GAME SOUNDS AND FLOW

THE ROLE OF GAME SOUNDS IN USER PLAY AND IMMERSION

by Kaitlin Gu

New York University
Department of Media, Culture, and Communication
Advisor: Finn Brunton
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ABSTRACT

The purpose of this paper is to illuminate the role of game sounds in user play and game flow. The current literature on video game effects emphasizes that video games play a significant role on our developmental process without being able to offer much as to why. Indeed, understanding video game effects as a whole would be an arduous task. There are multiple layers of video games that all interact with one another to draw players into a game. Moreover, the layers themselves are intricate. Take for instance character design: there are teams of hundreds of people that work on the design of one character and what that character signifies to the player. There can be extensive studies conducted on character design decisions such as female versus male character design.

Therefore, for my paper I chose to focus in on video game sounds and their effects on users. In my paper, I define video games as an interactive experience through hardware in which there is a clear or foreseeable objective (For instance, getting to the end of a maze or escaping a castle). Within those games, I define video game sounds as the game's soundtrack in addition to the sounds that you hear within the video game (such as the sound of a jump or a treasure box opening). I examine how these sounds come together to create an immersive experience and space for the user. With sound's ability to construct this audible space, video game music and sounds ultimately define what a game-like experience is to us. In particular, I will look at how sounds define games and ultimately, act as a guide for players .

INTRODUCTION

I start this paper by providing a brief overview of the history of sounds in video games and examining the transition from the first soundless video games of the 1950s to the development of contemporary video game soundtracks. In exploring such a history, I hope to provide an understanding of why game developers decided to integrate sound into games rather than continue to create soundless games. I will examine the major technical developments in sound engineering and how they contributed to game sounds in particular. In addition, I will focus in on how video game sounds engineers adapted to the limitation of such technologies.

Before exploring game sounds effects directly, it is significant to acknowledge that the foundation of my paper is based on the current literature of sound effects beyond the context of gaming. I will be looking at how sound researchers looked at how people have reacted and listened to sound in varying contexts. In particular I will be looking at *Ear Cleaning* by Murray Schafer and *Sonic Experience* by Jean François Augoyard, Andra McCartney, Henry Torgue, David Paquette Both provide a dictionary and understanding of sound effects for this paper to reference. It is only after providing a comprehensive overview of the existing literature on sound research that I will be able to apply it to video game sounds.

However, the existing literature on video game sound effects is limited and varied. Some major literature includes Natasha Schüll's *Addiction by Design,* which explores how sound plays a role in machine gambling, and K.J. Donnelly's and William Gibbons's *Music in Video Games: Studying Play,* which looks at eleven games and looks at how their sound tracks have been influential.

Since my paper is narrowing down video games to interactive electronic games with a clear objective, the research I'm conducting will hone in on three major categories of games. The first category will deal with games with soundtracks which have been popularized and recognized on a global scale.

Why have these game soundtracks resonated with people and what is the role of the soundtrack in particular? Second, I will be looking at independent games that do not follow conventional gaming standards and whose definitions as games are largely contested. How does sound aid in defining such games? Lastly, I will be looking at games that are largely musical in which it becomes unclear if there is any objective. Thus, when observing game sounds in the context of musical "non-games" we are able to look toward game sounds in order to create definitions.

OBJECTIVES

The goal of this paper is to demonstrate that game sounds are an integral part of defining game play and flow. Sounds create an immersive and audible space for the user and without sounds, a game would not have the same significance as it does with sound. The goal of this paper is to expose the ingrained associations we have with sounds and how these associations make it strange for us to experience games without sound. Namely, we associate sounds with certain actions and game features and have expectations from the games we play to use those sounds. For instance, the traditional dialogue boxes in games have a very recognizable sound that we expect to hear. Visually, it simulates a typewriter however, the way that we read it often goes along with the sound whether or not we choose to speed it up or read it as it comes. A specific example is in *Final Fantasy I* where the developers of the game decided to incorporate sounds into the opening and closing of a dialogue box despite technological limitations.[1] Therefore, I argue that a game and that same game on mute would create radically different experiences.

Final Fantasy 1 Text Dialog
Credit: howtomakeanrpg.com

Part of achieving this objective is exploring existing literature and experiences on game sound effects. The literature provided by sound researchers on how different sounds have affected people in varying context will

provide a foundation for my research. In particular, it will provide me a dictionary of psychological and physical effects to reference when discussing game sound effects.

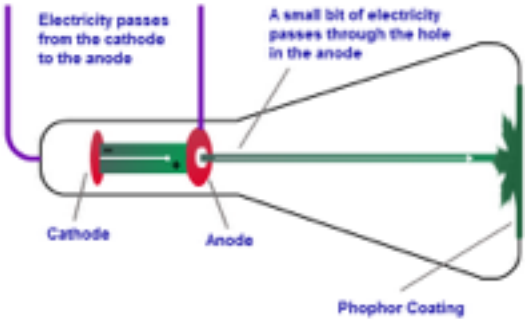
The core of the research however, will be done through case studies. These case studies will cover games across an axis: sound to soundless and game to non-game. Through studying these games and how these sounds contribute to the definition of these games or non-games, I will provide a new understanding of how sounds are able to define games by creating a flow for the user to follow. Sounds therefore, exist as game definers in the absence of visual definers.

BRIEF HISTORY OF VIDEO GAME MUSIC:

FROM SOUNDLESS TO SOUND

Video games, which I have defined as any game played on hardware with electronic logic circuits that allow for player interactivity, have existed since the late 1940s with the introduction of the cathode-ray amusement device. The cathode-ray amusement device consisted of a cathode-ray tube, which allowed for the creation and manipulation of electronic signals, and an oscilloscope that translates those signals into lights onto a monitor. The objective of this game is to have the ray of light point to a particular target. Much like other games that soon followed, such as *Nimrod* (1950), a simulation of *Nim*, and *Bertie the Brain* (1951), a simulation of tic tac toe, the Cathode-ray amusement relied on the user to recognize visual cues.[2] Yet, this alone seemed to be an effective means of communicating the game's goals to the user so why add sound at all? Moreover, why is visual communication not enough to constitute an effective video game?

