Jacob Westberg

Ludonarrative harmony

Music production through the lens of game design

Skriftlig reflektion inom självständigt arbete

Till dokumentationen hör även följande inspelning:

MUSIC_Abyssal_Viscus.mp3, MUSIC_Exlantiménos.mp3,
MUSIC_Éxo.mp3, MUSIC_Friendly_Stranger.mp3,
MUSIC_Sans_Void.mp3, MUSIC_Solve_et_Coagula.mp3,
MUSIC_Trailer.mp3, MUSIC_Tricari.mp3,
VIDEO_Abyssal_Viscus.mov, VIDEO_Exalntiménos.mov,
VIDEO_Guitar.mov, VIDEO_Outro.mov,
VIDEO_Solve_et_Coagula.mov, VIDEO_Solve_et_Coagula_2.mov,
VIDEO_Trailer.mov, VIDEO_Transistor_radio.mov
Abstract

This is a study of how game design has influenced my artistic process as a music producer for a video game called Sang: The Desert Blade. The artistic practice is used to explore a concept in game design called ludonarrative. The experiences gathered from this exploration are presented with examples of music that have been created and implemented for the game during this study. The music examples are contextualized together with video documentation from my creative process and video recordings of the game. The study concludes that video game music is directly interconnected with game design and its aesthetics is directly affected by the degree to which a music producer is included in the development team. The study also shows how unpredictability is a fundamental part of game design and suggests how it can be explored in future artistic research of video game music.

Keywords: Ludonarrative, video game music, music production, game design, video games

Abstrakt


Nyckelord: Ludonarrativ, dataspelsmusik, musikproduktion, speldesign, dataspel
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Introduction

Video games has been the most important source of inspiration during my musical upbringing. Meanwhile the video games industry has increased its export and is rapidly exceeding both film and music combined (Dataspelsbranschen, 2021).

It can be argued that music for video games is a relatively unexplored artform, since video games alone are subject to an ongoing transformation that evolves with technological, cultural, and aesthetic trends. I have questioned myself if the role of music production for video games may contain assumptions that have evolved from inherited beliefs of music production in other visual media. In order to discover these assumptions, I explore my practice as a music producer for the video game Sang: The Desert Blade by applying methods from game design as a starting point.

In the borderland between music production and game design it is possible to identify a shared set of problems that emerges when the game and its underlying music interacts. The interaction between the game and the music may even create unintended artistic results. For the sake of exploring how I can achieve my intended artistic result in video game music, this study rests on the hypothesis that a music producer who understands game design will be more qualified to create music for a game. The research question that guides this study is:

What experiences can I draw as a music producer for games when I apply methods from game design in my artistic process?

To gather experiences that are relevant for understanding music production through the lens of game design, this study is focused on one concept in game design called ludonarrative.

Ludonarrative harmony

This study revolves around the term ludonarrative, which is a compound of the words “ludology” (the study of games) and “narrative”. The term is used to describe the emerged narrative which is experienced when a player interacts with a game and its multiple layers of rules, mechanics, dynamics, and aesthetics. Coined by game designer Clint Hocking, who describes that a game’s aesthetic narrative can be contradicted by the game’s underlying rules
and mechanics. Hocking argues that this type of contradiction results in a problematic *ludonarrative dissonance*, and if the game’s mechanics instead has a symbiotic relationship with its aesthetics, then that problem would not exist. (Hocking, 2007)

An example of ludonarrative dissonance could be imagined as a game which follows a protagonist who is portrayed as a righteous pacifist, but the gameplay forces the player to kill enemies in order to progress through the story without addressing this contradiction. In this way, an unintended narrative emerges through the interaction of the player.

This way of describing the emergence of interactive narrative has further been elaborated by Frédéric Seraphine who explores what it means for a game to have ludonarrative dissonance. Seraphine concludes that ludonarrative is the sum of all media that coexists inside of a game and argues for how it can be manipulated to produce results that conveys artistic expressions in unique and meaningful forms. (Seraphine, 2016)

On a related note, the role of using music to convey narrative in video games has generally been appropriated from cinematography and film. Game music is often described as required to be composed and designed in a way that adapts to the gameplay and the mind state of the player to maximize its function. In that case, designers and composers needs to predict what and when the player should hear a piece of music that is suitable for each moment. (Bridgett, 2013)

However, as the differences in narrative between films and games have been mapped (Ryan, 2004), it can be argued that new types of artistic expressions can emerge when the fields of music and game design operates together in a game. It is this interaction between game and music that this study explores with the aim to discover unique ideas for composition, production techniques and artistic practice. Some games have achieved a synergy between the game design and its music. One example is *Untitled Goose Game* (Golding, 2019) that has been designed to sound like there is a jazz pianist improvising musical phrases over the mischievous acts of the player. The successful synergy of game design and music is what will be referred to in this study as ludonarrative harmony.

**Purpose**

The purpose of this study is to explore the role of a music producer in video game development. By comparing similarities and differences between the methods used by music
producers and game developers, the study intends to suggest a shared base of knowledge which may facilitate collaboration and understanding between the two fields.

The study is divided into three sub-topics, with the purpose to explore the research question from three different perspectives of music production for video games: 1) Pre-production, 2) Development, 3) User testing.

**Delimitations**

This study provides a touch-down in a project which is under development, meaning that the published version of the final product may look and sound different than the material presented here.

This study does not seek to make a qualitative judgment on its musical artifacts, other than the qualitative aspects that relates to the research question, since the project is under development and is subject to change. While the research does contain several artifacts, the purpose of their inclusion is to discuss how it relates to the ludonarrative. Moreover, they are not necessarily representative of the final product of the game but are used as a reference for discussion.

The study does not recount in detail how the technical solutions were achieved but points out the implications of the technical solutions in game development. This study also discusses music in video games without classifying its technical quality (interactive music, adaptive music, dynamic music et al.) since this is a special characteristic of music in video games that can be considered implicit. However, the significance of the game’s interactive aspects is addressed where it is necessary for understanding the results of the study.

**Prior research**

In the case of music production and composition for video games, Winifred Phillips has written the book *A Composer’s Guide to Game Music* (2014) which explains the basics of the composer’s role in game development. Phillips also gives examples of how music for games can be created to change during gameplay with two techniques called vertical and horizontal layering. Karen Collins provides a comprehensive historical overview of video game music in *Game Sound* (2008) which can contextualize the results of this study.

