# Agency and Audio: How a player's in game choice can impact their audio experience

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# <u>Abstract</u>

Since the emergence of the original arcade games, the role of audio in games has evolved drastically. What was once seen as an auxiliary feature is now at the forefront of games and player experience. Audio is a crucial part of modern games whether that is in the form of dialogue, soundtracks or diegetic and non-diegetic sound. However, the way in which players interact with audio in games has undergone a change in recent years. Throughout the course of this thesis I will examine the relationship between players and audio in games with a focus on the growing influence of player agency on their audio experience.

In order to discuss the relationship between players and their audio experience, I identified a number of different applications of audio in video games and examined how these applications have evolved throughout the years. Having identified these applications, I then examined a select few in greater detail. In doing so, I was able to identify how different elements of video game audio can be influenced by the actions of those playing the games. In particular, how player agency can influence a game's use of dialogue and musical soundtrack in order to reflect the preferences of the player. Similarly, I discussed how player agency can contribute to a player's sense of immersion within a game-world, through the creation of diegetic and non-diegetic sound.

Overall, this study found that audio has become a crucial part of the player experience. This importance is reflected in the growing levels of influence players have over their audio experience.

With new consoles due for release towards the end of 2020 and an increasing move towards virtual reality gaming, I believe the application of audio in games may be set for another overhaul. Future research on the use of audio in video games will likely be shaped by the technological advances of the next few years with the role of audio as an immersive technique in virtual reality gaming a particularly prevalent topic.

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# Introduction

Since the emergence of the original arcade games, our knowledge and understanding of what constitutes a video games has evolved greatly. From standalone machines in purpose built arcades, to consoles designed for bringing the video games into your home, to new virtual reality technology which allows players to enter into the games themselves, video games are constantly evolving and striving towards the future. In line with the technological advancements, the games themselves began to change. While classic arcade games such as Space Invaders (Taito, 1978) and Pac-Man (Namco, 1980) retain a special place in the hearts of players, most modern console games are far more narrative driven, attempting to create worlds in which the players can fully immerse themselves. A consequence of this change towards more story based games is an evolution of the different mechanisms which contribute to the game's overall atmosphere. One such example of this is the role of audio which has evolved drastically.

What was once seen as a backdrop, is now at the forefront of games and player experience. Audio has developed into a crucial part of modern games, whether that is in the form of dialogue, soundtracks or diegetic and non-diegetic sound. The presence of audio has, in some instances, become the central focus of games with music simulation games such as the Rock Band series (MTV Games, 2007-2015) and the Guitar Hero series (Activision, 2005-2015) achieving great success in recent times.

The evolution of audio in games has contributed to changes in the way in which players interact with the game's audio. Players are no longer happy with being passive participants simply following the linear paths which have been laid out for them by the games' developers. There is an increasing expectation and desire amongst players to have an influence on their gameplay experience. Players want to explore the game world, with the freedom to roam amongst the virtual reality and immerse themselves in the game. One such way in which players are increasingly able to interact with these worlds is through the games' use of audio.

Throughout the course of this thesis I will examine the relationship between players and audio in games, with a focus on the growing influence of player agency on their

audio experience. I will first provide a brief summary of the role of audio in classic video games, following the evolution from arcade to home video game systems and how this evolution was reflected by the developers' use of audio in video games. I will then discuss the importance of soundtracks in video games as a device for players to influence their audio experience within the game world. Having discussed how players can impact the soundtrack of a video game, I will subsequently move on to examining how video game audio can impact players. This will be done by discussing the use of audio in horror and survival games in addition to the role of diegetic and non-diegetic audio in video games.

Firstly, I will conduct a brief literature review of existing research examining the role of audio in video games.

## Literature Review

In this literature review, I will be providing a brief overview of written sources which discuss the relationship between sound and video games. Throughout the published studies on the subject, several key themes emerge such as the role of audio elements on player immersion, the use of diegetic and non-diegetic audio in video games and how music in particular is becoming an increasingly crucial part of the modern video game experience.

