The system was built to be easily understood. Early in the game we are taught that a certain combination of four notes performed will trigger a spell. In the early physical versions of the game, there was even a cassette tape with an audio recording that was a conversation between our main character Bobbin and Hetchel. During the recording Hetchel teaches Bobbin to spin a draft, which translates to singing a four note melody. With this clever recording, the cassette teaches the player the game mechanic even before starting the game. While playing the game,

one can see the staff and notes available. At the beginning of the game only a few notes are accessible, but as you progress you unlock altogether eight notes that make up a C-major scale. Not only are the notes sung out when the player performs them in the game, but they are also visually enhanced by colours that appear on the staff as they are played. During my analytical play I experienced that the player is able to learn 26 different drafts. The game creates replay value by having different variations of all except four drafts. This means that the notes for each draft could vary from game to game (Mixnmojo 2022, p.1).

The game's premise is to solve puzzles with the use of magic through music to progress in the game, and that this increases the player's urge to continue playing. In their article 'How musical training affects cognitive development: rhythm, reward and other modulating variables', Ewa A. Miendlarzewska and Wiebke J. Trost state that: "Furthermore, musical training can be a leisure activity and a possibility to learn a form of discipline outside of the frame of the school curriculum, which gives the opportunity for rewarding experiences of self-achievement and positive reinforcement" (Miendlarzewska & Trost 2014). Considering this in combination with Pete Wilton's article, we can read how the brain reacts on puzzle solving: "The researchers found that when people solved puzzles with Aha! a deeper part of the brain that generates the mood-enhancing chemical dopamine 'lit up'" (Wilton 2018).

As a result, *Loom*, with its combination of puzzle solving and music as a game mechanic, becomes a self-driving force. By giving the player constant feedback of performing the correct melodies or a sense of accomplishment, *Loom* was in theory a game that was impossible to put down. Despite great feedback from consumers, the sales numbers didn't match the feedback. According to *Rogue Leaders: The Story of LucasArts*, *Loom* was a critical success, but "failed to sell in sufficient numbers to warrant sequels" (Smith 2008 p.56). Sadly, even if the game itself gave the player a constant feel of mastery, the designer Professor Moriarty did not feel the same. He mentioned that there were two sequels planned, *Forge* and *Fold*. As a response in an interview by *Arcade Attack* to why there weren't any sequels to *Loom* he answered: "I was too burned out, and no one else cared enough to push one through." (Arcadeattack 2017). In his GDC lecture in 2015 he ended it by saying that he regrets not pursuing the creation of *Forge* and *Fold*. As for myself I agree that the mechanic is in many ways fun and rewarding, and as for the

story it is great. I just wish there was a way to look up the melodies during gameplay, rather than using pen and paper to keep track.

5.6.6 Authenticating Tchaikovsky

Knowing that Moriarty was a Tchaikovsky fan, I wondered if Sanger had stayed true to the composition while creating the soundtrack arrangement for *Loom*. I chose to investigate this by performing a short musical analysis and comparison of one piece by Tchaikovsky used in the game. I chose Act 1 No. 4: Pas de trois: I. Intrada: Allegro. The soundtrack in the beginning of games needs to grasp the attention of the player, and this particular piece was used to open *Loom*. Understanding that it might not be completely representative of the melodies in the entire game, I still believe that it carries with it some of the thought and consideration that Sanger had when he arranged the soundtrack.

The developers have used a little over two minutes of the 11 minute piece by Tchaikovsky (*Loom*, 1990). When the player starts the game, they are met with a harp playing broken chord patterns with underlying horns. The piece quickly moves on by introducing the string section playing a call and response bit with the woodwinds. This is repeated once before the piece yet again evolves. Strings take over the response of the woodwinds and the harp has now changed technique, and is strumming instead of plucking. Furthermore, what sounds like a dampered cembalo and the woodwinds are now performing a floating melody that moves in between the rest of the orchestra. The next section is introduced after the part is repeated two times. The harp starts off the section with some aggressive strumming, which is quickly overtaken by a flute melody with the occasional help from what I believe is a cor anglais. Then the harp returns to plucking broken chords to support the melody. The strings are present with rhythmical hits to strengthen the foundation of the piece. Going forward to the next section, the strings play the lead melody with support from the horns beneath. At the end of every phrase a clarinet comes in with a three note melody. Repeating this about two times the strings now repeat the same phrase four times, before it is replaced by the clarinette and the return of the cor anglais. They close off the section, leading us back to the first section of the piece where the harp is strumming chords. This repetition makes it feel like it is the main melody. Shortly after we are brought to the last

section of the piece. A rather calm part compared to the previous ones. The strings are now working as a steadfast foundation for the woodwind to play around on, but the horns also have some movement during this section, adding some points of interest. There is a build up towards the end, where a clarinet plays trills with string hits for supplement, before the clarinet plays a finishing melody walking down a major scale from the fifth to the root note, skipping the fourth. This move provides a feeling of fulfilment, and releases the tension. It works as a contrast to the complexity of the rest of the piece, and is a simple yet very effective way to tie up all loose ends.

Hearing the original piece by Tchaikovsky and following up with *Loom*'s rendition of the piece, I was surprised by the attention to detail, and how scarily accurate the transcription is. Luckily for *Loom*, the piece by Tchaikovsky was past the copyright law time limit, because it would without a doubt have been deemed as plagiarism if the composer was still alive. Sanger has done an incredible job keeping all the harmonic and melodic details intact, and the instrumentation is imitated in the best way possible considering the limitations present. Commenting on the sonic quality is difficult, as it seems Sanger has done his utmost to hold the piece to a high standard. However, the game is restricted to work on sound cards like AdLib or Soundblaster as that is what the regular consumer had (Edwards 2016). The limitation in sound can be heard especially with the attack of the instruments in *Loom*, whereas the original has a much softer sound to it. I suspect the limitations of the software Sanger used made it challenging to change velocity. There were only two anomalies in this comparison, and the first one was obvious from the get-go. Sanger changed the tempo, and made *Loom's* soundtrack faster than the original piece. Whether it was done to match the game in some way or not is difficult to say. I feel like this change in tempo throws the balance between the calm and the dramatic, which is one of the most beautiful features of Tchaikovsky's Swan Lake. The other element I noticed as different, was the added cembalo in *Loom's* soundtrack. I could not spot it in the original piece, and I am not sure why it has been added. Perhaps to make the player feel like the story plays out sometime in the past, when this instrument was more common. Personally, I don't think it adds anything to the piece. Still, it sounds like Sanger has great respect for the piece in question.