Bertie the Brain
Credit: Life Magazine



Cathode-ray amusement device explanation
Credit: tutorcircle.com

For 20 years, the video game industry was soundless and it wasn't until the introduction of microprocessors in the 1970s when game audio could be integrated into electronic games. In 1971, one of the first games to integrate sound was Nutting Associates' *Computer Space*.[3] They advertised the "battle

Computer Space advertisement
Credit: computerspacefan.com

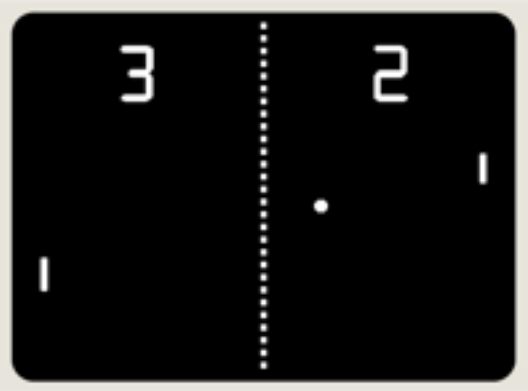
Computer Space gameplay
Credit: ytimg.com

sounds" featured in their game: "The thrust motors from your rocket ship, the rocket turning signals, the firing of your missiles and explosion fill the air with the sights and sounds of combat as you battle against the saucer for the higher score."[4] *Computer Space* represents one of the first instances where video game sounds were advertised as a key feature of a game. Combined with the space like environment and the sounds of actual rocket blasts, the game aimed to create an immersive environment that allowed players to believe they were actually experiencing space. Such environments and sounds were made possible by the technical affordances of the microprocessor and the growing field of game development seemed to lead to the integration of game sounds. Despite this, in the 1970s it was still unclear as to what the role of sounds in games would be.

8-bit music

Arguably, the origin of video game music can largely be attributed to the rise of Japanese games. The 1980s marked the boom of the Japanese video game industries as video games permeated Japanese arcades and in 1983, with the introduction of the Nintendo Entertainment System, an 8-bit video game console, the music of video games could now be in people's home. [5] The documentary *Diggin' in the Carts* acknowledges that "the music of video games

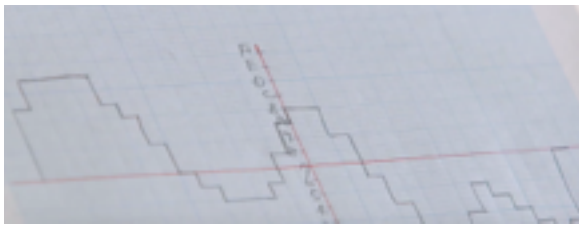
played more in our household than any other music at the time." [6] It goes through the evolution of video game music from 8-bit to current video game soundtracks. Through telling the story of various game composers, this documentary has demonstrated how video game music has been integrated into the cultural lexicon of contemporary music makers. In particular, the documentary focuses on the Japanese composers who innovated music in games starting with limited technology that only allowed them generate a handful of sounds.



Pong gameplay
Credit: timesillustrated.com

One of the first notable set of game sounds came out in 1972 with Atari's *Pong*. Although Atari's *Pong* is often considered a breakthrough in the game industry, it is rarely discussed why. The limitations of the video game technology only allowed for a certain selection of sounds to be produced: namely, bleeps and bloops. Moreover it was difficult to discern whether or not the limited sounds were melodies or sound effects. However, the sonar blip generated by the ball being hit back and forth marked one of the first times a user could interact with sound in a game. There were limitations to the technologies used for game sounds. There were only a selection of bleeps and bloops to choose from. And although the *Atari 2600*, which was introduced in 1977, only allowed two game sounds to be played, its sound design became widely popularized and recognizable.

It wasn't until the 1980s that video games began to integrate continuous background music. Bandai Namco's *Rally-X* (1980, Nobuyuki Ohnogi) paved the way for games such as *Pac-Man* (1980, Toshio Kai) and *Gasplus* (1984, Junko



Tower of Druaga music mapped as waves
Credit: *Diggin' in the Carts*

Tower of Druaga circuitboard
Credit: *Diggin' in the Carts*

Ozawa). At this time, there were still technical limitations. There was a sound driver for the program to read in data and play it back in musical form. Within the circuit board of most games (such as the *Tower of Druaga*, as picture above) the ROM held the game music in waveform data and thus, the composers making these soundtracks had to think of music in terms of such data.[7]

Nintendo Entertainment System
Credit: wikipedia.org

There were many limitations to programming sounds on chip. Chip Tanaka, a video game composer that scored works such as *Metroid*, *Super Mario Land*, *Mother*, and *Tetris* emphasizes the link between video games and their hardware. Therefore, sounds could only be created based on the technological affordances of the hardware. Tanaka, who made all the sound chips for the games he scored, states that producing sounds for arcade games involved making an old synthesizer with repeated trial and error: "I lined up a soldering iron with a bunch of components while doing cut and try - that's how I make sound."[8] With the NES, the sound chip was inside so control with CPU made sound development easier and could freely use 3 sounds and noise. In contrast, the Game Boy sound chip, which was significantly smaller than the Nintendo Entertainment System, presented lower

Game Boy and chip
Credit: rakanalysis.wordpress.com

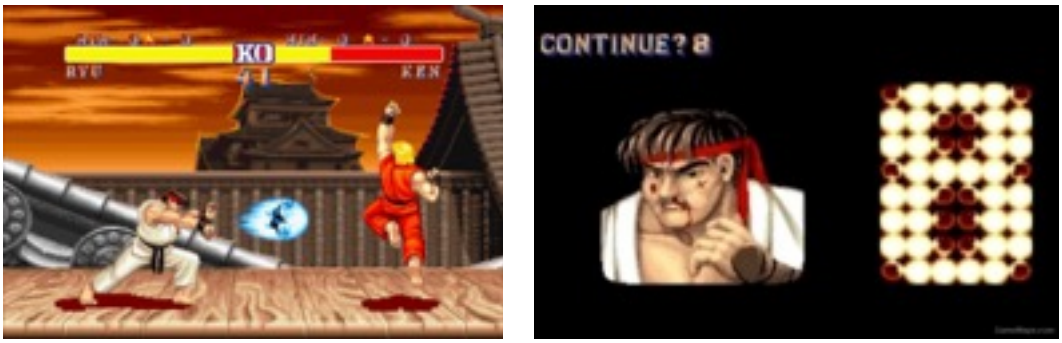
costs compared to larger machines.[9] As a result, various sounds could be created. Moreover, since people were more likely to play with headphones on portable devices, sound designers like Tanaka worked toward adding a lot of extra sound effects when people played. The distorted sounds generated by these games represented the limitations of the 8-bit technology that was available at the time and continues to influence music decisions today.

16-bit music

In the 8-bit music era with consoles such as the NES, sound designers only had an ability to manipulate 3 sounds. In the 1980s, with the introduction of 16-bit consoles, sound designers now had access to 7 to 8 sounds thereby creating increasingly immersive video game environments. It changed the experience of arcade and home gaming altogether. Everyone thought it was a revolution — the graphics became more beautiful and the music became more grand — instead of static backgrounds, they now moved as you moved. Moreover, with the introduction of complete 16-bit consoles such as MegaDrive, Rolling Uchizawa, former editor of Weekly Famitsu Magazine, notes that "it became possible to express things that had previously been impossible."[10]

Games evolved into something cinematic and dramatic with the introduction of 16-bit technology. Hiroshi Sakomoto describes the 1991 game *Magical Chase* as a shooting game where the heroine was a cute girl. He wanted the soundtrack to reflect the feeling of a cute girl making her way through a harsh world and aimed to make the music.[11] The end product included a piece titled *The Waltz of Meditation Part 2*, which was programmed on the TurboGrafx-16 with an 8-bit CPU and a dual 16-bit GPU which he described as "Beautiful, yet scary. Scary, yet beautiful."[12] In describing the limitations in developing such game sounds, Sakomoto notes that the major challenge was the inability to imitate real sounds such as reproducing drum sounds.