In her 2007 chapter "An Introduction to the Participatory and Non-Linear Aspects of Video Games Audio", Karen Collins discusses the idea that there are five unique applications of audio within video games. The five applications which she references include the use of audio for dialogue, the crucial role played by a game's soundtrack, how a game's audio effects can create a sense of depth within a world, how zonal audio can determine the ambience of a scene, and finally how a game's audio on the initial interface serves as a precursor to the player's overall game experience. (Collins, 2007) This concept of audio application is mirrored in a work by Parker and Heerema. They identify audio as having four distinct roles, which are: music, speech, effects and input. (Parker & Heerema, 2008) These different applications of audio demonstrate its versatility and reflect the many different ways it is utilised throughout video games. In the same chapter, Collins compares audio within video games to audio within traditional media such as television and film. This is done to highlight the different ways in which audio must be approached to ensure it is used correctly.  While audio in film is linear, and follows a set structure, its use in games is far more unpredictable. There is no set planning of audio in the same sense as film; audio in games must be reactive and align with the player's actions. (Collins, 2007)

Particularly in a medium such as video games, interactivity is of paramount importance. In her 2008 book "Game Sound: An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design", Collins defines interactivity as the physical ability to interact with an object with agency, and cites it as one of many factors which distinguish games from traditional media. (Collins, 2008) Interactivity within games can create both diegetic and non-diegetic sound. Diegetic sound refers to audio created by on-screen actions or that exists within the world. Non-diegetic

sound refers to audio which takes place off-screen or outside the world. Within a video game, diegetic sound is represented in the sense that a player's on-screen movement can create sound effects which the player may associate with movement (such as the crunch of gravel under foot). Conversely, it can just as easily create non-diegetic sound by triggering the game's adaptive audio. Collins describes adaptive audio as being reflective of in-game actions. Commonly found applications of adaptive audio include a change when approaching an enemy, or the presence of a beating heart effect when your playable character is running low on health. While the sounds are coming from off-screen, they are a direct result of the player's in-game actions and are the result of the player's interactions with the game world. Consequently, these are examples of players' in-game agency impacting their audio experience. This sentiment regarding adaptive sound is also found in more recent work, such as the 2013 report by Eriksson and Lindau. They defined adaptive sound as a reaction to on-screen activity. (Eriksson & Lindau, 2013) Adaptive sound was used sporadically in games during the 1980s, but only became a common feature in the early 1990s. The introduction of adaptive audio transformed the application of all audio in games. It allowed players to replay specific missions or parts of a game without being subjected to the exact same audio each time. With a particular focus on audio-specific games, adaptive audio revolutionised the genre. Two such games which display how impactful audio can be are Otocky (ASCII Corporation, 1987) and SimTunes (Maxis, 1996), both of which feature music by acclaimed composer by Toshio Iwai. In the games, players are tasked with creating their own soundscapes by their actions within the game world. Rather than simply influencing their audio experience, players in these games are curating their own soundtracks. In a 2008 article, Collins discusses in greater detail how these examples are almost closer to the gamification of real-world music creation than a traditional video game. These games closer reflect real music production software which are being controlled in a manner similar to video games rather than video games which create music. Collins then goes on to compare how modern music applications like MIDI systems operate on the opposite end of this spectrum, using actual game interfaces to create real music. (Collins, 2008)

Within adaptive audio, the importance of procedural music cannot be overlooked. Procedural music is a term used to refer to music which is created by processes which were developed by a composer. In games, it creates unique audio experiences for the

player based on a pre-existing set of tracks laid out by a composer as part of the game production. This can be done using transformational algorithms or generative algorithms. Transformation algorithms take an existing track and rearrange the specific pitch and tempo of sections to create a different song. (Collins, 2008) Generative algorithms draw from a large back-catalogue of notes, which have been loosely categorised and are then arranged in real time with the game to produce completely new tracks which are relative to the player's experience. (Collins, 2008) Generative algorithms can also be referred to as "vertical re-orchestration". (Eriksson & Lindau, 2013) This focus on development and implementation of dynamic audio highlights the key role audio plays in consumption of video games.

There have been a number of different studies conducted, with a particular focus on the role of audio on player immersion. In 2011, Boyle et al. published a long-form literature review examining a number of papers published between 1961 – 2001 discussing levels of engagement with regards to video games. (Boyle et al., 2012) Ningalei and Wöhrman (2018) conducted a report in which they examined the effect of audio devices in horror- and survival-based video games. Throughout the course of their research, they found there was a fine line between creating the perfect level of unease for a player without producing an unpleasant atmosphere, which in turn would drive players away from the game world. There was a similar report conducted in 2008 by Rowan Evans, but with a key distinction. In Evans' report, he looked at the effect of music in particular, rather than audio as a whole. Using a combination of questionnaire and interviews, Evans found that participants felt a greater level of immersion when playing a game with music than playing a game without. (Evans, 2018) This approach has been utilised in other examples too, such as the 2015 article by Zhang and Fu. Using the same structure of a combination of questionnaire and interview, they came to a similar conclusion that stated background music significantly improved levels of immersion whilst playing games. In their article, they also identified three separate types of immersion (sensory, imaginative and challenge-based immersion), stating a good video game should provide their players with an optimal balance of all three types. (Zhang & Fu, 2015) Rod Munday published a similar study, charting the evolution of audio with a particular emphasis on its place within player immersion. Munday identified music as not only contributing to the development of a world in which the game existed, but also as a feedback mechanism of the player's