5.7. *The Legend of Zelda: Ocarina of Time.*

5.7.1 Shigeru Miyamoto: Father of Modern Video Games.

Shigeru Miyamoto, is a name that carries a lot of power in the game industry, and here is why: The man is the mastermind behind the beloved *Zelda* series, as well as the world famous *Super Mario Brothers* (IMDb b 2022). Studying for his degree in industrial design at the Kanazawa Municipal College of Industrial Arts, Miyamoto was not sure how to utilise it. He had a deep love for the art that is manga and at one point wanted to be a professional manga artist. This was prior to him considering a career in video games. However, his interest was piqued when he played the 1978 arcade classic, *Space Invaders* (Taito, 1978). Miyamoto has explained where his inspiration for the games come from. One of the more interesting facts is that he has drawn a lot of inspiration from his childhood in Kyoto. When he was young, he often played and explored the areas around his home. He explored forests and caves. He mentions that these expeditions were heavily inspirational for *The Legend of Zelda* series (Lambie 2011).

During the 1970s, the small company Nintendo sold playing cards amongst other products as well as branching out into the toys and games business. Miyamoto's father arranged an interview for him at the company with the past presiding president of Nintendo, Horishi Yamauchi. Miyamoto was quickly brought into the company as an apprentice in the planning department, after presenting some of his original toys in 1977. In one of his first jobs there he participated in creating the art used for the coin-operated arcade game, *Sheriff* (Nintendo, 1979). Nintendo released their first games console in 1983, known as Famicom (short for Family Computer) in Japan and the NES (short for Nintendo Entertainment System) in the rest of the world. Miyamoto did not only create more than half of the ten best selling games for the system, but it was also the start of the two beloved game series *Super Mario Brothers* (Nintendo, 1985-present) and *The Legend of Zelda* (Nintendo, 1986-present). Miyamoto's games became what Nintendo was known for. Super Mario is now the company's mascot, much like Mickey Mouse is for Disney. A national survey done in the 1990 showed that at that time Super Mario was more recognised than Disney's Mickey Mouse (Northernexpress 2004).

Miyamoto is often recognized by the title: The Father of Modern Video Games, and it is not hard to see why. He is the man behind Mario and Zelda, but his catalogue goes on and on, with other famous series like *Donkey Kong* (Nintendo, 1981-present), *Pikmin* (Nintendo, 2001-present), *Duckhunt* (Nintendo, 1984), *F-Zero* (Nintendo, 1990-present) and *Star Fox* (Nintendo, 1993). He even worked as a producer for the first *Pokémon* games, which grew to become the highest grossing media franchise in the world. As the years passed, Nintendo continued releasing games, each time to high praise from the audience. In 2021 a theme park opened in Osaka in Japan with Super Mario as the main attraction, in good company with other series as well. After its success in Japan, three other locations are planned to open in Hollywood, Singapore and Florida (Tracy, 2022).



Shigeru Miyamoto (Harding 2019).

5.7.2 Koji Kondo: Father of the Game Soundtrack

Koji Kondo is well-known for creating the soundtracks in various games in the same way as Miyamoto is famous for creating the story and visuals in games. One way of recognizing the expertise of a game composer is when the game is recognized by the music alone. Another way of recognizing a skilled composer is if the music accompanies the visuals in a way that doesn't

interfere with the immersion of the player. Kondo not only creates entertaining and well-thought-out music for the games he composes for, but as he often works together with Miyamoto, his catalogue is of great magnitude. Kondo is responsible for creating the music for the classic series, *Super Mario*, *The Legend of Zelda* and *Star Fox* among others. He has created music for well over 50 games, and his first credit was for the classic arcade game *Punchout!!* (Nintendo 1984). No one in the industry has a musical catalogue of this magnitude.

Kondo was introduced to music early on and started taking electronic organ lessons from age five. He played in a cover band and finally graduated from Osaka University of Arts at the department of Art Planning in 1984. Although he was surrounded by music and performed music all his life, he was never classically trained or academically dedicated to music. He was in love with arcade games such as *Space Invaders* and *Donkey Kong*, and he has mentioned that working with video games was the only way he felt he was able to work with sound and music in the way he desired (Kohler 2007). Through his passion he gained experience composing and arranging using the piano and a computer, and programmed using the programming language BASIC.

During Kondo's senior year at Osaka University of Arts in 1984, Nintendo reached out to the school recruiting a composer and sound programmer. He applied for the job and received it, even without sending in any demos. Kondo recalls, "I found my way to Nintendo by looking at the school's job placement board. You're supposed to apply to many different companies, but I saw the Nintendo ad, and had a love of making synthesisers, and loved games, and thought – that's the place for me. I interviewed with one company, Nintendo, and that's where I've been ever since." (Kohler 2007). Kondo was the third ever music and sound creator employee at Nintendo, joining Hirokazu Tanaka and Yukio Kaneoka, all industry legends today. Kondo was the first to be hired by Nintendo that actually specialised in music composition (Nintendo Online Monthly referred on Shmuplations 2022).



Koji Kondo (Orland 2021).

5.7.3 The Game

The *Legend of Zelda: Ocarina of Time* (Nintendo, 1998). It sold well over 7 million copies. The fans had great expectations for it, because of the previous games released in the same series. With *The Legend of Zelda: Ocarina of Time*, the creators were going to take the first leap into using 3D graphics. As *Zelda* had become a staple for the company, there were no expenses spared during the development of the game. It received great critique and not only did the game fulfil the expectations of the fans, it also received several awards and accolades, who praised its visuals, sound, gameplay, soundtrack and writing. It has been recognized by numerous publications as the greatest video game of all time (Allison & Co 2022).

The Legend of Zelda: Ocarina of Time is a fantasy action adventure RPG (roleplaying game), set in the kingdom of Hyrule. The player controls the protagonist, a hylian child named Link. It is set in a third-person perspective in a 3D world. During the game the player collects a plethora of items that can be used as weapons, to solve puzzles or perform magic spells. Throughout the game Link is equipped with a sword and shield that works as his weapons in combat. The main item is mentioned in the title of the game. The player is given an Ocarina early on in the game, which is later replaced by the Ocarina of Time. During the progress of the game, the players are taught twelve melodies that are used for solving music-based puzzles, teleporting, calling for

your horse and other tasks. The Ocarina of Time is also used to claim the legendary sword, the Master Sword in the Temple of Time. When the sword is drawn from its resting place, the player travels seven years into the future and becomes an adult. This means the player has to move back and forth between the present and the future to solve different puzzles, as the young and adult form of Link has different abilities.