A major hit that came out of this era was the *Street Fighter* series for its ability to immerse the player in different worlds. Music in *Street Fighter*, as the

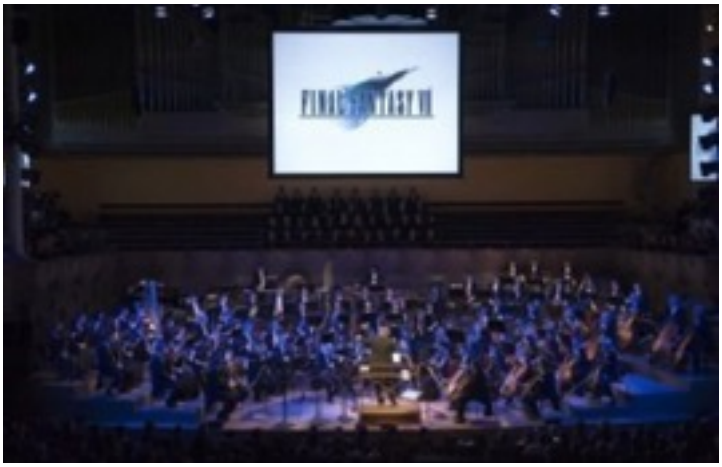


Street Fighter screen captures
Credit: *Diggin in the Carts*

musical artist Thundercat describes, is music that "made you feel like a champion. Even when you die you have the grandest death ever. How do you make music sound like that?"[13] In addition, Yoko Shimomura, the composer for *Street Fighter 2* created background music with the feeling of each country. For instance the theme Chun Li, a Chinese character, harks from sounds that imitate a yanqin (dulcimer), a pipa (Chinese lute) and a dizi (Chinese flute) in addition to metallic pluck strin . Other characters include Ryu, a Japanese character in a white karate gi, whose theme Thundercats describes as a "Fight to live and live to fight" feeling that is common amongst most disciples of Karate.

Video Game Music as Music

Despite these technological feats and video games's increasingly detailed compositions, many composers considered video game music as "not actual music." However, video game music seems to contradict this notion. In particular, the significance of the *Final Fantasy* soundtracks as orchestral performances have demonstrated the reach and significance of video game music. The *Final Fantasy* series are a set of Role Playing Game (RPG) that are seen as convincing dramas that can be enjoyed like a play or musical. They immerse the players into the world and characters of the game. The music, by Nobuo Uematsu, created the soundtrack for the *Final Fantasy* games with the limitations of 8-bit and 16-bit technology. Uematsu notes that "the more people



Street Fighter screen captures
Credit: *Diggin in the Carts*

are limited the more ingenious they are to begin with. I would like to attempt to create rock music with 3 sounds, classical music with 3 sounds. Sound music was like a game to me."[14] He attempted to make difficult alterations to 8-bit music that were filled with emotion drama. He describes playing a melody at one frequency and using that same melody while tweaking the frequency and timing creating a shimmer and sound full of emotions despite being electronic sound. He tested things like that every day and as a result, created a game soundtrack whose effects are felt today. Currently, there are orchestras that exist in order to match the sound of *Final Fantasy* as close as possible in order to recreate the emotions felt during the actual gameplay.

32-bit and CD Technology

In 1994, with the introduction of the PlayStation, the industry of game sound creation underwent a major shift. The quality of game music changed entirely because there was no longer a restriction to creation due to the technology. Before the PlayStation, games had been on cassettes and cartridges — CD media on the PS4 no longer required games to be programmed on cartridges. A notable game that came out of this recent era is the fighting game Tekken. The heightened sense of elation from the uptempo track of Tekken

Tekken vinyl record (left) and Tekken opening screen (right)
Credit: en.wikipedia.org

created a sense of exhilaration from the players. It was unique music for its time, and for the first time, video game music was seen as similar to actual music that was produced and sold. Along with the game itself, was a *Tekken* vinyl LP that was used as club music both overseas and in Japan.[15] Sound engineer Rio Hamamoto noted that "as the hardware changes, the sound quality gets better and better so I think creating sound has actually become easier. In other words, you can express whatever you want whether it's guitar, bass, real drums, and even brass and strings."[16] The introduction of the CD Rom format and 32-bit music paved way for countless possibilities with video game music and it became easier to directly convey the artists' intent.

Cultural Significance of Video Game Music

Despite the advantages of 32-bit technology, it remains important that we acknowledge the significance of both early and modern video game music and their effects. People to this day, continue to listen to the soundtracks of *Final Fantasy* and *Pac-Man* and feel a fondness to it whether or not they have played it before. For instance, the alive states and death states are still recognizable in *Pac-Man* and we immediately envision Pac-Man eating or running into ghosts along a blue maze. When we hear the sounds from these widely known games, we immediately are brought into their world.

NPR's "The Evolution of Game Music," demonstrates the increasing significance of music in video games. It starts first with noting that the 1970s

Pac-Man screenshot
Credit: youtube.com

were when games first had notable and memorable sounds with game such as *Pac-Man* and *Pong*. The author remarks that the sound "wasn't exactly symphonic" but rather a "recognizable onomatopoeic sound."[17] However, upon closer inspection video game music became integral to the narrative of the game. Take for example, *Space Invaders*, a 2-dimensional fixed shooter game in which players are shooting layers at 8-bit aliens. As the aliens came closer the music became faster and faster with the intention of inducing panic. Game developers took the players' heart rate and changed it according to the music. Thus, video game music took shape as something that would influence how the player felt while playing the game. With the development of hardware — moving away from microprocessors to the development an agile personal computer — video game music had much more potential. As Tommy Tallarico, an America video game music composer and musician, states, "video game music isn't a passive experience but an integral part of the foreground. It's for this reason that I've always said that if Beethoven were alive today, he'd be a video game composer." [18] Ultimately, what Tallarico notes is that video game

music induces an immersive musical experience in which music is felt as part of the experience of the game.

Although video game music is a field that is still developing, it is becoming more and more essential to video games. The sounds that we hear in our current and past systems are the sounds we hear in the world around us and affect us in surprising ways beyond the nostalgia that we feel toward them. They not only define the different game states but induce states of excitement and fear that guide us through the game as well. My paper will go forth and explore the ways in which video game sounds are defining features of games and how they affect us.

LITERATURE REVIEW

Sound Effects Research

In order to understand the role of game sounds in play it is important to have a basis for quantifying how sounds affects the player. Without such a basis, it is impossible to effectively describe a user's experience. This section of the review attempts to assess the literature that is dedicated to providing a way to articulate and describe the experience of sound on individual listeners.