On the aspect of aesthetics in video game narratives, Marie-Laurie Ryan (2004) has edited a book that explores and analyzes aesthetics of interactive media as opposed to traditional media.

Patrik Juslin (2019) has summarized comprehensive research of the psychological mechanisms that are relevant to how music creates emotions, which is used in this study to contextualize aspects of how emotions in video games are related to music.

The challenges and consequences of interdisciplinary work has been presented in an article on the effects of delegating tasks in development teams by Melvin E. Conway (1968).

*Methodological considerations*

This is a study of artistic research in music production for video games. The field of artistic research is a form of study that is conducted through the artistic process, classified by Borgdorff (2007) as research in the arts. The goal of artistic research is to present the act of creating art in a way that may create new knowledge by communicating that knowledge through the art itself. Therefore, this study contains both audio files and video files that are referenced to discuss the research question. The study is also contextualized through research from game design and game theory.

This study is performed through the production of music for a video game titled *Sang: The Desert Blade*, which is being produced by game developer FiskyFisko. Research is conducted during the game’s development and material is collected through audio recordings, video recordings, screen captures from the game.

Several informal interviews has been conducted throughout the research which acts as a base for discussion against the discoveries that can be concluded from the practical results. To clarify that the research includes interviews with two different audio directors, they have been annotated as Audio Director [A] and Audio Director [B].
The artistic approach of this research is based on the writings of Nassim Nicholas Taleb and his book *Skin In The Game* (2019), which promotes experience-based actions before theoretically based decisions.

The results are presented by categorizing the study into three distinct phases of the production process: Pre-production, Development, and User testing.

However, it should be noted that these three phases overlapped each other during the entire process. Especially the development and user testing phases were cycling back and forth as part of the game production cycle. The disposition in this study should therefore not be considered chronological.

**Ethical considerations**

This research follows the ethical guidelines presented by the Swedish Research Council in *Good Research Practice* (Vetenskapsrådet, 2017). Throughout this work the scientific principles suggested by the Swedish Research Council has been taken into consideration to ensure anonymity in relation to unpublished material.

**Disposition**

This paper is divided into three main sections. Firstly, an introduction that describes the background and fundamental theory for this study.

Secondly, under the chapter called *Three phases with ludonarrative considerations* the process of working with the music for the game is presented in three phases: Pre-production, Development and User testing. Each phase is subsequently divided into two sections: 1) A section that presents several aspects of game design that were considered during each phase, and 2) a section that presents pieces of music that were created during the same phase.

Thirdly, the results of the study are discussed in three reflective chapters: *Art in video game music, Conway’s law in music production for games* and *Embrace the unpredictable*. The paper is concluded with a problematization of the study and a short discussion on possible future research of the study’s subject.

Finally, the study contains an appendix which explains some central concepts in the study.
Three phases with ludonarrative considerations

The study based on my process of producing music for a video game called *Sang: The Desert Blade*, developed by a person who is a professional graphic designer. The developer, called FiskyFisko, started working on it in 2018 and has authored a story and design for the game. It is developed with a game engine called GameMaker Studio 2, which allows users to create the majority of game assets and technical solutions themselves.

Information on how to access and play the latest public version of the game can be found on the developer’s website: [https://fiskyfiskogames.com/](https://fiskyfiskogames.com/)

The developer has classified the game as a top-down action RPG, inspired by *Dark Souls* (2011) and *The Legend of Zelda: A Link to the Past* (1991). Its visual style is inspired by the pixelated graphics and low-resolution design in games released between circa 1985 and 1995. The attached file in this study named VIDEO_Trailer presents the project in a short sequence of scenes that shows the central themes and gameplay, scored by a distilled version of the musical motifs.

The story of the game revolves around the adventure of the protagonist Sang, who escaped her home village as a child with her mother when the ruling sect started to develop sacrificial rituals that Sang risked becoming subject to. After she starts experiencing disturbing visions during adolescence, Sang decides to travel back to her birth village only to discover that it has
been infested by a mysterious entity that has infected the inhabitants and other creatures, rendering them hostile and violent.

During this study, the game project is in a state called vertical slice, a proof-of-concept that presents the fundamental mechanics and aesthetics of the project which can be shared by the development team to the public and potential investors, with the intention to raise finances through a crowdfunding campaign. The project also includes a dedicated open forum, through a service called Discord, which allows the project’s team and its supporters to communicate directly with each other.

My role as a music producer for this project has been to compose, produce, and implement, original music that scores the game in a style that supports both the macro and micro narrative. Since composing and production was my sole responsibility, I had the freedom to use any tools and procedures that I deemed suitable, but I was required to do the implementation of the music and programming inside the game engine chosen by the developer.

Furthermore, as a consequence of having a direct communication with the project’s supporters it also became possible for me to show and discuss the music of the game with whoever was interested in the project forum. This allowed me to perform user testing, and other audience focused research, independently from the developer.

**Pre-production**

In this section, I describe the first phase of working with the game and has divided the results into three design aspects: Conceptualization, Music design document and Collaboration through version control. Two pieces of music are also presented: Solve et Coagula and Sans Void.

When I approached developer FiskyFisko with the idea of letting me have the responsibility of creating music for the project, my intuition was to write a demo based on the small amount of information I had about the game.

As part of exploring new ideas during pre-production, I had a conversation with an Audio Director [A] who explained a current problem on which they were working. They needed to maintain a musical continuity with musical contingency, since the game they worked on
allows the player to navigate freely in a world filled with puzzles, exploration, and combat. This made me draw up a diagram which displayed an idea how having several musical figures with customized entrances and exits which would follow the ludonarrative of the player’s actions. The thought came to me as I reflected on the different established music systems referred to as vertical and horizontal layering (Phillips, 2014). I imagined a combination of these two concepts where several figures of music are connected in a circular network which may be played back in an order that mimics a natural movement between the figures. My intention before starting the project was to find a way to implement this concept, which I named *circular layering*, into the game.