5.7.4 The Story

The kingdom the game is set in is called Hyrule. It was created by the three goddesses Faroe, the goddess of courage, Nayru, the goddess of wisdom and Din, the goddess of power. After finishing their creation they depart Hyrule, leaving behind the Triforce, a relic made up of three golden triangles, that is said to hold within it the power of the three goddesses.



The three goddesses (El-Ters 2019).

The game starts with the fairy Navi, waking up our protagonist from a nightmare. The nightmare was of a man in black armour pursuing a young girl on horseback. Later we learn that the man in black armour is Ganondorf Dragmire. The king of thieves and a part of the Gerudo race. The young girl is Zelda, the princess of Hyrule. Shortly after starting the game, we learn that Ganondorf wants to take over Hyrule and acquire all three pieces of the Triforce to rule the whole kingdom. With that our quest starts, and Link sets out on his long journey to find and rescue the princess, and defeat the evil Ganondorf (Nintendo, 1998).

5.7.5 Points for consideration

Considering the sheer size and impact of this game, several questions arise. While I was playing the game for analytical purposes, I decided to narrow the scope of my questions down to the following three. First, I want to discover why the creators of the game opted for music as the mechanic to control the Ocarina of Time. How and why did one of video game's biggest creators choose to go with learning and performing music on a rather unknown instrument as the main mechanic on his next big project, which needed to live up to the hype created by its predecessors? Second, I failed to grasp how the creators added a close to unlimited instrument into their game and still keep the player progressing in the game, instead of learning how to play the instrument. How did they make the player care about the story instead of the instrument available in the game? And, third, an obvious question arose regarding the use of the digital instrument. How much would a player exploit the possibilities concerning composing and performing in the game? Could the player compose their own original music? Could they cover famous real-life music, using an instrument inside of a game?

5.7.6 Analytical play

Although there are four different versions of this game, I chose the original version released for Nintendo 64 for my analytical play. I wanted to see if the system of music as a mechanic was intended from the start, or if it was a feature the creators thought of after the first release. As I tried to start the game, it didn't start up right away. Being hit with a sense of nostalgia I knew just what to do. I took out the cartridge and blew into it, a cloud of dust hit my face and I started laughing and coughing at the same time. I put the game back into the console and long and behold it booted up.

I played my way through the start to acquire the first ocarina. It was given to me by Saria on the bridge as I left Kokiri Forest. The first melody we learn is Zelda's Lullaby. The caretaker Impa teaches us the song when we find Princess Zelda in the Hyrule castle. Next up is Epona's Song, which we use to summon our horse, Epona. To learn the song you go to Lon Lon Ranch, where

you can wake up the ranch's owner, and talk to his daughter Malon. She teaches you the song. Later on we meet Saria in the Lost Woods close to Kokiri. She is sitting by the entrance to the Sacred Forest Meadow, and here she teaches us Saria's song. Furthermore, we find ourselves in Kakariko village where we walk into the windmill. A man is inside and he tells us about a song a child used to play to make the windmill move faster. If we select the ocarina item at this point, the man teaches us the song. Moving forward, we are about to learn the Sun's Song. In the same village, more specifically in the graveyard of Kakariko Village, there is a Triforce symbol on the ground, which reacts when we play Zelda's Lullaby. This opens a grave and in the back of the room, the instructions to Sun's Song are written on a tomb. The next song we learn is the Song of Time. It is taught to us right after we receive the key item of our story, the Ocarina of Time. It is Princess Zelda herself that teaches it to us. The mysterious character Sheik teaches us the next six songs at various points in Hyrule: Minuet of Forest is taught in the same place Saria taught us her song; Bolero of Fire is taught at Death Mountain Crater; Serenade of Water we learn at Lake Hylia close to the Water Temple; Requiem of Spirit is taught to us when we arrive at the Spirit Temple; we learn Nocturne of Shadow when we return to Kakariko Village after beating the Water Temple and at last Sheik teaches us Prelude of Light. Sheik does this the first time we go back to the Temple of Time to return the Master Sword in order to travel back to the present. For all songs that I discuss in this part, please take a look at figure 14 to see the notation of the melodies.

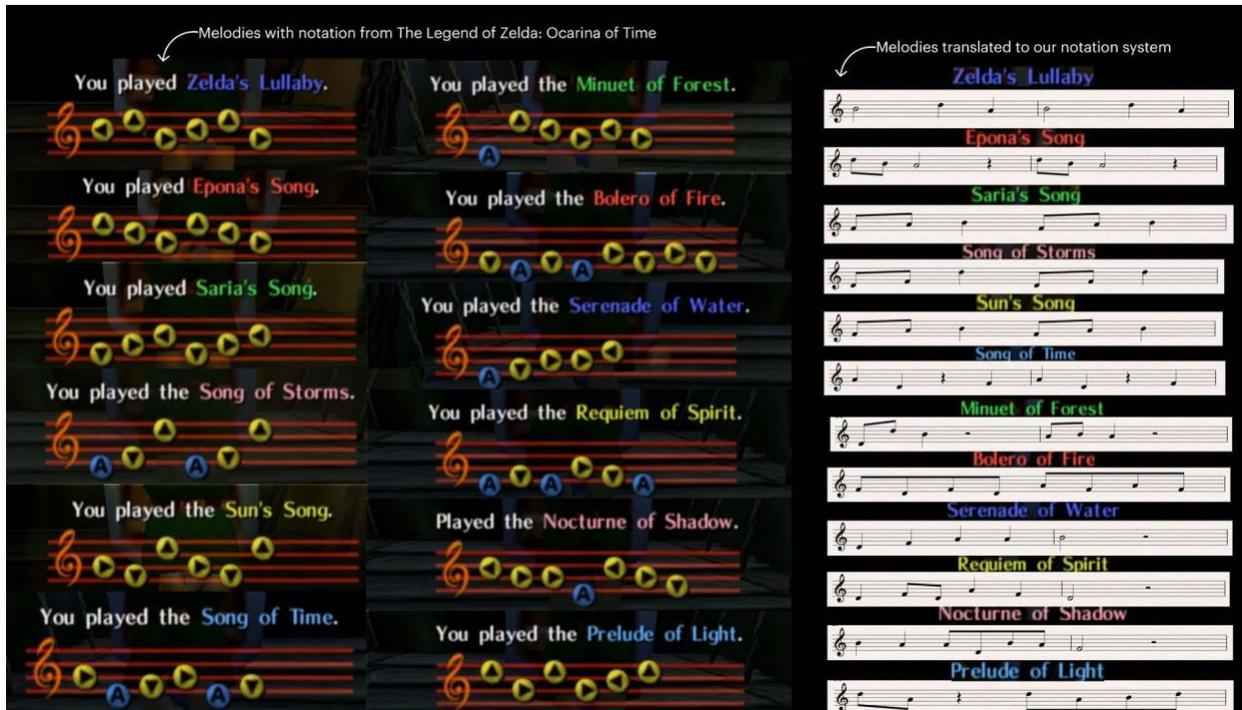


Figure 14 (Nintendo, 1998).