One notable piece is *Ear Cleaning* by Murray Schafer. The paper itself focuses on a study conducted on university students in an attempt to understand how they listen and perceive sound. Despite its anti-noise sentiment, *Ear Cleaning* provides a useful understanding of the ways we listen: we begin by listening to sound however, the world is full of sounds both undesirable and desirable. Schafer offers a process of ear-cleaning that allows students to filter out unwanted noises. The goal of his study was to understand how the sonic experience and changed with the transformation of the "soundscape"and the introduction of urban noise in the 1960s. Every experiment conducted in his course, he states, "was calculated either to sharpen the ears, or to release latent creative energy, or both." [19] Through his studies, Schafer argues that the way we listen to sounds are conditioned by our environment, which includes both the time and physical space in which we experience such sounds. Some of his studies include listening and discussing the works of Charles Ives, having students bring in sounds they found interesting, and listening to silence. He details the way we filter out desirable and undesirable sound. For one, Schafer defines noise as undesirable sound. In order to hear desirable sounds we must go through what Schafer describes as an ear-cleaning operation in order to concentrate on desirable sound. Through this process, students are able to analyze what they should hear and reconstruct

the sounds they listen synthetically. Therefore, Schafer's gives way to understanding how we should listen to sound in the face of modernization. Although it is a focused and small study, it is useful in understanding how video game create soundscapes that focus in on desirable sounds.

Jean François Augoyard, Andra McCartney, Henry Torgue, and David Paquette further emphasize the need to provide a criteria for sounds in *Sonic Experience: A Guide to Everyday Sounds*. In particular, *Sonic Experience* provides a dictionary of sound effects that takes into consideration the context in which the sound is heard. As leading sound researchers at Centre de recherche sur l'espace sonore et l'environment urbain (CRESSON), they focus on "earwitness accounts in concrete contexts" in order to shine light on the "dynamic interaction between the physical environment, the socio-cultural milieu ad the individual listener."[20] Through their research, they attempt to outline a dictionary that defines eighty sonic effects in detail, aiming to accurately describe sound based on its effects on listeners. Much like Schafer, their primary consideration in classifying such sounds is the cultural and physical contexts in which sounds occur and are listened to. Schafer even comments that, "Sonic Experience is a simulating listening experience. As I read it I found myself measuring the effects of sounds heard, overheard, or imagined."[21] They argue that within urban and non-urban spaces, the noise that permeate these spaces are worth consideration and reflection — sounds cannot be isolated from their spatial and temporal conditions. In addition to considering the space, it is important to consider that sounds are shaped subjectively —there is no universal way of listening. An example of the sound that that they encounter under these conditions is Colouring: "An effect describing the influence of a location, electroacoustic system, or instrument on the new balance of the frequencies of a sound, 'coloured' through its diffusion."[22] Through listing such sound effects, the purpose of this guide is to analyze the experience of every day sounds and provide a framework for sound researchers to classify and further discuss such experiences.

The existing research on sound effects is incredibly useful to the field of video game music and sounds. The sounds of video games are experienced in a variety of contexts and sound engineers look toward sound effect research in order to understand what types of sounds and music would be effective to place in a game. As *Sonic Experience* demonstrates, the music of video games are not experienced in the same contexts and soundscape and yet, the types of experiences that video games create are widespread. It is therefore important to note that these types of spaces are constructed based on an understanding of sonic effects.

Game Sound Engineering: Thoughts and Considerations

Game sound engineers are largely responsible for engineering the experience for a player. They must thoughtfully construct game sounds that match the intended narrative and feel of the game. Alexander R. Galloway's *Gaming: Essays on Algorithmic Culture* provides useful insight on how game sounds interact with the other layers of the game. Galloway dissects each layer of a game for over fifty video games and provides a classification system for each game. His research aids in answering the question: how do different layers of a video game interact together to form the grammar of the game?

In G.W. Childs *Creating Music and Sound for Games* Childs explains the video game sound design process. In particular, he demonstrates how game designers and sound designers play a crucial role in the production of a game. Childs provides information that is usually only accessible within the industry itself. In particular, he provides a step by step guide on how to develop game sounds for two roles: designer and composer. He points out that there are particular sounds that are critical to the game and all have to be mixed: sound effects, cut scenes, sound track, score, sand pitch. Additional considerations include understanding the character: what tools are they using and what would those tools sound like? If they are in environment X what would their footprints sound like? Moreover, what does environment X's natural noises sound like?

Through various case studies and processes for attaining such sounds, Childs provides a detailed process that allows readers to imitate a sound designer and producer's role.

Karen Collins furthers Childs' insight on how the sound engineering industry works. In her book *Game Sound: An Introduction to the History, Theory and Practice of Video Game Music*, Collins provides various interviews with industry professionals including composers, sound designers, voice-over actors to give insight to the production of video game sounds. Her research has two main focuses: first, how video games are similar to linear audio visual media and second and second, how technology has constrained video game music production. She firsts looks at the historical development of game sounds and then examines the production process for mainstream games. This research is a useful way of understanding the process of audio development from industry professionals.

Game Sounds and Play

Up until now, this literature review has looked at a swath of literature that gives us a way of understanding how to discuss game effects and the psychology of sound. But it has not looked at literature that has directly examined such effects which are both positive and negative. Thus, the remaining portion of this literature review will be dedicated to answering the question: In what ways do video game sounds provide negative or positive experiences for those playing it?

It is impossible to separate video game affects from addiction. Video game addiction has even gone so far as to be categorized as a mental illness. However, it is hard to decipher why video games are so addicting: Is it there built-in reward systems? Would these rewards be as rewarding in a video game without sound?

In her book *Addiction by Design: Machine Gambling in Las Vegas* Natasha Schüll argues that if game sounds truly effect the gamer's experience then they

play a strong role in addiction. She looks closely into the relationship between game design and game addiction. In the passage "Engineering Experience," Schüll makes an argument that engineers have put thoughtful consideration into how sounds encourage play while seemingly remaining in the background. Through examining the experience between silent gambling machines and audible gambling machines, she begins to understand that the sounds of the machines guide the player through the game. These sounds which are designed to increase players heart rate and excitement begin to be associated with rewards built into gambling machines. Without sound, players do not have the same experience and are less likely to become addicted.

However, it is important to consider the positive effects of game sounds as well. Video game music has influenced generations of people, there are video game soundtracks that are played in concert halls and it is important to ask why? K.J. Donnelly's and William Gibbons's *Music in Video Games: Studying Play* contains eleven essays that look at the music of eleven different games. Within these essays we begin to understand how games offer "their listeners and operators and express experience within the framework of melody and rhythm" (Donnelly and Gibbons 2). It is undeniable that video game sounds effect the psychology of the player within their own grammar.