**Design artifacts**

During pre-production there were three distinct aspects of applying game design that had direct implications on how the music was composed and produced: *Conceptualization, Music design document* and *Collaboration through version control.*

**Conceptualization**

The developer revealed that the artwork and narrative was conceptualized through a process of drawing inspiration from pre-existing mythical stories and symbolisms. The stories and symbolisms were then modified to capture their aesthetics without referring to their original context. Thus, evoking a significant notion of mystery in the eye of the beholder. The idea, as I interpreted it, was that the visual imagery and story would seem familiar to the audience while it would also alienate them, which would result in a mysterious impression.

![Figure 2) Screen capture from the attached file VIDEO_Trailer, showing the mythical symbolism that is part of the game’s aesthetics](image)
We also discussed the type of gameplay (the style of action and interaction in the game) and how the story is told to the player. This discussion established my understanding of the core concept and style of the ludonarrative that the music would embody. Emotions such as fear, relief and curiosity seemed to be the core motivating emotions of the envisioned player. The developer agreed with my assessment and also referenced the somber atmosphere of the video game Demon’s Souls (Kida, 2009) as a desired aesthetic for the music, a game where music is only heard during key moments throughout the gameplay while most of the game is not scored at all.

As with Demon’s Souls, a common trope in scoring adventure narratives is the use of a symphonic orchestra. This allowed me to write music by improvising with a midi-keyboard and an orchestral library that followed the mythical adventure aesthetics of Sang, which meant that I could send audio files with ideas to the developer shortly after we had discussed the central concepts of the game and how they should be illustrated through music.

**Music design document**

The starting point for this study was to understand ludonarrative (Hocking, 2007) through the process of creating music for a video game. To explore what kind of ludonarrative that would emerge in Sang, I explored what methods and tools are used in game design during conceptualization. One useful tool is the game design document (Adams, 2014) which is used by designers to communicate a common project vision within a development team, but it may also prove helpful in a process of self-reflection.

Based on the study’s hypothesis, game design may infer decisions about the music for a game. This prompted a method to understand the main motivations of the players and thus figure out how to score those motivations musically.
Figure 3) Diagram outlining the assumed core emotions for the music in Sang: The Desert Blade

Inspired by the idea of a game design document, I created a music design document as shown in the image above. By leaving out genre specific labels, it formed an abstract overview of what kind of music could be considered fitting for this context, since this was done in the early stage of production. The design document is based on a so called 6-11 Framework proposed by Dillon (2014) which intends to identify a set of core emotions that makes the game fun (Federoff, 2002).

Game design documents are usually more detailed with lists and graphs of all events and assets. However, the music design document intentionally left out any rigid design decisions. Instead, the document was created in a way that primarily identified the core emotions which were assumed would be central to the game’s aesthetic and gameplay. Those core emotions could thereafter inform what the aim should be for the composition and production of music.

As can be seen in figure 4, because of the story driven nature of the game, the player is assumed to identify with the protagonist and will feel a sense of curiosity about the world in which the game takes place. As a consequence of this auto identification, it was assumed that the player would feel a sense of fear of letting the protagonist get hurt. The effort to survive,
and the excitement that comes as a result of that, effort is then assumed to be one of the core emotions that drives the player’s engagement. With the connection to the core emotions had been identified, I could start composing and planning the music implementation from a departure point that took the game’s ludonarrative aspect in consideration.

Collaboration through version control

A third aspect of pre-production was setting up the rules of collaboration with the developer. I suggested that we would share our code through a widely used system called Git since the developer was not familiar with version control and code management. It allowed me to work on implementing new music without disrupting the developer’s production schedule. When either of us were finished with a new feature we would update our work with the latest functioning version, and therefore the developer had the ability to publish and update a demo of the game that would work without any bugs.

By collaborating through version control, I could explore and develop the game’s ludonarrative through the process of producing the music and implementing it inside the game engine, without interrupting the work of the developer. For instance, I could experiment with unusual ways of programming the music behavior of a boss fight at my end, independently on what the developer was working on.

This method of collaboration made it possible to have a published version of the game, while I could explore unusual ways to create and implement the music for the project. When an experiment proved valuable for the game, I could therefore incorporate it into the next update of the published version, while the experiments that were unsuccessful could be disregarded by the developer.

Music artifacts

Two significant pieces of music were composed and produced by me during pre-production: Solve et Coagula and Sans Void. They were specifically linear and intended to show a possible concept of how the music would sound in the context of the game.

Solve et Coagula

- MUSIC_Solve_et_Coagula.mp3
- VIDEO_Solve_et_Coagula.mov
This was the first piece of music written and produced for the game as a proof-of-concept and was later implemented into a first version for the demo. I composed it in a 11/8 time signature, which was intended to match the ludonarrative of the player is being forced into combat against an intimidating larger and erratic foe.

_Sans Void_

- MUSIC_Sans_Void.mp3

_Sans Void_ is a theme that symbolizes the metaphysical narrative. It is intended as the first music the player hears when starting the game, but it is also heard whenever the player encounters shrines across the game world which are safe zones where the player can restore health and upgrade the Sang’s skills.

_Development_

The development phase contained three aspects of design choices that I found significant: _Music system, RNG or State of Flux_ and _Subtext_. This phase also resulted in three pieces of music that developed through the application of these design aspects: _Tricari, Abyssal Viscus_ and _Solve et Coagula – 2nd pass._

As development was underway it appeared to me that translating and implementing the ideas that were conceptualized during pre-production would become the main challenge. Especially creating a system that could perform musical transitions that sounded natural. However, this challenge proved to be fruitful when it came to exploring the fundamentals of what it means to create music for video games.

It forced me to dive deeper into the world of coding and understanding how to get my artistic vision across in the mechanical cogs of the game environment. This is a world of rules, logical gates, loops, and other operators that are arranged by a coder. And fundamentally, this is a world of dichotomies. On or off.

A computer is capable of creating predictable and repeatable results. A human is capable of being unpredictable. This can create a problem of ludonarrative dissonance if the game designer does not take the player’s interactivity and agency into account. This problem made me hold on to a question I had during development: How can the music follow the ludonarrative when the player is unpredictable?
Design artifacts

During development there were two different aspects on how the envision music informed the development process, these two are discussed under the sub-titles Music system and RNG or State of Flux.