I set out with a definite goal: To learn all the 12 melodies in the game. However, as I played through the game, the goal faded and I ended up learning the melodies as a byproduct of playing. I did experiment with the instrument, and found that there are but a few limitations to what you can play. One of the limitations is the register, and another one is that you get caught in a pattern if you perform any of the 12 melodies by accident during your improvisation.

The Legend of Zelda: Ocarina of Time has a menu that allows you to look up the melodies as you progress in the game, which you can listen to as an aid when learning the melodies. This was a positive surprise, especially after playing through *Loom* and missing this exact feature.

One thing I noticed while studying how the ocarina functioned, was that the game has its own notation that does not coincide with our way of noting music. It is built up to what looks like a G-clef and has four lines in the staff instead of our traditional five. However, I could play a full scale on these four lines, which made me wonder how the instrument really worked in the game. Even though I could play the full scale, the system only recognized five of them, meaning it would not add the remaining notes to the staff. It even has a vibrato. Below (figure 15.) you see

the button combination that corresponds with what notes. The picture contradicts itself by using five lines in the staff and the G-clef looking symbol together. I had to check its accuracy against a digital piano and can therefore say with certainty that the picture below is correct, despite the use of the peculiar clef. With this information I translated the 12 melodies into our traditional notation system. By doing this I got information about the ocarina register in the game. Following this investigation I started thoroughly exploring the possibilities of the instrument and was pleasantly surprised.

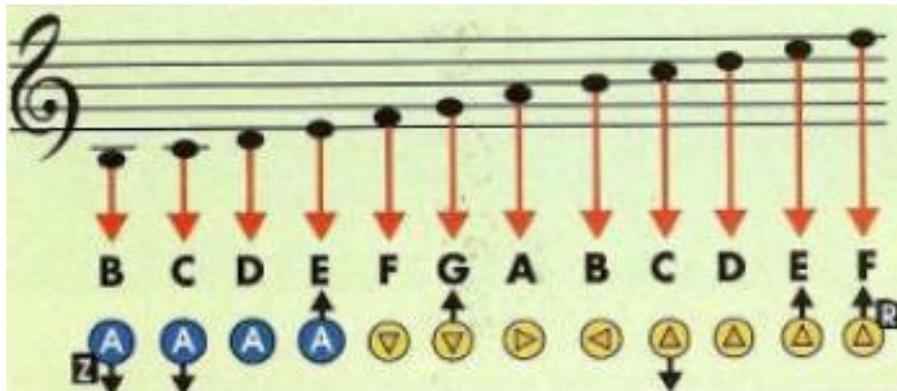


Figure 15. (Zelda Wiki 2022).

Drawing on Tim Summer's way of categorising the songs learned throughout the game, we can see that they all can be divided into three categories: plot-advancing melody, assistance melody and warp melody (Summers 2021, p.35). Some of the categories also have the added description of optional, informing us if this melody was not needed to finish the main story of the game. There are some melodies that are under multiple categories as they have multiple functions. Underneath I have added the table from Summer's book (2021, 36-37) in Figure 16. *The Legend of Zelda: Ocarina of Time, A Game Music Companion*. If you want to be able to use the ocarina instrument and improvise freely, you have to either not learn any of the melodies you need to progress in the game, or avoid playing any of the 12 melodies, as this triggers their effect.

Song	Song Type	Function
Zelda's Lullaby	Plot-advancing	Various, especially as a force for moving or changing barriers (e.g. raising and lowering water level in Water Temple, opening sealed or obscured pathways). Places to use the song are often indicated by a Tricorce sing on the floor.
Song of Time	Plot-advancing	Used to open 'door of Time', to allow access to the Master Sword and the time travel mechanic. Also transports particular stone blocks in dungeons.
Epona's Song	Assistance melody and optional plot-advancing	Summons Link's horse.
Sun's Song	Assistance melody	Changes night to day or vice versa.
Saria's Song	Assistance and plot-advancing	Communicates with Link's friend, Saria, for plot hints; open path to Sacred Forest Meadow; can be used to obtain additional bonus item by entertaining non-playable characters (NPC's)
Song of Storms	Assistance and optional plot-advancing	Water-themed agency, such as draining the well in Kakariko Village, creating a desert oasis and summoning a fairy. Required to obtain Lens of Truth, a powerful but not essential object. Also opens up bonus grotto areas.
Prelude of Light	Warp melody	Transports Link to Temple of Time.
Minuet of Forest	Warp melody	Transports Link to Sacred Forest Meadow.
Bolero of Fire	Warp melody	Transports Link to Death Mountain Crater.
Serenade of Water	Warp melody	Transports Link to Lake Hylia.
Nocturne of Shadow	Warp melody and plot-advancing	Transports Link to Kakariko Graveyard (required to access the Shadow Temple dungeon).
Requiem of Spirit	Warp melody and plot-advancing	Transports Link to the Desert Colossus (required for child access to Spirit Temple dungeon).

Figure 16.

5.7.7 Use of music as a core mechanic in *The Legend of Zelda: Ocarina of Time*

When I was researching why music is a core mechanic in this game, I hoped to find an answer with more depth to it than “It’s fun!” or “Why not?”. While investigating this, I found an article at GameAnalytics.com called “Using Music As A Core Mechanic: Insight From Amanotes” (2019). In this article Sarah Impey gives us insight on why it could be beneficial to use music as a mechanic.

