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Senior Thesis

How Game Sounds Affect Play - Draft

Working Title:

The Role of Game Sounds in User Interaction

1.0 Abstract:

The purpose of this paper is to illuminate the role of game sounds in user play. 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 experiences 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 for the user. In particular, I will look at how sounds act as a guide for players.

1.1 Overview:

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 creating 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 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 Schull'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 game with a clear objective, the research I'm conducting will hone in on three major categories:

1. Games with soundtracks that have been popularized and recognized on a global scale. Why have these game soundtracks resonated with people and what is the role of the sound track in particular?
2. Independent games that do not follow conventional gaming standards but still have an arguable end objective.
3. Games largely driven by sound.

1.2. Objectives:

The objective of this paper is to demonstrate that game sounds are an integral aspect of game play. Without sounds, a game would not have the same significance as it does with sound. We associate sounds with certain actions and game features. Therefore, I argue throughout my paper that a game and that same game on mute would create radically different experiences.

Part of achieving this objective is to explore 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. This literature will provide me a dictionary of psychological and physical effects to reference when discussing game sound effects.

1.3. A Brief History of Video Game Music: From soundless to soundtrack:

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,



Bertie the Brain (1951)

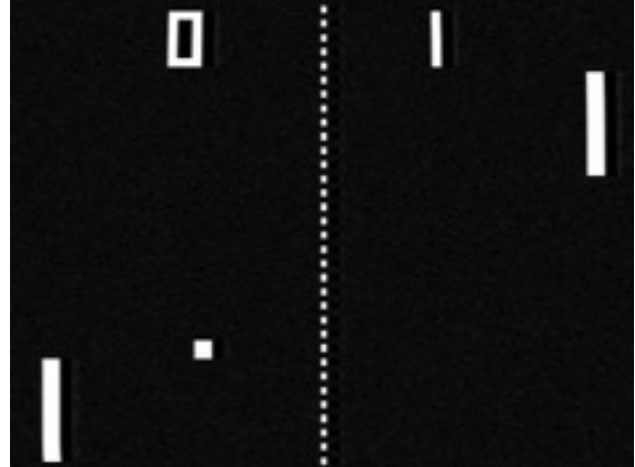
which allowed for the creation and manipulation of electronic signals, and an oscilloscope that translates those signals into lights onto a monitor. The objective of this game is to have the ray of light point to a particular target. Much like other games that soon followed, such as

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.¹ Yet, this alone seemed to be an effective means of communicating

¹ Before the Crash: Early Video Game History

the game's goals to the user so why add sound at all? Why is visual communication not enough to constitute an effective video game?

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.² They advertised the "battle 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."³ This was one of the first instances where video game sounds were advertised as a feature of a game. The technical affordances of the microprocessor and the growing field of game development seemed to lead to the integration of game sounds. However, in the 1970s it was still unclear as to what the role of sounds in games would be. One of the first notable set of game sounds came out in 1972 with Atari's Pong.

Atari's Pong is often considered a breakthrough in the game industry but it is rarely understood why. The sonar blip generated by the ball being

² Game Sound by Karen Collins, 8

³ Ibid, 8.

hit back and forth marked the first time 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. The Atari 2600, which was introduced in 1977, only allowed two game sounds to be played, yet the sound design for Atari had become widely popularized and recognizable despite this.

Possible early game soundtracks:

- Breakout
- Atari
- Pac-Man
- Street Fighter 2

The documentary series about Japanese video game music titled Diggin' in the Carts goes through the evolution of video game music from 8-bit to the current soundtrack. Through telling the story of various game composers, this documentary has demonstrated how video game music has been integrated into the cultural lexicon for the figures that make up contemporary music. It focuses on the Japanese composers who innovated music in games with limited technology that only allowed them generate a handful of bleeps and bloops. This documentary goes in a chronological order from examining the first music in games such as Pac-Man and Street Fighter II to the full scores of games such as Final Fantasy.