An aspect of narrative design that had special implications on the music is presented under Subtext.

Music system

One of the requirements that had been suggested during the conceptualization phase was the seamless transition between musical parts. An aspect of the game’s ludonarrative is how the player follows the narrative of a hero’s journey described by Campbell (1949) and Murdock (1990). In film music, the hero’s journey is traditionally scored through musical references of the story’s characters that are weaved together as the story acts out. However, to be able to create a musical score that reacted with the moment-to-moment actions of the game, while maintaining a rhythm and continuity that feels natural and musical, I needed to have a way to synchronize different vertical and horizontal layers of music as proposed by Winifred Phillips (2014).

![Figure 4) Screenshot from code that I programmed for the music system](image)

The project’s game engine provided only some simple audio functions which were unable to start and stop playing audio clips at specific beats, as I had envisioned for the music.
Therefore, I programmed a music system in the game engine that uses a timer which I connected to an adjustable tempo and time signature. By having access to this system, data from anywhere inside the game can be sent to the music system, which can then be instructed to play music clips accordingly.

The screenshot from the code in figure 4 shows that the metronome is set at a tempo of 124.1 BPM with a time signature of 11/8. The metronome can be adjusted by code at any point during runtime. The metronome is also completely optional and could be disregarded if I desired to.

This allowed different parts of music to be played back in sync. Music could also be programmed to be played back freely in creative ways, in different tempi and time signatures. Therefore, I could work spontaneously during the composing and production of the music, which gave me room for expressions of the musical ludonarrative without forcing the design decisions onto those expressions in advance.

However, this structure of playing back music according to a predetermined system proved to be inadequate when I wanted to express a ludonarrative that was unpredictable.

**RNG or a State of Flux**

One issue that was bothering me with the music system was that even if it allowed me to focus on creative methods to compose and trigger music, it was still a rigid system that required strict rules and logic mechanisms to work. However, a common idea in game development is that the music should support the mood and theme of the game, and that it should be tolerable no matter the length of time that is spent with the same music (Adams, 2014).

It seemed to me that there exists a correlation in the game between its mechanics and its aesthetics. Because if the ludonarrative of most games contains some degree of unpredictability, as proposed by Schell (2008) and Verhoeff (2009), then that is an attribute of games that can be expressed through the music and how it appears for the player.

This is an aspect of video game music that seemed more important to me than what comes across in the discussions of Phillips (2014), Bridgett (2013) and Collins (2008), who rather presents video game music as attempting to predict and lead the player’s emotions. However, games are unpredictable. A large part of what makes them fun is that the players will not be
fully able to predict the games’ outcome. Most discussions around music for games is regarding the challenge to anticipate events and prepare music that can mimic exactly what the player is feeling at a certain moment. For example, in a podcast episode of Level with Emily Reese, Gareth Coker contemplates the issue with writing melodies that lasts over eight bars of music because the melody would most likely need to be interrupted during gameplay at some points (Coker & Reese, 2020). Instead, I wanted to use unpredictability as an inspiration for how I could compose and produce the music.

![Figure 5) Screen capture from the recording session in the file named VIDEO_Transistor_radio in the study’s attachments](image)

An example of this inspiration is how I used recording techniques where the sound of performed instruments were emitted by various speakers and cabinets that colored the signal in unpredictable ways. For instance, through a computer cabinet from 1989 (which can be heard in VIDEO_Exantliménos), or through a circuit bent transistor radio which can be seen in the video of figure 5. However, to be able to capture that unpredictable sound as it was performed, I placed a pair of microphones in an ORTF-setting in the vicinity of the performers listening spot. My idea was that the performer then has a similar role as the player of a game. They both react to the unpredictable events in a way that creates a unique outcome of that interaction. The listener will therefore hear the recording from the perspective of the performer. In this aspect, it made me draw an association to streamers, whose audiences will watch them play a game from a shared perspective.
While writing and recording material it was important to me to understand more deeply what it means for something to be unpredictable. It can be argued that randomness have something to do with unpredictability. Statisticians tends to speak about randomness in terms of uncertainty, because the unpredictable element in randomness is a result of its uncertainty (Verhoeff, 2009). However, measuring a signal that is completely random over time will generate white noise. And on a scale of predictability, it is my understanding that noise is as predictable as a signal can be, because the signal will continue to have the same property and texture over time.

Therefore, unpredictability is something else than randomness. It is the result of assuming that something will act in a certain way because of preconceived ideas, but occasionally an event will occur that interrupts those ideas (Taleb, 2019). It is customary in game design to increase unpredictability in a game by including an RNG (random number generator) in the code that effects specific parts of the game (Schell, 2008). Depending on how RNG is applied by the designer, and to what degree it randomizes the gameplay, the player may experience a state of flux between predictable and unpredictable events. The player may even start to anticipate a degree of unpredictability which, in turn, opens up a new dimension of composing music for unpredictable events, since anticipation is an important psychological mechanism of how music creates emotions (Juslin, 2019).

With this approach of unpredictability, it prompted me to think about what should and should not be predictable in the music. If it should follow the ludonarrative, then it seemed critical to me to understand the intricacies of the game’s aesthetics and mechanics for having sufficient insights into how unpredictability should be applied during the music production, all the way from composition to implementation. However, it became obvious to me that the degree of unpredictability needed to match the game’s subtext in order to align with the ludonarrative.

Subtext

During the development phase of the study, I also started to elaborate the musical themes that supported the narrative for the game. I prompted a deeper discussion with the developer on the story and its underlying meaning and symbolism. Furthermore, I asked what kind of story the protagonist was going through from a metaphysical point of view. The player’s impression might be that the story is told through a series of cutscenes and dialogues, separated by free roaming gameplay that does not have any significance to the progress of the
narrative. However, there are details in the general gameplay which alludes to significant aspects of the game’s subtext.

For example, whenever the player dies, they wake up next to the shrine that they most recently prayed to. The player may continue from there, and if they reach the location of where they previously died, they will encounter a ghost of the protagonist that merges with the player on contact. When that happens a text appears reading “Future memories recovered” which alludes to a deeper explanation about what the narrative is in the context of the dialogues and cutscenes that intermingles with the general gameplay.