Impey first mentions that there are over 19 different game categories on the App Store, as of 2018. All these categories have over 800.000 games featured in the store. She also writes that their own company Amanotes have created 100 games centred around music as a core mechanic over their span of four and a half years of existence (Impey 2019). Impey mentions three main reasons why music can aid the game to do better and reach further. The first reason is that music makes the games more addictive, and is therefore a way to hook the player and keep them playing longer. The average American is said to use up to four and a half hours listening to music every day (McIntyre 2017). On this basis one can assume that combining music with addictive gameplay will keep the players coming back for more. Furthermore, Impey mentions that after adding popular music to their game *Magic Tiles 3* (Amanotes, 2018), play time increased by 33%. The second reason for using music as an aid, is that it makes the game more intuitive. She goes on to say that if integrated well, music can help the player to go through the gameplay at a ‘semi-conscious’ level. Using *Dancing Road* as an example: after playing a short period of time, the player can often get into the rhythm of the game and predict when the next beat will be. The demand for music is booming, and by adding music into games, the potential to appeal to the music audience presents itself (Iqbal 2022).

It is not a secret that Nintendo is one of the most successful video game companies to date, and their competency in expanding their business and reaching a wider audience is apparent (Scully 2021). Both Lucasfilm and Nintendo had success in combining music with their games. However, I would argue that Nintendo had a better foundation, using their previous success with *The Legend of Zelda* series to test out music as a mechanic as a new feature in *The Legend of Zelda: Ocarina of Time*.

5.7.8 Story-centred vs. instrument-centred

As discussed above, the players were able to learn how to use and play the ocarina freely, except for a few limitations. First, I found it curious that players would progress very easily, seeing as they had the chance to learn a new instrument in the game. However, after playing the game, I gained a greater understanding of the urgency to progress. The story and world is beautiful, and the characters, music and writing made me want to save Princess Zelda and stop Ganondorf Dragmire. Moreover, in a similar fashion to that of *Loom*, the developer created a brilliant system to make the player feel mastery and accomplishment when making progress in the game. Both for learning the melodies acquired to progress, but also the solving of the puzzle itself. I believe it is the feeling of accomplishment the player receives with each solved puzzle that keeps the player progressing. As mentioned earlier, Miendlarzewska, Trost and Wilton all write about how the brain reacts when learning music and solving puzzles, that's why the impact it has on the brain when it is combined is almost like a perpetual machine.

5.7.9 Limitless in-game composing?

As mentioned, *The Legend of Zelda: Ocarina of Time* has created a reward system for the player, that makes them want to continue to learn the music and solve puzzles to make progress. What piqued my interest is that due to the compositional design of the game, which allows the player to experience both freedom, intuitive composing and performance during gameplay, the player has the possibility to perform the pieces that make them experience progress, as well as compose freely. The compositional design creates a feeling of freedom that does not clearly force the player in any direction, but rather makes it appear as if it is their own choice to progress and perform the pieces that move the story forward. The same applies for *Loom*, only there are more limits in regards to composing.

Another fascinating possibility with this is that one can potentially, by using adapters from the Nintendo 64 or any of the other devices that *The Legend of Zelda: Ocarina of Time* is ported to, extract the sound of the performance to effectively record the performance. Also, in *The Legend of Zelda: Ocarina of Time* the developers gave the players the possibility to use the ocarina to compose. As mentioned, there were only a few limitations when using the ocarina, which has led

to many interesting compositions. During my first initial exploring of the ocarina I played some melodies from known songs like Take On Me by Aha, Never Gonna Give You Up by Rick Astley and even the *Super Mario Bros.* Theme (Nintendo, 1985).

After exploring the ocarina for a while, I started receiving video recommendations on Youtube, to videos of people who had done the exact same as me: composing or recreating known melodies with the ocarina. This piqued my interest even more, which led me to an article, or rather a post, on the fan website called *Zelda Dungeon*. It was about a Youtuber called Bigfatfrown, covering Africa by Toto using *The Legend of Zelda: Majora's Mask 3D* (Nintendo, 2015), performing all the voices and recording it through the mini-jack port on the Nintendo 3DS (Bigfatfrown 2022). It's not the most accurate and pleasing version of the song I've heard, and it has some questionable harmonies that are reluctantly there because of the pitch of the drums, but it shows the musical possibilities given to the player inside these games.



Bigfatfrown's covering Africa by Toto (Bigfatfrown 2022).

6. Conclusion: The Future of Music in Games

If it's not fun, why bother?.

(Reginald Fils-Aimé former president and chief operating officer of Nintendo of America, 2019)

Throughout this thesis I have considered how adaptive music impacts the player in games. Some of the questions that have surfaced concerned the immersion of the player in the game, while others covered the elements used to produce a sense of immersion. As mentioned in the introduction, I have sought to better understand how adaptive music affects players through analytical play. I wish to emphasise that my experience with the games for the purpose of this thesis has a decidedly analytic intention, as opposed to the normal player, who would play for the fun of it.

In my playthrough of *Monkey Island 2: LeChuck's Revenge* (Lucasfilm Games/LucasArts, 1991), I encountered much sonic variety and found answers to some of my central questions. On many occasions I felt invested in the story, much because of the musical decisions made by the composers to enhance the storytelling. The music accompanied the visuals to the extent that I felt it could convey my whereabouts on its own. An example of this is the use of tools as a rhythmic element in the Woodtick Woodshop. At times I muted the game to understand exactly what effect the music had on my immersion. During the muted periods I felt disconnected and as if I missed out on the essence of the game. This method might be considered as extreme because we can assume that the average player does not mute the game while playing, making it an unrealistic situation. However, by doing this it became apparent that the function of adaptive music was to aid the immersion of the player.

In my findings, the way in which the iMuse system works as a pit orchestra, as described by McConnell, lifts the gaming experience to a new level and brings it to life. The way the music matches the players actions got me to feel like I am taking part in the game's story. As Ron Gilbert, the creator of the Monkey Island series once said: “[iMuse] was just pure genius. I wish

I could claim credit for it” (Gilbert cited in Smith 2008, p.65). I believe the system was part of changing video game audio to what it is today.

The use of horizontal mixing in *Monkey Island 2: LeChuck's Revenge* is apparent, and even though the pieces are similar, their changes between scenes are obvious. Given this was the first game to apply the iMuse system, I consider it to be revolutionary for the video game music industry. The smooth transitions between different parts of Woodtick in combination with the small, yet key changes in composition assists the player perfectly with immersion of the game. This convinced me that adaptive music has a literacy that communicates the visuals to the player.

While playing *Sid Meier's Civilization VI* (2K, 2016), I experienced both similarities and differences to the playthrough of *Monkey Island 2: LeChuck's Revenge*. The first evident difference was that the music came second to the gameplay. In contrast to *Monkey Island 2: LeChuck's Revenge*, *Civ VI* applies vertical mixing, which conveys the evolving of eras in the game, with small or big changes in the composition. Although the music changes to fit the civilizations you pass while moving around on the map, aiding the story, it still provides less information than the music in *Monkey Island 2: LeChuck's Revenge*. What I mean by this is that the music in *Civ VI* is used to signify considerable events, compared to that of *Monkey Island 2: LeChuck's Revenge*, where the music continuously communicates smaller changes throughout the game. I believe this illustrates the clear difference between vertical and horizontal mixing.