involvement and a key role in supporting the narrative structure. (Munday, 2007) Beyond examining the impact of audio on player immersion, there have also been a number of studies which examine the impact of audio on a listener's physical health. Stefan Koelsch conducted a study in 2010 which examined the effect of different forms of music on the listeners' emotions using a series of functional neuroimaging and lesion studies. This study found that while music alone lead to increased emotional activity, it was at its most effective when paired with a visual stimulant as it is within video games. (Koelsch, 2010) Hébert et al. had carried out a similar study in 2005 with a particular focus on the physiological effects of video game music on the player. In their study, they attempted to define what contribution, if any, music made to the secretion of the hormone cortisol within their test subjects. Cortisol is widely considered to be the hormone most closely linked with the emotion of stress. Their study found that the saliva samples taken shortly after the player had concluded their gaming whilst being subjected to audio had the highest levels of cortisol secretion. This confirmed their hypothesis and aligned with pre-existing research. (Hébert et al., 2005) The music used in this study was primarily techno and, in their research, they queried whether the use of techno itself could have been a contributing factor to the levels of stress, and if that is why it was chosen for the particular game. All of the studies mentioned above highlight a distinct relationship between players and video game audio. In particular, they place a focus on how audio within games can prove to be a vital component of a player's immersion within the game-world. The influence of audio on player immersion, particularly with regards to horror- and survival-games is discussed in greater depth throughout Chapter Three.

Considerable levels of research have been conducted analysing the role of music in video games. In 2009, William Gibbons examined the early applications of music within video games. He cited well-known games such as Tetris (Alexey Pajitnov, 1984) and Captain Comic (Colour Dreams, 1988) as examples of early Nintendo games which utilised classical music as the backing track, and attempted to reconcile what kind of relationship these games had with the chosen tracks. (Gibbons, 2009) Karen Collins examined music in a more contemporary sense with her 2008 paper. Starting with a summary of the games Journey's Escape (Data Age, 1982) and Revolution X (Midway, 1994) which featured the music of Journey and Aerosmith respectively, Collins then creates a chronological timeline from the 1980s until the mid 2000s. In

this timeline, she discusses the emergence of popular music being licenced for video games, but also the expansion of video game specific music being consumed within the realm of popular music. (Collins, 2008) As will be discussed further in Chapter Two, different genres of games approach soundtracks from different perspectives. Musical soundtracks in particular have proven to be incredibly versatile and are becoming increasingly recognised as one of the most important features of contemporary games.

Whilst music is certainly one of the most prominent uses of audio in games, music and effects are not the only featured use. In the 2017 book, "Dialogue Across Media" Sebastian Domsch has penned a chapter dedicated to the role of dialogue within video games. Starting from the roots of audio as a text-based narrative, he follows its evolution into an audio device. Using the example of the silent protagonist trope, he discusses how the absence of audio dialogue can lead to a player feeling a sense of detachment from a game which sees other non-playable characters in conversation. However, this concept is then juxtaposed by theorising how the presence of a character's own voice may detract from the player's experience as it serves to remind them they are only controlling this character, as opposed to being fully immersed in the game as the character. (Domsch, 2017) Additionally, the role of dialogue in games has become a new domain for players to assert their agency on a game. Open world games afford players the choice of who to interact with, if with anyone at all. By choosing whether or not to speak with non-playable characters, they are influencing their audio experience. The influence of player agency on in-game dialogue is discussed in greater detail in Chapter One.