This research is furthered by NPR's piece, "The Evolution of Game Music," which demonstrates the increasing significance of music in video

games. It starts first with noting that the 1970s were when games first had sounds with game such as Pac-Man and Pong. The author remarks that the sound "wasn't exactly symphonic" but rather an "recognizable onomatopoeic sound." 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." The article concludes that video game music is a field that is still developing but becoming more and more integral to video games.

As video game technologies became more intricate, the soundtracks for games became elaborate. There are currently orchestras dedicated to reproducing game soundtracks.

Examples of elaborate game soundtracks:

- Legend of Zelda

- Earthbound
- ChronoTrigger

1.4. Literature Review

A. Existing Research on Sound Effects

1. Ear Cleaning by Murray Schafer

- a) Study conducted on university students to understand how we listen.
- b) Provides an 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.

In order to understand how game sounds effect play it is important to have a basis for quantifying how sounds effects 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.

In Ear Cleaning, Murray Schafer uses a study conducted on his first year university students to observe how sound effects its listeners. 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."⁴ 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 listen: We begin by listening to sound. However, the world is full of sounds both undesirable and desirable. 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 sound. Through this process, students are able to analyze what they should hear and reconstruct it synthetically. Therefore, Schafer's gives way to understanding how we should listen to sound in the face of modernization.

2. Sonic Experience by Jean François Augoyard, Andra McCartney, Henry Torgue, David Paquette

- a) Provides a dictionary of sound effects that takes into consideration the context in which the sound is heard.

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*. As leading sound researchers at Centre de recherche sur l'espace sonore et l'environnement urbain (CRESSON),

⁴ Schafer 45

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 and the individual listener” (Augoyard, McCartney, Torgue, Paquette XIII). Through their research, they attempt to outline a dictionary that defines or 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.” They outline 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” (Augoyard, McCartney, Torgue, Paquette 28). Ultimately, 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.

B. Game Sound Engineering (How the practice currently functions)

1. Creating Music and Sounds for Games by G.W. Childs
2. Game Sound: An Introduction to the History, Theory and Practice of Video Game Music by Karen Collins

C. Current research on game sounds and play

1. Addiction by Design by Natasha Schüll

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.

- a) How do game sounds manufacture addiction? What are the engineering considerations that go into creating such sounds and experiences?
- 2. *Studying Play* by K.J. Donnelly and William Gibbons
 - a) Extensive look into 11 different video games

3. **Look for existing literature on how users memorize controls based on game sounds.

1.5. Analysis and Requirements:

Problem Analysis: How do game sounds guide players through a game?

Analysis approach: 3 case studies and an analysis of how they effect user experience

1. Proteus: A game of audio-visual exploration and discovery
2. Kittens Game: Silent incremental game for cat feeding
3. Earthbound: A game surrounded around a 13-year-old boy who journeys around the world to fight evil.

1.6. Description of design decisions:

- Why did I choose the model of looking at three games soundtrack
1. Proteus goes against traditional gaming and does not seem to have an end goal Instead, it as an audio visual experience..
 2. Kittens is a game with no sound but has a clear purpose and objective.
 3. Earthbound is a mainstream game with an intricate soundtrack. There are levels to this game and a clear end goal.
- Why did I choose to study these three games in particular?
 - To compare and contrast how sounds play a role in varying types of video games. These three are three games I found that differed the most.

1.7. Implementation of research:

I will be creating a game with Unity or JavaScript. The goal of creating this game will be to understand whether or not sound is successful in guiding users through a game.

1.8. Possible Testing:

Test on a random sample size of 100 NYU students. 50 will be asked to play the game without sound and 50 will be asked to play the game with sound.

The goal of the study will be to see whether or not the students understand what the objective of the game is through the sounds.

1.10. Conclusions: An understanding of how sound acts as a guide for users.

Not sure what the results will be yet.