The immersion aspect of the game would be compelling and was mostly noticeable while I travelled through other nations, especially South-Korea. The music changed and added the Korean instrument Gayageum and suddenly I felt like I was standing somewhere in Asia. These types of sonic cues made the travels around the map feel longer than they appeared on the map. What caught my interest concerning adaptive music in this game was how the composition evolves with the evolution of the player's nation. I want to praise how each nation has its own theme in the form of a folk-like composition that is layered throughout the game to fit the current time. One of the answers I sought to answer was if the instrumentation used in the composition was historically correct. This might have been my only disappointment about the music in this game, as it turned out the creators had not stayed completely true to the history of music and

instrument evolution in the game. However, it did not take away much from my enjoyment of the game. I believe it is still impressive to think that the composers made 50 different themes to the 50 nations represented in this game.

Throughout my study I have referred to immersion on several occasions. I believe it is important to stress the significant role adaptive music plays in video games. By playing through the games with analytical attention to audiovisuality, I gained a better understanding of how the communication afforded players through sound and music is of utmost importance for immersion. One could claim that a game that has a soundtrack that can back up the writing, animations, storytelling and design is more likely to become successful. Because video games are an interactive form of media, the music needs to be interactive as well. By utilising adaptive music, the creators go above and beyond when communicating with the player as the game is being played. This is something I experienced through my analytical play, where I felt like the music enhanced enjoyment and immersion when playing. A downside to adaptive is that if done incorrectly or poorly, it can potentially ruin the immersion of the player. This places a huge responsibility on the audio department of a game studio, and I believe it calls for an increase in people who are passionate and skilled in their job as video game composers.

During the process of this thesis, I became aware that the use of adaptive music in games provides accessibility to players with vision disabilities. A game that fully utilises the concept of adaptive music to directly communicate to the player about their every move, could help players play the game even without vision.

6.1 In-game composing

In the chapter of in-game composing, several questions were posed concerning music as a game mechanic, and the challenges and opportunities this produces. *Loom* (Lucasfilm Games, 1990), the first game I investigated, provided further understanding of the usage of music as a mechanic in games. The fact that the idea of using music as a game mechanic came from the limits of another idea is fascinating. When *Loom* was released, there were far more limits to software and hardware, both for the creators and the consumers. The creators had to work around the obstacle

that was hardware shortage with consumers and make a system that could be carried out without a computer mouse. Through using music as a game mechanic, they made a reward system that both made the game more amusing, in addition to creating a system that kept people playing the game. Solving puzzles with music rewarded the brain twice: Once for learning the melody and second for accomplishing the task at hand. I find this solution very motivational, especially considering the vast options creators have today. To think that they made this sophisticated entertaining system with the constraints of 1990s technology is rather impressive. It could only provide inspiration for future game developers.

Another question I attempted to address while playing *Loom*, was how the temptation of learning a new instrument challenges the desire to play the game when presented with one. It quickly became apparent that there were several limitations to the instrument, which made the need or want to learn how to play minuscule. Furthermore, the use of a classical music piece as a soundtrack was a clever move by Moriarty and Sanger. It was music that people most likely would have heard before, creating a sense of familiarity to the game even before they had played through it. In addition to that the character of the music fits the story quite well, in my opinion.

The Legend of Zelda: Ocarina of Time (Nintendo, 1998) is in many ways similar to *Loom* in terms of game mechanics, only there are more possibilities regarding performance on the instrument presented. In *The Legend of Zelda: Ocarina of Time* we come close to complete freedom concerning the ocarina. Still, the developers have created a game so complex and compelling, that this freedom does not interfere with the urge to play and finish the game. The use of music is not the only game mechanic in this game, which I believe is part of why it could be considered more entertaining compared to *Loom*. The fact that the player is exposed to different game mechanics might contribute to their continuous engagement. While playing the game I felt captivated by the story and puzzle solving and believe that this in combination with action-oriented gameplay and music performance kept me playing. Granted, I am influenced by my background as a musician, but I found it amusing that I was able to “learn” a new instrument while playing a video game. I believe the differences between these games are mostly dependent on the time gap: *The Legend of Zelda: Ocarina of Time* was released eight years after *Loom*, in

which there had been substantial technological advancements, such as adding a 3D-perspective instead of 2D.

6.2 Future potential of music in games

The future of music in games has immense potential. Composers and sound designers are already pushing the possibilities with their work, such as in *Octopath Traveler* (Square Enix, 2018) where they have created a piece of music that is tailored to keep the interest of the player. Or how in *The Legend of Zelda: Ocarina of Time* the developers and composer have together created a psychological reward system based on performance that keeps the player wanting to play the game.

During this study I was presented with an idea that I had not considered before talking to a colleague of mine at Høyskolen Kristiania, who mentioned Terry Garret. Garret is referred to as a blind gamer in the article by Wired, written by Jason Schreier in 2011. He has played through both *Oddworld: Abe's Odyssey* (Oddworld Inhabitants, 1997) and *The Legend of Zelda: Ocarina of Time* only based on the sound and music from the game. Looking at the picture from the article, it looks like he has some special equipment for playing, including speakers that are mounted to the chair he is seated in. "Garrett's unlikely accomplishments underscore the importance of good sound design in video games. When was the last time you paid attention to the clang of a sword, or the patter of your character's footsteps?" (Schreier 2011). I believe and hope that there will be more games that rely on sonic elements, specifically tailored to be accessible for people with visual disabilities.



Terry “The Blind Gamer” Garret (Schreier 2011).

This ignited my interest in further researching the term that I previously coined ludomusicliteracy. Instead of ludomusicliteracy, I consider the term ludosonicliteracy to be more inclusive, stressing the importance of all sound in games. For instance, sound that backs up the story, alerts the player of changes in environment or assists the player independent of the player's visual abilities. Following on from this thesis I intend to further investigate blind gaming and take part in advancing accessibility for games through music and sound.