ANALYSIS

In order to understand how sounds define games and how games contribute to user experience and affect the narrative of user play, I will be doing a case analysis of four different games from four different eras of gaming. Each of them will focus in on how sound or the lack of sound affects the experience and definition of a game. The first game is Proteus, "a game of audio-visual exploration and discovery by Ed Key and David Kanaga."[23] Proteus is a game built with Unity and intended is a computer-based game. This game, which is largely driven by sound and visual components has no clear role as an objective based video game and is often considered an "anti-game." With only the ability to move in varying directions, Proteus relies on sounds to guide the player through the game. In contrast, the *Kittens Game* is a silent text-based incremental browser game that simulates village of kittens. In this game, there are discernible actions that are made clear by buttons such as "Gather catnip," "Sell catnip" and "Refine catnip" that have very clearly defined reactions and outcomes. However, *Kittens Game* has no visual representation of the world beyond texts, whereas *Proteus* has an entire visual and audio world to explore. Similarly, *Bloom,* a generative music iOS application developed by Brian Eno and Peter Chilvers is extremely musical but lacks a physical world. In the absence of clear objective and visual exploration how can *Bloom* can be considered a game? I will also be examining clearly definable games whose soundtracks have been hailed as pieces of music. For my last case study, I will looking at a game whose soundtrack has been celebrated and developed on a technical skill level similar to the *Final Fantasy* games: *Earthbound*. *Earthbound,* known as *Mother 2* in Japan, is a Role Playing Game that is played on the Super Nintendo Entertainment System (SNES). It tells the story of the protagonist Ness whose mission it is to collect eight melodies. Through these case studies, my analysis will understand how these games are defined by their sound or lack of sound and how the sounds of these games guide the users through the game.

Proteus gameplay
Credit: twistedtreegames.com

Proteus (2013)

Developed by: Ed Key and David Kanaga (Twisted Tree)

Platform: Windows, Mac, Linux, Playstation

Developed by Ed Key and David Kanaga and published by Twisted Tree, *Proteus* was released in 2013 for Windows and Macs and shortly after, for Linux and Playstation. It is hailed as a pure exploration game — it has no specific goals and is largely based on walking around and discovering the particularities of an island. In the world of Proteus, each object and living thing has a unique musical note. Played in first-person, the primary means of interaction in *Proteus* is the players' own observations through the world. Much of what drives their interaction of the world is the game's audio and visuals. The game world is procedurally generated, creating a unique layout each game and with each soundtrack, the soundtrack is dynamically linked to the location you are in, creating an ambient soundtrack that changes as you move around.[24]

Proteus initial world drafts
Credit: Ed Key's 2012 GDC Europe talk

In 2008, Ed Key began the game's development and was joined by David Kanaga in 2010. They aimed to make a "nontraditional and nonviolent game."[25]

In the developmental process, Key discusses that his initial objective of a game was to build a quest-based RPG game much like SkyRim however he had neither the time nor resources to do so as an independent game maker. However, Key and Kanaga both felt as if it was difficult to justify *Proteus* as a game without clear objectives and a clear visual landscape.

The landscape of the game plays a particularly significant role in Proteus. As an exploration game, one of the most important aspects of Proteus is that it is a first player perspective. Key describes that his exploration of procedural generated terrains made him realize that the feeling of "feeling of being situated and being able to get lost – all that comes from not having a top down view."[26] However, given that the soundtrack is dynamically linked to the location, it became difficult to ascribe a goal to Proteus.[27] An initial idea was to create cities in which the users had to deliver items from Point A to Point B. Within these mini quests there would be a musical element that draws inspiration from composer Phillip Glass, which leads up as the player reaches the goal. The players had either environmental music or the quest music and if the players veered from the goal, the item would be silently removed from the inventory. Other ideas involved survival — creating a punctual exploration in which players had to retreat given a certain condition. However, this hindered the dream like ability to wander around the world carefree. Another involved allowing players to make music within the game through arranging objects. Key rationalizes that this would be too useful as a creative tool rather than a game world to explore.[28] Ultimately, Key and Kanaga decided that there was creativity in indirection and passivity. Key notes that for Proteus, "your audience is still yourself but you are engaging in something in creative by choosing where to go

Proteus initial Point A to Point B game draft
Credit: Ed Key's 2012 GDC Europe talk

and what you look at and what you find."[29] As a result, the goal of *Proteus* is extremely musical, which makes it difficult to quantify it as a game since normally, games are defined through visual goals. It is therefore, important to understand how the sounds in *Proteus* defines goal-seeking behavior.

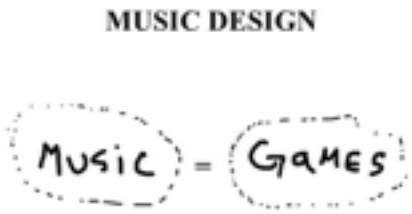
Each season of *Proteus* has a different soundscape and a day night cycle with different creatures. Moreover, there is a beginning and end which frames the procedural content and adds structure to the wandering. Therefore, within the game there is a definite progression to an end and the player is able to acknowledge the season changes and progressions through the music change. Key adds that they decided to add almost magical scenes in Proteus in which there were alien like experiences. Because each object and each scene has its own soundscape — users attempted to make sense of these non sensible scenes through understanding which objects triggered what action to occur.

Proteus presents an interesting challenge to video games and what can be considered video games. The game has been hailed for its use of audio however, it is unclear its role as a video game. In 2011, Proteus won the award for Best Audio at Indiecade and was a finalist for the 2012 Independent Games Festival. Both Key and Kanaga acknowledge the role of sound as inherent to the game play. In an essay by Kanaga, he argues that sound functions as the spirit of the game. He states that it game sounds are chosen by designers because they hold certain meaning to them and the interaction between those sounds and the player leaves a world of interpretation and possibility:

> "Musicality as play-within-constraints can reveal for us ways of playing more fluidly, of opening ourselves to the world and to that infinite sense of possibility at every moment. Now, as players, we'll need to learn to bear the burden of generating our own meanings. And as designers, we'll need to bear the burden of imposing implied values (if not meanings) on the player with our boundaries. We'll open these forms and gladly hand over certain variables to the player because we know that it's not particular values that establish meanings, but the dynamics of change that generate them."[30]

However, many critics have criticized Proteus for lacking objective and direction, often dubbing it an anti game. Players online have argued for and against the games merits, and its untraditional game play.[31] Key comments that he doesn't "call Proteus an antigame or a notgame," he said, "I call it a game, but

obviously I am at pains to make it clear that it doesn't have explicit challenge or “winning."[32] Key goes on to say that Proteus does have systems "it's just 95 percent optional whether you engage with them and it generally doesn't give you any confirmation when you do. There's a design reason for this.”[33]



Music = Games
Credit: David Kanaga’s 2014 GDC talk

Thus, Proteus poses an interesting questions for games: which is, can audio alone define a game? In David Kanaga’s presentation at Games Developer Conference 2014, titled “Music Object, Substance, Organism,” Kanaga presents his working hypothesis that games = music, arguing that there is an identity between music and games as a played structure.[34] Through following this structure, users gain the ability to “construct an image of such an identity” in which the discrete components are meaningless but become meaningful when played.[35] For instance, his presentation begins with a picture of an egg sizzling and which abstracts into colors with the same sizzling noise in the background.