Because of the reason that the game contains subliminal details that connects to the metaphysical narrative, I wanted to comprehend the subtext so that I could work creatively with that information when composing and producing the music. That knowledge could therefore inform what the game’s ludonarrative would be at each moment of gameplay. For example: When the player explores a new area, when the player is engaged in combat with a specific foe, when the player watches the cutscenes of the protagonist’s visions etc.

Figure 6) Picture from a recording session of string quartet that plays the motifs, in the attached file named VIDEO_Trailer, that alludes to the game’s subtext
In my reflections on the subtext, I concluded that even the instrumentation of the music should relate to the ludonarrative. For instance, the game has a pervasive theme of blood sacrifice, and Sang uses her own blood in rituals to advance through the game world. I associated the theme of blood sacrifice and the hostile world, with the metaphor of hanging on by a thread. To me, the idea of the Sang’s blood veins being her “threads” could be illustrated by using string instruments to play the theme that narrates her struggle, since I associate threads with strings. That is why I emphasized the motifs that symbolizes Sang with the string quartet I recorded for MUSIC_Trailer, from the session that can be seen figure 6.

Moreover, the discussions about the game’s subtext also prompted me to question how the sound quality of the music would relate to the aesthetics of the game and its ludonarrative. Since the game’s visual aesthetics are inspired by games created between 1985 and 1995, it seemed to me that simply using acoustic recordings of symphonic instruments could result in a disconnection between the music and the graphics. Especially because the graphics of the game occasionally becomes distorted during gameplay as an effect. It seemed to me that a disconnection like that could potentially create a ludonarrative dissonance unless it was done deliberately.

I concluded that the instrumentation could express the relationship between the corruptive force of the villainous infestation and the uncorrupted essence of the protagonist. This inspired me to swap some of the acoustic instruments with digital instruments that had a similar sound quality to the games which inspired the project’s visual style. This approach, together with sound processing by digital distortion, resulted in music with a mixed style that could pull in either a digital or an acoustic direction depending on the game’s ludonarrative.

Music artifacts

During development, a large set of musical ideas and pieces were written to explore the motifs that originated from pre-production. In this section, three different products are presented which each have a unique connection to the ludonarrative. These pieces are named: *Tricari, Abyssal Viscus and Solve et Coagula – 2nd pass.*
**Tricari**

- MUSIC_Tricari

An idea that was elaborated from the conceptualization phase led me to experiment with including retro style instrumentation in the music. *Tricari* came to inspire the aesthetic direction that guided the sonic style where acoustic recordings of real instruments are supported by renditions of instruments used in video games from the 1980’s and 1990’s. It incorporates a lot of the digital artifacts that was generated by the DSP:s from that generation of video games.

*Tricari* contains an arpeggio which is clearly heard at 0:52 that was elaborated from the melody in *Sans Void*. It connects to the game’s ludonarrative by mimicking the cyclical symbolism of the hero’s journey-archetype. This arpeggio is intended to transform into different themes as the game’s narrative evolves.

**Abyssal viscus**

- MUSIC_Abyssal Viscus

This is a piece that utilizes RNG during runtime to create a unique and unpredictable soundtrack when the player is located in a specific area. The area is an empty void with meandering platforms that are suspended in thin air and is filled with hostile creatures. If the player can fight their way through the area, they will have a strange encounter with a large, imprisoned creature.

In contrast to the predictable nature of the piece named *Sans Void*, which is played exactly the same during every appearance, this music connects to the ludonarrative of being suspended in an unknown area and encountering something unexpected.

**Solve et Coagula – 2nd pass**

- VIDEO_Solve et Coagula – second pass

The boss fight which had been scored during pre-production needed to become implemented with music during development. Instead of playing back the original demo from start to finish, I programmed the music to transform during gameplay.
The music for this iteration of the boss fight is properly understood by watching the video that the screen capture in figure 7 is referring to. It shows a transformation in the music that suddenly switches intensity at the moment when the enemy becomes angered. That moment can happen at any time during gameplay, and as soon as that happens the music instantly transitions into the next musical figure. This implementation contradicts the idea I had during the conceptualization phase, which said that the music system should be used to create transitions in the music that mimics human performance. However, I preferred the aesthetic effect of switching music suddenly, since it instead mimics the ludonarrative of the boss fight.

As I started to implement music into the game, it became crucial for me to let other people than myself test how the music sounded and how it appeared in the game’s context.

**User testing**

In this phase, I identified three aspects from a perspective of game design that connects to the topic of user testing and what it means for the development of the music: *Sharing the process, The lens of perspectives* and *Surrender*. These aspects are juxtaposed with four pieces of music that came as a result of applying user testing in my artistic process: *Friendly Stranger, Outro, Exantliméños* and *Trailer*.
The production cycle of game development revolves around user testing (Adams, 2014), because the complexity of game production prompts the developers to frequently test each new feature that is worked into the game. Different methods for user testing have been formalized to gather the specific data that is of interest for the designer. For example, if the designer is looking for qualitative judgements from players, then an in depth interview might be preferable over a survey (Schell, 2008).

It occurred to me that I conducted a kind of user testing when I shared my work progress with the supporters in the project forum. However, the conversations I had were only informal and I never labeled them as “user testing” for the members in the chat. While it may be considered good practice to formalize the collection of feedback and user data (Schell, 2008), it seemed more important to me to continue the conversation by mostly sharing video and audio recordings of my work without explicitly asking for specific feedback. This resulted in a type of data collection that can best be described as friendly banter, but by disregarding the superficial meaning of the conversations I could identify some trends in the behavior towards specific aspects of the music. To elaborate on those aspects, I used an approach that I had learned from studying critical response process, which is a methodological approach to creative feedback formulated by dance choreographer Liz Lerman (2003).

Design artifacts

This section on user testing applies the method of evaluating the performance of a software, but instead of following a strict evaluation method, the results presented here are categorized by a non-conventional approach that describes two important aspects of how the player receives and reacts to the material, depending on the mode of presentation. The two aspects are labeled Sharing the process and The lens of perspectives.

Subsequently, the artistic vision through the whole project collapsed into one problem which prompted me to seek insights by having discussions with two different music professionals about this study. The search for that insight is detailed under chapter Surrender.