Another idea to extend the sonic possibilities in games, developed in a conversation with my partner. She asked me if there is any way that music could be used in the same way that games like *World of Warcraft* (WOW) (Blizzard, 2004) or *Smite* (Hi-Rez Studios, 2014) use different weapons and magic to combat. She was amused by the idea of playing a task-based game which had to be solved by a team, where each player had a different musical skill set from the other players. WOW is a story-based game that makes the player perform different quests and tasks in order to help the NPC (non-playable characters), that rewards you with either the game's currency, experience points that help the player level up their character, or items and equipment that is useful in the game. In WOW or *Smite* the guilds or teams are chosen based on the skillset of the different players. With the team you can either play around inside the game or perform quests together, which often requires a team effort due to the strength of the enemies. The groups, or guilds, are made up by players with different skill sets, and it would be exciting to see if a game could incorporate this type of problem solving with the use of music in teams. It would be interesting to explore a game that lets you choose a class based on instruments in an orchestra

or voice registers such as baritone, tenor and the likes, in order to build a team that solves tasks and defeats enemies together based on performance. The idea of this game sparks new questions: How would one compose music for this type of game? Would it be possible for players to compose original music within the game or should there be presets and limitations like in *The Legend of Zelda: Ocarina of Time* and *Loom*. If there were limitations such as set melodies, should there be a score system that awards you points on how well you perform together with your group, like in *Guitar Hero* or *Dance Dance Revolution*? There are many options that would be exciting to investigate further. However, there are some challenges with the development of such a game. First of all, the creation of such a game could be quite time consuming. Another difficulty with this type of game could be creating instruments that work well enough in the game to make it enjoyable for the players, that in turn let them become immersed. Furthermore, achieving the correct timing between players could become a problem, as it might depend on the speed of each player's internet connection.

6.3 Conclusion

Surprisingly enough, I find myself drawing the same conclusion for the two rather different techniques of applying music in games. The overall answer I arrived at concerning why developers use music as a game mechanic or use adaptive music in games is simple: immersion and fun.

The way adaptive music have been used to create smooth transitions, whether it was between different parts of the world or eras, has helped me become immersed in the games. It has made me realise how strong the power of music in games is, and how well composed pieces of music enhance and impact the players perception of the story. The same is applicable for using music as a game mechanic. Based on my findings it has become evident that these two techniques, either in combination or separate, ease the immersion of the player, making playing games exceedingly more fun.

Regarding my central research question: *How has the approach to composing video game music evolved in line with technological breakthroughs*, there is little doubt that the art of composing

video game music has evolved in tandem with technological developments, from chiptunes to full blown orchestral compositions. The technological developments have changed the way composers think about music and compositions for games. I believe the creators of games today need to think holistically about the games they make, in a different fashion than they had to in the early years of video game creation. This hopefully becomes apparent in my case studies, where I have sought to describe in detail aspects of compositional design and what choices the game developers, sound designers and composers make when considering music as a mechanic and adaptive music. These tools have contributed to changing the way the players perceive the stories in games and help them become immersed and enjoy whatever game they chose to play. Indeed, technological breakthroughs allow for more complex interaction with the player through sound and music as well as presenting them with new ways to play games. As we have seen, rhythm games and games require you to perform music to advance throughout the story. In sum, the technological breakthroughs have opened possibilities for composers to create immersive worlds in video games that create fun experiences in new and interesting ways for players to enjoy.

7. Attachments

- Attachment 1: Full score from analytical play (p.91-96).
- Attachment 2: Video from analytical play. Espeseth, Alex. 2022. *Monkey Island 2, LeChucks Revenge. Analytical play by A. Espeseth, Performed the 3rd of January 2022.*
https://www.youtube.com/watch?v=Sy2Oq4lAcVE&ab_channel=AlexEspeseth

Monkey Island 2: LeChucks Revenge

Arranged from Analytical Play

Arranged by: Alexander Espeseth
Analytical Play by: Alexander Espeseth

1. Woodtick

J = 68

Musical score for '1. Woodtick' in 4/4 time, tempo *J* = 68. The score includes four staves: Banjo (treble clef), Piano (bass clef), Bass (bass clef), and Drums (percussion clef). The Banjo part has a melodic line with some grace notes. The Piano part provides a harmonic accompaniment with chords and single notes. The Bass part has a driving eighth-note pattern, marked *ff*. The Drums part features a consistent eighth-note pattern, also marked *J* = 68.



Continuation of the musical score for '1. Woodtick'. It includes staves for Banjo (Ban.), Piano (P.), Bass (B.), and Drums (D.). The Banjo part continues with its melodic line. The Piano part continues with its harmonic accompaniment. The Bass part continues with its driving eighth-note pattern. The Drums part continues with its consistent eighth-note pattern.



2. Cartographer's Hut

7

Musical score for '2. Cartographer's Hut' in 4/4 time, starting at measure 7. The score includes four staves: Violin (Vln., treble clef), Organ (Org., treble clef), Bass (B., bass clef), and Drums (D., percussion clef). The Violin part has a melodic line with a *pizz.* marking. The Organ part has a rhythmic accompaniment with a *mpff* marking. The Bass part has a simple melodic line. The Drums part features a pattern with a *(cym.)* marking.

2

10

1. Woodtick

Vln.

P.

Org.

B.

D.

Musical score for '1. Woodtick' featuring Violin (Vln.), Piano (P.), Organ (Org.), Bass (B.), and Drums (D.). The score starts at measure 10 and includes a double bar line at the end.

3. Woodtick Woodshop

14

Ban.

Vln.

Cl.

P.

B.

D.

(cym.) (Hammer) (Sawing)

Musical score for '3. Woodtick Woodshop' featuring Banjo (Ban.), Violin (Vln.), Clarinet (Cl.), Piano (P.), Bass (B.), and Drums (D.). The score starts at measure 14 and includes performance instructions: 'pizz.' for the violin, and '(cym.)', '(Hammer)', and '(Sawing)' for the drums. A double bar line is present at the end of the section.

18

Vln.

Cl.

B.

D.

Musical score for measures 18-21, featuring Violin (Vln.), Clarinet (Cl.), Bass (B.), and Drums (D.).

1. Woodtick

3

Musical score for '1. Woodtick' (measures 21-24). The score is for five instruments: Banjo (Ban.), Violin (Vln.), Clarinet (Cl.), Bass (B.), and Drums (D.). The key signature is one sharp (F#) and the time signature is 4/4. The Banjo part is mostly rests with some activity in the final measure. The Violin part features a rhythmic pattern of eighth notes. The Clarinet part has a melodic line with some grace notes. The Bass part has a steady eighth-note accompaniment, marked with a forte (*ff*) dynamic. The Drums part features a consistent eighth-note pattern.