Egg sizzling abstracted
Credit: David Kanaga’s 2014 GDC talk

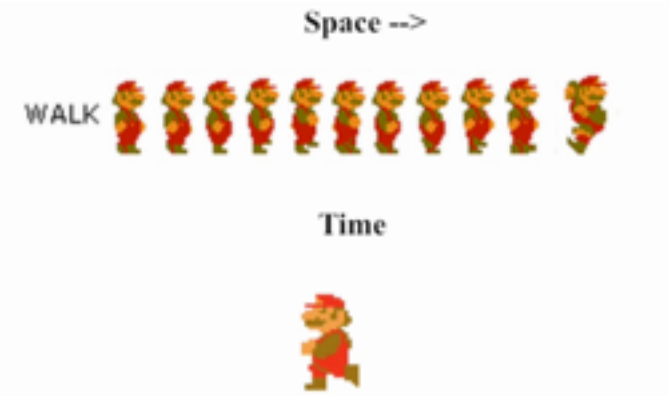
Although the egg becomes abstracted, it is still real and apparent to us that we are experiencing an egg sizzling. Thus, the image and the sound come together to create a realism that translates to a discernible experience for us.

Kanaga lays out four different kinds of realisms in game: Haptic realism, musical realism (the object) , flux realism (the substance) and organic realism, which constitute realism (the organism) in video games. These four realisms constitute the very nature of creating “realistic video games.”The first, haptic realism has much to do with player’s interactions with games. Kanaga argues that all player music originates from touch and is playing as long as it continues to be touch and that the relationship of touching is determined by the affordance of each subject’s capacity to be affected by each other. Thus, video game sounds are touched in the capacity that game sound designers allow them to be comprehended and interacted with and users are touched in the sense of their experience of the sound. A lot of the feel of game concerns the rhythm of the video game’s affordances. Often, games with be described as smoother or harsher than another one. This relationship has to do with sight as well, which is a form of touch at a distance. Therefore, video games is all about designing affordances that users can interact with.

Haptic realism description
Credit: David Kanaga’s 2014 GDC talk

The second kind of realism, magical realism, presumes that everything is music and it only requires space time. This is supported by Robert Fludd’s Neo Pythagorean definition of music which states that “music is the knowledge by

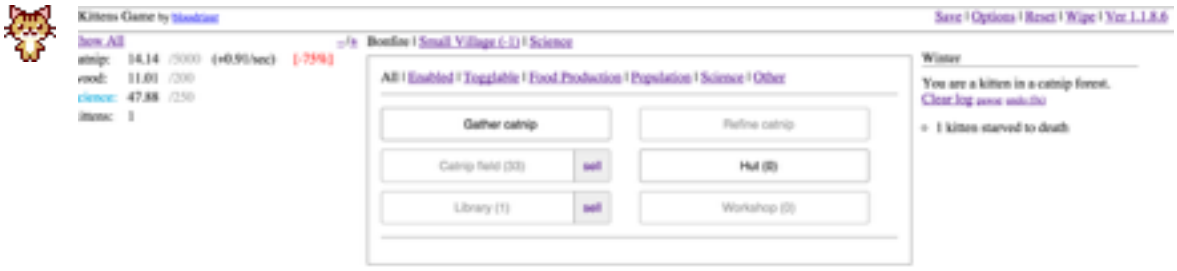
which all worldly things are joined by unbreakable bonds and by which like is related to like by equal proportion in any object."[36] This is stating that for every change of state video game , there should be a corresponding change of soundtrack. The video game becomes a musical instrument that changes across space time.



Magical realism example
Credit: David Kanaga's 2014 GDC talk

Flux realism builds upon the notion of music as something that is all encompassing. It purports that nothing is constant and everything flows. Williams James' *Stream of Consciousness* argues that both objective and subjective realities are in flux and what is possible at one moment is not possible at another. Thus, despite having constants in games such as objects — they are variable to change based on decision making — which is what makes games entertaining.

Games therefore, are very much like organisms. The last kind of realism that Kanaga discusses, organic realism, has much to do with how music and games are organisms and living beings themselves. Every life in the organic world has a beginning and end that undergoes constant change in between, much like Proteus. Playing involves the interference of other living things involve things being changed, born and dying. Thus, the goal of games is to listen to the whole living body in play with music.



Kittens Game gameplay
Credit: bloodrizer.ru

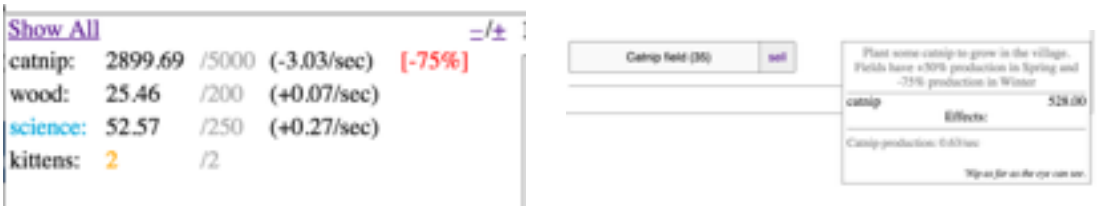
Kittens Game (2014)

Developed by: Bloodrizer (Independently made)

Platform: Browser game

"You are a kitten in a catnip forest."

Kittens Game seems to directly contrasts Proteus's notion of sound in games. *Kittens Game* is an independently made browser game and is a text based incremental game built by bloodrizer. You start as a kitten in a catnip forest looking to gather catnip in order to build fields to produce catnip. Once you gather enough catnip, it can be refined into wood and be used to create buildings. Despite this simplistic definition, *Kittens Game* is surprisingly difficult and involves thoughtful planning. One wrong move and your kittens will have starved to death.