Sharing the process

As I produced music during development, I became interested in getting feedback on my work to understand whether the music was aligned with my artistic vision or not. At first, I showed the music to my peers. However, Adams (2014) describes that user testing should primarily be made with users from the target audience of the game. It seemed to me that my
peers were not all part of the game’s target audience and therefore they might get an inaccurate impression of how the music relates to the game.

That is why I decided to instead focus on collecting feedback from the members in the project’s discussion forum. I assumed that they would react positively to music that corresponded with the game’s aesthetic context, and also show a negative interest to music that would not correspond with it. I also assumed that aligning the music with the aesthetic context that the target audience would expect in the game would increase its ludonarrative harmony.

When I wrote and produced music for the project, I would occasionally set up a video recording of my attempts with various production techniques. With these recordings, I shared the creative process with the forum members. Three of those videos are included in this study (VIDEO_Exlantiménos, VIDEO_Transistor_radio, and VIDEO_Guitar).

An interesting consequence of sharing a video was that I noticed an increased activity in the various forum channels after I had posted the video. It seemed to me that by sharing my artistic process of the music, other forum members were more inclined to, for example, share their own art in the forum. The members also seemed to become more talkative each time the video created a positive response, even when the members claimed that the music in the video was not appropriate for the game.

As I reflected on my motivation for sharing these videos, it occurred to me that I had been inspired by the developer’s methods, who had continuously shared the game’s progression since the project started. Up until that realization, my preexisting belief was that any music I created should not be presented publicly before it was finished. After I had recognized my presumption, I was inspired to explore this dynamic closer and how it can relate to the game’s ludonarrative. I wanted to change the perspective of both me as a music producer and the users as listeners.

**The lens of perspectives**

Inspired by the experiment of sharing videos from my artistic process, I started to reflect on how I could involve the game’s audience in the artistic process. To understand how I could do it while maintaining my own artistic integrity, I decided to explore various methods of changing my perspective while I produced the music.
Jesse Schell (2009) suggests that game designers should imagine themselves as the player when conceptualizing a game, and furthermore, imagine themselves as a character inside of the game they are trying to design. As I reflected on how I could apply that idea into a method of changing the perspective during music production, I started by elaborating the method of re-amping the recorded material through old speakers. Instead of only placing a microphone in front of the speaker, I picked up the speaker and moved it while it was emitting sounds.

Figure 8) Screen capture from the file named VIDEO_Abyssal_Viscus

However, I was not fully pleased with the initial result because it did not sound as good as I had imagined it would when I listened to the recording. As I experimented with a variety of microphone setups during development, I recalled some advice I had gotten from a teacher that an instrument usually sounds good from the listening spot of the performer. It was at that moment I recorded the video named VIDEO_Transistor_radio which.

With that experience, I started to explore even more extreme versions of that technique. The attachment named VIDEO_Abyssal_Viscus (shown in figure 8) shows how I recorded a bowed cymbal that pans across the microphone stereo pair. Since I had placed my head just in front of the stereo pair, I did the recording from the perspective of both the performer and the listener at the same time. It seemed to me that this type of recording technique can have some implication on the ludonarrative, but I was generally satisfied with the result that the player would experience the music from the same perspective of where the music had been created.
And since the music is intended to follow the ludonarrative, I believed that it was good enough for this project.

This approach to record music from the perspective of the performer made me recall an exchange I had with composer Chaya Czernowin who inspired me to understand composition as a form of setting the perspective for the audience. For example, composing a melody for either a solo instrument or a full section changes the perspective of that melody for the audience. During that exchange, I asked myself what the perspective in composition means in the context of video games, but I could not identify a satisfying answer at that time. This recording technique made me think that I had perhaps gotten closer to answering that question.

However, although I had approached music production through user testing and gathered a more informed understanding of the target audience’s perspective, I was overwhelmed by all the different aspects of possible events and contexts for the music that I wanted to take into consideration. It seemed to me that I needed to give up on my vision of creating ludonarrative harmony with certain aspects of the game.

*Surrender*

Since pre-production and my discussion with Audio Director [A], I had wrestled with the concept of producing music for the video game in a way that would interact with the ludonarrative from moment-to-moment. The music system that I created for this project allowed me to control a complex network of music with a method that I called circular layering. However, even though I managed to compose and create music that both had a musical continuity and contingency during runtime, I could not avoid thinking that it seemed too complicated. Musically, the material was rather uncomplicated and had a natural dynamic flow to it. But it seemed to me that the concept was not fully aligned with the game’s ludonarrative.

To understand why that concept did not work as envisioned, I got in touch with another Audio Director [B] who invited me to have a conversation about video game music and how it relates to game design. The Audio Director [B] expressed a feeling that most music for video games tends to be disappointing and banal, because it usually sounds like someone is just changing the volume on different instruments when the player interacts with the game. Instead, the music would be more appropriate if it was more mysterious. When I asked what it
means for music to be mysterious, we started talking about embracing the unpredictable and letting go of preconceived ideas. The Audio Director [B] explained how their production team would try alternative approaches to producing sound design that challenged those ideas. For instance, recording dialogues and shouts outside in the city instead of inside their studio.

That conversation made me especially interested in understanding how video game music should be made to avoid making it sound like someone is changing the volume of different instruments during gameplay, and what it means for music to sound mysterious.

It was at that moment I recalled the time when I was an intern at a reggae studio in Stockholm. During the internship, my mentor showed me how to create a dub mix by playing back a multi-track recording of a song and changing the volume of the instruments in real-time while maintaining a steady groove. The mix was continuously altered by sending an occasional note and drum hit to a series of delays, reverbs, and other auxiliary effects. Furthermore, I personally consider dub to sound mysterious, which made me curious about how I could draw inspiration from dub into the game project. My old mentor invited me back to the studio to discuss my research and the art of dub.

In our conversation I noticed many similarities from my discussion with Audio Director [B]. Especially the point of embracing the unpredictable, and in some cases let the unpredictable guide the creative process. Another interesting aspect was the insights that had been passed down to my mentor from the studio’s founder, the late reggae producer Tom Hofwander (a.k.a. Internal Dread), who had expressed that microphone leakage created a sense of mystery when producing a dub mix. My understanding of that insight is that the distant and diffused sounds of other instruments gives the mix a texture that hints at a deeper dimension.