4. The Bloody Lip Bar & Grill

25

Musical score for '4. The Bloody Lip Bar & Grill' (measures 25-27). The score is for four instruments: Violin (Vln.), Trombone (Trb.), Organ (Org.), Bass (B.), and Drums (D.). The key signature is one sharp (F#) and the time signature is 4/4. The Violin part has a few notes, marked with a pizzicato (*pizz.*) dynamic. The Trombone part has a melodic line. The Organ part provides a rhythmic accompaniment with chords. The Bass part has a steady eighth-note accompaniment, marked with a mezzo-forte (*mf*) dynamic. The Drums part features a pattern with a cymbal (*(cym.)*) in the first measure.

28

Musical score for '4. The Bloody Lip Bar & Grill' (measures 28-31). The score is for four instruments: Trombone (Trb.), Organ (Org.), Bass (B.), and Drums (D.). The key signature is one sharp (F#) and the time signature is 4/4. The Trombone part has a melodic line. The Organ part provides a rhythmic accompaniment with chords. The Bass part has a steady eighth-note accompaniment. The Drums part features a consistent eighth-note pattern.

4

1. Woodtick

32

Ban.

Trb.

P.

Org.

B.

D.

5. Woodtick Laundry

36

Vln.

Trp.

B.

D.

39

Vln.

Trp.

B.

D.

1. Woodtick

6. Swamp Rot Inn 5

43

Pan. Ban. Vln. Trp. P. Org. B. D.

pizz. mf



47

Pan. Org. B. D.



50

Pan. Org. B. D.

6

1. Woodtick

53

The musical score is arranged in six staves, each with a different instrument label on the left: Pan., Ban., P., Org., B., and D. The key signature is one sharp (F#) and the time signature is 2/4. The score is divided into two measures by a double bar line. The Pan. staff begins with a melodic line in the first measure, followed by a whole rest in the second. The Ban. staff has whole rests in both measures. The P. staff has whole rests in both measures. The Org. staff has two chords in the first measure and a whole rest in the second. The B. staff has a continuous eighth-note bass line. The D. staff has a continuous eighth-note bass line.

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9. Ludography

Title. Developer/publisher. Year. Original platform.

- *AereA*. Triangle Studios. 2017. PC
- *Banjo Kazooie*. Rareware. 1998. Nintendo 64
- *Beyond Zork*. Infocom. 1987. PC
- *Dance Dance Revolution*. Konami. 1998. Arcade
- *Dancing Road*. Amanotes. 2018. Apple iOS, Android
- *Deus Ex*. Eidos Interactive. 2000. PC
- *Devil May Cry 5*. Capcom. 2019. PC, Sony Playstation 4, Microsoft Xbox One
- *Donkey Kong* (series). Nintendo. 1981-present. Various Nintendo consoles
- *Doom Eternal*. Bethesda Software. 2020. PC, Sony Playstation 4, Microsoft Xbox One, Google Stadia
- *Duck Hunt*. Nintendo. 1984. Nintendo Entertainment System
- *Empire*. New World Computing. 1977. PC
- *Escape from Monkey Island*. Lucasfilm Games/LucasArts. 2000. PC
- *Final Fantasy* (series). Square/Square Enix. 1987-present. Various consoles and computers
- *Frogger*. Konami. 1981. Arcade
- *F-Zero* (series). Nintendo. 1990-present. Various Nintendo consoles
- *Goetia*. Sushee. 2016. PC
- *Guitar Hero*. Harmonix. 2005. Sony Playstation 2
- *Guitar Hero Aerosmith*. Neversoft. 2008. Sony Playstation 3, Microsoft Xbox 360, Nintendo Wii
- *Guitar Hero Metallica*. Neversoft. 2009. Sony Playstation 3, Microsoft Xbox 360, Nintendo Wii
- *Halo*. Bungie. 2001. Microsoft Xbox
- *Hollow Knight*. Team Cherry. 2017. PC
- *Loom*. Lucasfilm Games/LucasArts. 1990. PC
- *Magic Tiles 3*. Amanotes. 2018. Apple iOS, Android

- *Maniac Mansion*. Lucasfilm Games. 1987. PC
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- *Monkey Island: 2 LeChuck's Revenge*. Lucasfilm Games/LucasArts. 1991. PC
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- *Pokémon Mystery Dungeon Explorers of Time*. Spike Chunsoft. 2007. Nintendo DS
- *Pokémon* (series). Game Freak, The Pokémon Company, Nintendo. 1996-present. Various Nintendo consoles, Apple iOS, Android
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- *Red Dead Redemption*. Rockstar Games. 2010. Sony Playstation 3, Microsoft Xbox 360
- *Return to Monkey Island*. Terrible Toybox. 2022. PC
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- *Rock Band Beatles*. Harmonix. 2009. Sony Playstation 3, Microsoft Xbox 360, Nintendo Wii
- *Rock Band Green Day*. Harmonix. 2010. Sony Playstation 3, Microsoft Xbox 360, Nintendo Wii
- *Sheriff*. Nintendo. 1979. Arcade
- *Sid Meier's Civilization*. MicroPros. 1991. PC
- *Sid Meier's Civilization II*. MicroPros. 1996. PC
- *Sid Meier's Civilization III*. Infogrames Interactive. 2001. PC
- *Sid Meier's Civilization IV*. 2K. 2005. PC
- *Sid Meier's Civilization V*. 2K. 2010. PC
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- *Sid Meier's Civilization Revolution*. 2K. 2008. Sony Playstation 3, Microsoft Xbox 360
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- *Sid Meier's Colonisation*. MicroPros. 1994. PC
- *SimCity* Maxis. 1989. PC
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- *Smite*. Hi-Rez Studios. 2014. PC
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- *Super Mario Bros. 3*. Nintendo. 1988. Nintendo Entertainment System
- *Super Mario Odyssey*. Nintendo. 2017. Nintendo Switch
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- *The Curse of Monkey Island*. Lucasfilm Games/LucasArts. 1997. PC
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- *The Legend of Zelda: Majora's Mask*. Nintendo. 2000. Nintendo 64
- *The Legend of Zelda: Majora's Mask 3D*. Nintendo. 2015. Nintendo 3DS
- *The Legend of Zelda: Ocarina of Time*. Nintendo. 1998. Nintendo 64
- *The Legend of Zelda: Ocarina of Time 3D*. Nintendo. 2011. Nintendo 3DS
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- *The Secret of Monkey Island*. Lucasfilm Games/LucasArts. 1990. PC
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