Kittens Game gameplay
Credit: bloodrizer.ru

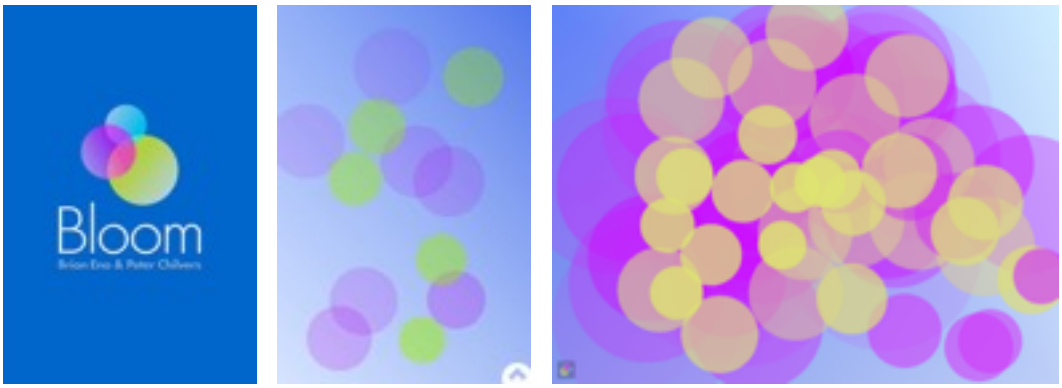
The gameplay of *Kittens Game* has very obvious consequences based on the text labelling of the buttons. If I clicked on "catnip field" for instance, it immediately adds to my catnip supply. Moreover, the pace of the game is

evident itself. There is a rate besides each action and the numbers tick accordingly. This game is incredibly addictive — although it moves slowly in the beginning, you must consider how to prioritize upgrades so that your kittens don't die. However, once you get the initial set up rolling, you are aware that this civilization is capable of being self sufficient, requiring minimal management in order to move it forward.

Therefore, the game *Kittens* brings to question: "how are games music? or how are games games?"[37] In his piece, "Intro to Ludic Ecologonomy (Pt. 1)" David Kanaga discusses how games are dualistic — economic and ecological, "one dealing with rules which can be broken and changed abstractly, the other dealing with forces which cannot be broken and which can only be changed by concretely reconfiguring the materials conditions which cause them."[38] *Kittens* falls under the definition of economical, which defines games as a set of rules. However, Kittens is a completely silent game that seemingly goes against Kanaga's argument that games equal music. On the contrary, Kittens evidently succeeds as a video game and has a very obvious goal: to build a civilization for cats. It is important however, to think about what sound would add to the user experience of Kittens. Music in particular, adds something to a game: it creates an environment for the user to experience and move through the game.

In *The Soundscape of Modernity*, Emily Thompson, a sound historian from Princeton University, looks at how the acoustic space has evolved over time. In particular, she defines soundscapes as "simultaneously a physical environment and a way of perceiving that environment." [39] Sound spaces thus, have the capacity to be manufactured such as Radio City Musical Hall which represented a marriage between technology and acoustics: "Physically as well as conceptually, the distinction between sound in space and sound signals in circuits fell away, as acousticians and sound engineers sought to achieve ever greater degrees of control."[40] Similarly, the orchestra pit creates a sonic space in which the music is invisible. All of these spaces answer the question of how to tweak spaces and the sounds generated by such spaces so that people get immersed and lost in the space.

Spaces are constructed in order to manufacture immersion, which includes silence. For instance, in a room of typewriters it is important to consider how much noise is interfering with other typists' work. When constructing spaces for typists then, engineers must consider how the space is able to amplify the human ability to succeed in a particular task, i.e. typing. Therefore, we have to consider the space in which *Kittens* is experienced. Kanaga states that it is not necessary to have sounds for a game to be considered music for "it is possible to read ALL GAMES as dynamic scores already complete with the necessary time-structures, rhythmic information."[41] It is therefore, possible to label actions as rhythmic, which Kanaga defines as ludo-musical. For instance, Kanaga discusses the jump from Mario 64, which had a couple of different jump mechanics. For instance, the triple jump has a rhythm that is "elastic-expansive [where] air time increases with each additional hop: J - - , J - - - - , J - - - - - - - ..... where "J" is for jump, and the dashes are airtime."[42] Similarly, the actions in Kitten can be coded as rhythmic with wait cycles in between an example between G G G G - - - - H, in which G represents the gathering of wood and H represents hut. Therefore, *Kittens,* a game which is evidently rule and goal based, is musical in the sense that its actions can be read as rhythms.



Bloom gameplay
Credit: apple.com

Bloom (2008)

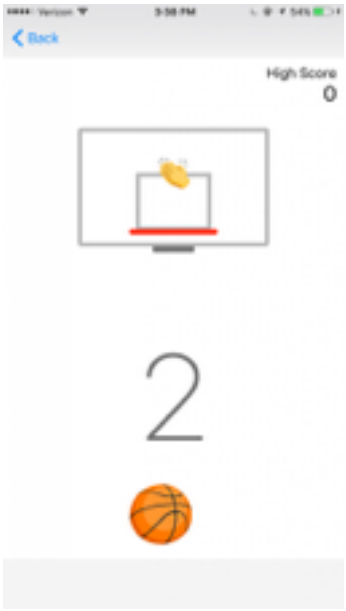
Created by: Brian Eno and Peter Chilver

Platform: Generative Music iOS Application

So far, we have understood *Kittens Game* and *Proteus* as being defined as immersive games despite the conflicting role of sound. This contrast however, poses a question: how can we define games in terms of sound? Let's take for example Brian Eno's and Peter Chilver's "game" *Bloom*, an app that is "part instrument, part composition and part artwork"[43] in which players tap the screen to form patterns and melodies. When the player becomes idle, a generative music player takes over the game and creates an infinite set of compositions and visualizations. Similar to *Proteus*, it is difficult to conceptualize *Bloom* as a game: there is no clear goal and the only clear actions are to generate sound.

There are many ways that Bloom can not be considered a game, the first being that it keeps living after the player is active. Therefore, it seems to be anti-addictive and anti-immersive since music will keep happening regardless of user interaction. It can also be said that there is no clear build up to a goal for the user as there are in other games. For instance, you can say that the goal of *Kittens Game* is to build a civilization for your kittens whereas in *Bloom*, you are simply making sounds through screen taps. Moreover, there is no increase in

difficulty as there are in games like *Kittens Game* where it becomes more difficult to maintain your kittens civilization as it grows bigger. There are no obstacles in *Bloom* as well, as long as you continue to tap the screen then music and its visualization will continue.



Fruit Ninja gameplay (top)
Facebook *Basketball* gameplay (right)
Credit: apple.com and facebook.com

However, the interaction between the player and the game *Bloom* is game-esque: you are tapping on a screen to generate effects which is present in games such as *Fruit Ninja* and Facebook's *Basketball*. Moreover, the game world persists in most games when the user leaves the game. Most notably, in *Kittens Game*, the civilization will continue regardless of user input. Especially in more advanced civilizations, the kittens will often be able to survive for years without input from the user much like how the music persists without the user. In most other games as well, such as *Majora's Mask* or *Tales of Symphonia*, the game world will continue in the player's absence. Moreover, Kanaga places *Bloom* in the category of an ecological game which describes games in terms of affordances. For instance, in Russell Davies "playful" he describes a set of games as "Barely Games" such as Star Wars toys. Kanaga calls these ecological games, where things such as toys can be considered games in terms of the set of affordances they have.