Internal Dread used to try out delays with several different settings for each new production. While he did experiment with different settings on a new production, he always had one auxiliary delay where the time was fixed at 304ms. The reason was that he had discovered that it was a delay time that was usually not in synch with the tempo of a typical reggae song. Meaning that the music would always contain a counter rhythm that was independent of the music. Furthermore, he would shape the sound quality of the delay by filtering the signal before feeding it back into the delay, thus creating a more diffuse signal the longer it was echoed. Internal Dread would also shape the various delays with filters to create an illusion of
the sound bouncing against the walls of a room which can be heard on the record *Dub School* (Hofwander, 2004).

The insights from this phase of the study made me reflect on how I can draw inspiration from dub music into video game music and the research project. For instance, I started using a delay that I controlled with a fader, just like I had seen my mentor change the volume on instruments to send them to the delay. That way I created long echoes that could linger the sounds from a piece of music, long after the music had stopped.

The echo was rendered by itself so that I could implemented it in the game in a way that makes transitions between parts happen through the soundscaping of dub effects. Because the echo gets more diffuse the longer it lasts, it will eventually be difficult to recognize as an instrument but instead becomes a texture that interacts with other echoes. And since I had also been inspired by Internal Dread to use a fixed delay time of my own, different pieces of music in the game could be overlapped by removing the instruments if necessary and play back their echo tails until the disappear.

Finally, I reflected over what I had learned during this project and how the insights from my user testing had influenced and shaped my insights into the project and video games in general. It seemed obvious to me, from the conversations I had with both my old mentor and Audio Director [B], that an unpredictable event is not only something that can inspire the direction of a music production but applying unpredictable methods can also be used as an approach to create art that is both unique and mysterious.

This made me realize that the one of the core characteristics of video games is their unpredictable nature. Regardless of how much I plan my design beforehand and try to predict the player’s emotions or create a system that accommodates for all possible outcomes, I can never predict exactly what will happen when the product I create reaches the player. So instead of trying to control the outcome of the game, I should make music that surfs on the game’s unpredictable characteristics. This realization made me understand that ultimately, I need to surrender my attempts to control the unpredictable.

**Music artifacts**

As a consequence of producing music through the aspect of user testing, there are four pieces of music presented in this phase: *Friendly Stranger, Outro / Éxo, Exantliménos* and *Trailer*. 
Friendly Stranger

- MUSIC_Friendly_Stranger

This is a demo that I recorded after I had one of my first deep conversations with two members in the project’s discussion forum. I was inspired by the wholesome interaction we had. I improvised this song and shared this demo on the channel so they could listen to it. Despite the fact that the demo contains hesitations and mistakes, it was very well received by the community, and I was asked to complete the work on it. My intention is to use this song as a theme in the full game in scenes where the narrative develops the friendship between the protagonist and her companions.

Outro / Éxo

- VIDEO_Outro
- MUSIC_Éxo

This is an example of the effects that a user testing had on a specific scene in the game. The video was posted to the forum, where it received a good response. However, there were several members who voiced that they expected a style of music that was more melancholic. That led me to produce a new piece of music, which received a way more positive response.

Exantliménos

- MUSIC_Exantliménos
- VIDEO_Exantliménos

In this piece, I explored the technique of re-amping the delay of a signal through an old computer cabinet from 1989. The effects chain is routed in a way that lets me control the feedback and the signal’s send amount through a midi-controller which be seen in the video recording.

Trailer

- MUSIC_Trailer
- VIDEO_Trailer

The game project is presented through this trailer and contains several of the techniques and insights that was discovered in this research. Other pieces in this study are also quoted in their appropriate sequences to create a ludonarrative harmony between the game and the trailer.
Discussion

My experiences as a music producer who use methods from game design in my artistic process has changed the way I understand my own artistic practice and how I can create music for a video game that aligns with its ludonarrative.

I think that the purpose of this study, to propose a shared base of knowledge between game developers and music producers, has been accomplished. Furthermore, it is my opinion that video game music as an artistic expression has not been fully explored in this study. However, because of the results in this study, I argue that understanding the concept of ludonarrative is a good foundation for artists who wants to practice their craft in a video game project.

The reflections that I have drawn from this research are presented here in an emphatic disposition:

- First, the research is contextualized as an inquiry into how an artistic vision was developed in this study and what that experience can mean for other projects.
- Secondly, the study is contextualized through the concept of Conway’s law, which connects two fields of game design and music production in a unified frame of reference.
- Thirdly, I reflect on the concept of unpredictability and what it can mean for video game music in general.

This discussion ends with a segment of problematization of the study’s results and is concluded with suggestions on what future research can be made in reference to this study.

Art in video game music

This study shows that music can give video games a unique and significant identity. It can draw the artistic vision out of the deepest conceptual roots of the game’s design and reveal it through music as an art form.

The degree to which a developer wants their game to have a unique identity can therefore inform the development team of how involved they need the music producer to be in the project. In this study the game developer decided to allow me to explore freely how the music could be produced. The developer shared significant details and secrets of the game’s story, along with conceptual art that described plans for the game’s development, which had not
been created yet. In turn, I produced demos and talked about my visions of the music and how it could relate to the game design. This dialogue manifested as an artistic trust between me and the developer.

The quality of communication between me and the developer had a direct impact on the quality of the music I could create for the game. The details we shared with each other during the early stage of production were useful for creating music that was tightly linked to the game’s ludonarrative. However, planning detailed artistic decisions in advance proved to be problematic because some core assumptions I had on failed to hold in the long run.

Furthermore, the music producer may benefit from having a direct communication with the players of the video game. As can be seen in this study, a significant amount of understanding that I needed to shape and create the music came from the discussions I had with the project’s supporters, who could provide insights into what aesthetics appealed to them. That allowed me to engage with the community in a way that has also improved the relationship between the supporters and the developer.

This interactive relationship between artist and audience makes me think about Marina Abramovic’s works. As I understand it, her work The Artist Is Present (2010) contains a degree of interactivity between the audience and the artist which creates a shift in agency over how the art comes about. Perhaps music for video games can be an interplay between the creator and the audience in a similar way. I think it that idea has been shallowly explored in this study with Friendly Stranger and Outro / Éxo.