Yet, despite all these game-like features, it is still difficult to call *Bloom* a game but it is also difficult to call it an anti-game. What then, does sound contribute to defining *Bloom* as a game? When we play games we expect our actions to have effects and outcomes. More often, we expect a win or a loss, however, we expect that our actions either advance the games or do not. Sound indicates those effects: in RPGs, we know that we've entered a new scene because the background sound has changed, in lottery machines, sound is used to indicate a win or a loss, and each action in a game is often attributed to a particular sound.

However, the only indication that *Bloom* provides is that a sound has been generated, but there is no evident change of stage or scene. The user creates different sonic events which are driven by a series of taps, which then continue onward regardless of user input. Therefore, *Bloom* is not a game but it is extremely musical. However, when we ask why Bloom is not game we begin to understand how it clarifies the goal seeking behaviors of games and how sound informs those behaviors.

Bloom is extremely addictive, much like *Kittens Game*, but there is no goal, there is simply only new music patterns to be created:

> It is hypnotic and ludicrously addictive. A friend of mine spent six hours poking the screen of her iPhone, mesmerised by the colours and noises she was making. So should Bloom be regarded as a new Brian Eno album (because it certainly sounds like one), a clever but singularly pointless computer application, or a massive Satie-like joke at the expense of its listeners?[44]

How does an app that is simply sound generation then, become addictive? The patterns that are generated are "ever changing composition, which is always familiar, but never the same."[45] Therefore, the game isn't linear, you spend "arbitrary amounts of time in different locations around an artificial world."[46] Bloom creates a soundtrack that acts as a landscape in which "'virtual improvisers' [are] constantly generating an ambient soundscape in the background."[47] Therefore, in this case, sound represents goals in the absence of

physical goals, we can think of "navigating these musical edifices as a kind of game."[48] It presents new soundscapes for the user to explore possibilities.

Earthbound gameplay
Credit: kotaku.com

Earthbound (1994)

Created by: Shigesato Itoi and Satoru Iwata (Nintendo)

Platform: Super Nintendo Entertainment System

Earthbound is a RPG produced by Shigesato Itoi and Satoru Iwata made for the Super Nintendo Entertainment System (SNES). It involves the story of a 13 year old traveling the world to collect eight memory shards to defeat an evil alien named Gigyas. The game was developed over the course of five years and was one of the most involved Japanese video games. Beyond the story itself, Earthbound presented a real world setting, parodying Western Americana culture. In addition, it came out with a vinyl soundtrack that accompanied the game.

Keiichi Suzuki, Hirokazu "Chip" Tanaka and Hiroshi Kana worked on developing the soundtrack of this game and commented that the technological affordances of the SNES allowed more freedom for the music development as opposed to the 8-bit technology of the NES. There was more memory, as well as access to eight notes as opposed to three notes, therefore increasing sound quality and composability.[49] Music thus, could be composed for the video game as it could be composed for real life. Itoi commented that the music that was produced was one-third the size of the total game, each track aimed to capture the emotion and atmosphere of the story and scene of the game. Moreover, Suzuki cited John Lennon's songs about love as a major influence to all the composers of the soundtrack.

It is without a doubt that *Earthbound* is both musical and a game. It is therefore, important for us to understand how both music and game work together to guide the player through the gameplay. Foremost, let us analyze why there are sound effects for each action that the player takes such as hitting an enemy or reading texts. There are obvious results of such sound effects that have taken place in other games as well such as the sound effects of texts indicate to the user that texts is being read versus the sound of going to sleep indicating another action.

Earthbound rhythmic hit
Credit: wikibound.info

However, these sounds effects immerse the player into the world of *Earthbound* and ultimately guide the players through the game as they represent movement. The most obvious case of this is during battle. During battle, the users are able to deal more damage by using rhythm combinations. For instance in a battle against strong characters in *Mother 3,* the sequel to *Earthbound*, the battle theme "Strong One" plays at a time signature of 15/8 a looping rhythm of "X__X__X__X__X__X_X__X____" that loops at 250 BPM. Like in any other battle, users can tap the hit buttons at the X's to perform more damage on the opponent. However, given that it plays during harder characters, the beat pattern is difficult to perform patterns with. Yet, the strike sound when the user lands a successful hit indicates success whereas a miss does not generate any

sound affect. Thus, sounds become desirable in the atmosphere of battle, thereby guiding players toward higher hit rates.

Now, let us analyze the soundtrack of the game which contains 24 tracks. The games soundtrack is diverse and represents the different stages that the character enters. They are similar to movie soundtracks in that they convey certain emotions based on the music. Take for instance, the song *Cease to Exist (Pokey Means Business)*, which is used in a battle against Gigyas. It starts out with a traditional 8-bit RPG battle music and builds up into Trash Metal. This song will evidently get the users blood pumping in battle and put them in the scenario of a battle. Then we have songs like "Home Sweet Home" which conveys sadness and nostalgia, and “sounds exactly like the nostalgic sensation of coming back to visit your mom after a long time.”[50] Overall, the soundtrack sets the scene for the various events that occur in Earthbound which constitutes the world of Earthbound.

CONCLUSION

Before concluding, I would like to take a moment to rationalize the choices I made in the games I analyze simply because there is a plethora of games to choose from. I wanted to choose four case studies to analyze that fell on an axis of Sound, No-sound, Game and Non-game. Moreover, I hoped to choose cases that encompassed a wide range of gaming. I moved away from violent video games because it would have most likely resulted in a discussion about whether or not video games can make us violent rather than the role of game sounds. Moreover, I was interested in how video games that were less high energy and less violent incorporated sound to draw players in.

Foremost, *Proteus* was an obvious choice for me as a game that relied purely on audio-visual interaction. It falls under the category of **game and sound.** David Kanaga and Ed Key made active design decisions in the games audio in order to make it possible and therefore, the effect of the sounds present in Proteus is more evident.

Kittens Game was a less obvious choice and came out of the fact I wanted to find something wholly different from *Proteus* while still supporting my argument. It falls under the category of **game and no sound**. What surprised me most about this game was how addicting it was despite having no evident or traditional sound or visual elements. In contrast, I chose an app that was **anti game and sound** *Bloom*. The contrasts and similarities between *Kittens Game* and *Bloom* aid in defining what makes a game a game and what makes a game music.

Lastly, I wanted to choose a more traditional and mainstream game that was both **game and sound** and was developed by a major company, Nintendo. In particular, *Earthbound's* soundtrack is nostalgic for me much like how Final Fantasy is nostalgic for audiences.

In conclusion, the games that I have chosen to analyze have aided in clarifying the role of sound in gaming as both something that helps user enter

game playing state and also as a way for them to navigate through the game. By placing these games on an axis of sound and game, it becomes clear what qualifies a game and how sound adds to the definition of games. Sounds signal goals and help user transition into mode where they are thinking about goals, thereby inducing a flow state.

ENDNOTES

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[43] Taken from app description

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[47] Ibid.

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