Finally, I have reflected about what happens when the player experiences the sudden transition in Solve et Coagula – 2nd pass. Aesthetically, the boss snaps and becomes even more frantic and it is as if the computer, which the game is played on, is angered. This sudden shift is also expressed with the music. The concept as it appears to me is that the music is not what the game designer wants the player to feel. But what the video game itself is feeling. However, this anthropomorphizes the computer, and discussing what that implies for the ludonarrative goes beyond what this study intends to answer.

I could not help myself from thinking that I am programming the computer with senses and patterns that gives it emotions.
Towards the end of my research, I came across a video lecture by game designer Casey Muratori (2022) who described a phenomenon in organizational work that was first labeled in an article by Melvin E. Conway (1968), popularly referred to as Conway’s law.

Conway’s law suggests that the product of the work of a team is isomorphic (equal in shape) of the communication structure within that team. In software development, it means that a team will create data communications within that software that becomes a copy of the organizational structure of the team. Therefore, the effectiveness (optimization) of the product essentially depends on the quality of communication between the members of the organization. Studies points towards this being a repeatedly emerging phenomenon in any type of organization (MacCormack et. al., 2012).

When I reflect on Conway’s law in relation to this study it also suggests to me new ways to think about artistic practices. Especially when artistic practices are done in a larger context. A facet of artistic research is the endorsed use of vagueness, because an aspect of art is that it may be able to speak for itself. Artists can therefore have the freedom to explore and express their work in any way that they see fit. And when it is done in solitude, artists may work freely without the need to communicate their ideas besides themselves.

However, when artists engage in an organization (such as a game development team) then the structure of that organization will have a significant effect on the artists practice according to Conway’s law. This study shows a result of what happens with the artistic process when that artist understands the development of a video game and its underlying theory.
The organizational structure of the development in this study can be seen in figure 9. The boxes symbolizes participants in the project, and the circle indicate the group of supporters that are not formally a part of the development. These are connected with dotted lines which indicates communication channels, and solid lines that indicates production channels. According to Conway’s law, the developer and I have created a product that is a copy of our communication structure. The solid lines indicate that me and the developer share our code privately and thus the confidential information that guides the artistic process can be explored without the need to communicate it to others. I think the artistic potential in myself with the skillset of a composer, music producer, and programmer, showed promising potential to work with projects that requires a broad competence in game development and a deep competence in composition and music production. It is my opinion that this study shows how an artistic vision could be realized through both the game’s aesthetics and mechanics because I could execute on ideas that would otherwise need to be communicated and delegated to others. Had I been unable to compose, produce, and implement the music on my own, then my intended design would instead need to be delegated, motivated, and thoroughly articulated to someone else.
**Embrace the unpredictable**

The biggest development that I have felt on personal level is the insight into how unpredictability is an essential part of video games. That realization has prompted me to explore how I can use unpredictability in my artistic expressions outside of video games. The reflections I have around my own practice has shifted my perspective.

I discovered that I had a lot of assumptions about musical layering in video games. For instance, when the gameplays tempo increases, I assumed that the music would need to increase in intensity somehow. Because of this study, I have concluded that layering is an established and effective tool for creating a video game score that appears lively and musical. However, most of the literature and knowledge that is taught about video game music only discusses layering as a way to accommodate for the supposed emotions of the player.

This research has only been conducted on one case study. I assume that the ludonarrative of different games may include varying degrees of unpredictability, which means that understanding styles and genres should be considered if this subject is elaborated in future research.

**Problematization**

This study assumes that ludonarrative is a concept that is valuable for game designers and developers, and that the concept should be understood by music producers to give them the tools they need to produce video game music that makes the game more enjoyable. Great video game music was already being made long before the concept of ludonarrative dissonance was articulated. However, that does not invalidate its usefulness as an analytical lens, and it is my opinion that this study shows that understanding the concept of ludonarrative can be helpful when a music producer works with a game project.

**Future research**

It seems to me that music for video games remains an unexplored field of artistic research. This study shows how artistic research in music production can be applied to video games in order to develop unique artistic expressions that can inform both the field of game development and music production. However, it also shows that unpredictability in games
inspired me to develop my artistic practice to connect with the game design in a way that had not been accessible through music production alone.

This interdisciplinary approach to artistic research in video game music could explore other genres of games and music as well. It also introduces the possibility to develop new artistic expressions around the unpredictable attributes of video games. I am especially interested in developing an approach to create and implement music in video games that resembles the way dub music is produced.
References
Muratori, C. (2022, March 16th). The Only Unbreakable Law [video]. YouTube. [Lecture originally given to the School of Informatics of the Technical University of Madrid].
Appendix

Explanations of central concepts in the study

Dub

Dub music is a genre that evolved from reggae music. Dub was originally created by music producers who made new mixes of already recorded songs by removing the vocals and emphasizing the rhythm section. The mixes were usually improvised by freely applying studio effects such as delays and reverbs to manipulate the entire soundscape of the mix.

Game design

The art of combining game rules and mechanics with aesthetics is usually referred to as game design. Therefore, modifications to one aspect of a game (mechanics or aesthetics) has a direct implication on the entire game experience.

Gameplay

The moment-to-moment interaction a player has with a video game is referred to as gameplay. The gameplay is a result of the game’s rules and mechanics which continuously changes the player’s experience.

Implementation

In the context of this study, implementation refers to the act of importing and setting up assets inside the game environment. Usually done through programming and visual scripting.

Ludonarrative

A compound of the words “ludology” (the study of games) and “narrative”, used to describe the emerged narrative that is experienced when a player interacts with a game and its several layers of rules, mechanics, dynamics, and aesthetics.

Narrative

Derived from the Latin word “narrare” (“to tell, relate, recount, explain”, literally “to make acquainted with”). The usage of narrative within this thesis encourages the reader to think of
narration at both the macro-level, such as storytelling, as well as the micro-level, such as metaphors.

**Re-amp**

A music production technique where an already recorded signal is played through a sound emitter, such as a guitar amp or transistor radio. When the audio from the new sound source is recorded its referred to as “re-amping”.

**Runtime**

An expression that refers to the process of when the game is being run on the user’s hardware.