Throughout the evolution of audio within video games, there is an equally interesting story to be told with regards to how that audio is communicated to the player. There have been a number of papers published regarding the technological developments associated with audio communication through the medium of video games. As far back as the early 1990s, there were patents being filed with intent to develop video games based around the interaction of the player with the in-game narrative through audio devices. (Best, 1994) Even now, this concept of reactive games is still present today. Weinel et al. published a journal article in 2014 examining the development of "affective audio", a concept which would be able to adjust a user's audio experience

relative to their emotion or mood as communicated by sensors. (Weinel et al., 2014) Chang, Kim, & Kim developed a document which provides a chronological timeline from the earliest forms of video games to the mid 2000s. This timeline includes the technical specifications for each major games consoles with emphasis on how they differ from their predecessors. (Chang, Kim, & Kim, 2007)

Having now established a foundation for existing research, in the following chapter I will begin my own analysis with regards to the role of audio in video games. Firstly, I will establish what constitutes audio devices for the purpose of this study. I will then discuss their origins before examining how the role of dialogue in games has evolved throughout time to reflect the influence of players on their audio experience.

## Chapter One

Throughout this chapter, I will focus on three main points. To start, I will first attempt to clarify what are the common phrases and terminology used when discussing the presence and role of audio within video games. Having established an understanding of these phrases, I will then begin to examine the origins of audio within video games, before providing a brief timeline for their evolution. I feel it is important to address what role audio originally occupied in order to fully discuss how it has developed since then. Once I have discussed the definitions and origins of audio devices, I will then set about examining such devices in greater detail, starting with the role played by dialogue in video games. At this point, I will now examine what terminology is used to define an audio device and advise on how I will be using these terms throughout my thesis.

At different points of this thesis, I will be examining key elements of audio through their relationship with video games. There are a number of key phrases which I will be using regularly which I have defined here for clarity. I will use the term 'audio' to refer to a spectrum of sounds, or the overall aural output of a game or genre. It is said that applications of audio in games can be broken down into four main categories: music, speech, effects and input. (Parker & Heerema, 2008) These applications can vary drastically relative to the type of game being analysed. When discussing the specifics of game audio, I will then use more focused terms such as sounds or music. 'Sound' will be used to examine aspects of audio through a specific lens, such as discussing sound effects, or examining elements of sound such as diegetic or dynamic sound. 'Music' will be used to address elements of audio which feature a musical base such as a soundtrack. 'Dialogue' will be used when discussing conversation or communication within games.

In a very rudimentary sense, the audio featured in video games shares its core with audio featured in other forms of media such as television or films. This common base would initially define audio as existing in one of two categories, diegetic sound or non-diegetic sound. Discussing the difference between diegetic sound and non-diegetic sound with regards to film, Dykhoff stated that "Everything which happens inside this world is called diegetic and what happens (in the movie) outside this world is called non-diegetic." (Dykhoff, 2012, p.169) Whilst this could be considered a very broad

definition, it provides the foundation on which further analysis can take place. This definition has been applied by certain studies which examined the use of sound effects in video games. Ekman defined diegetic sound as any sound produced within the game world. Conversely, any sounds produced outside the game world are considered to be non-diegetic (Ekman, 2005). Ekman's definition is limited when examining the diegetic sound of video games for a number of reasons. Video games offer a level of agency which is unavailable to those simply watching a film. This level of interactivity creates a new dimension which can impact the diegesis of the game world. Rather than expecting the player to simply accept sound as a set point, the player must provide the impetus to trigger sounds too. The differential analysis of video game audio in comparison to that of conventional media has been a growing field of research in recent times.

Karen Collins, in her extensive work on game audio, has raised several interesting points with regards to how we may interpret the audio of a game. Collins states that while the general understanding of diegetic and non-diegetic is an acceptable foundation for discussing audio in games, there is scope for analysing audio even further. In 2007, Collins highlighted that within both diegetic and non-diegetic audio, sounds could be further identified as being either dynamic or non-dynamic sounds. (Collins, 2007) Collins has defined dynamic audio as encompassing both interactive and adaptive audio elements. Interactive audio is used to refer to any sounds which were triggered by a player's in-game actions (such as a player's movement creating the sound of footsteps as you walk around a map.) This definition of interactive audio has been used by other academics when discussing the role of audio within games (Ningalei & Wöhrman, 2018). Adaptive audio is similar in that it is triggered by in-game changes, but it does not necessarily relate to the actions of the player. Adaptive audio changes to reflect the current state of the game world, such as transitioning from day to night or moving from a vibrant town to a secluded woodland. Adaptive audio would reflect these changes. Adaptive audio in certain cases could refer to the implementation of sound as a reaction to on-screen activity. (Eriksson & Lindau, 2013) In the same fashion that diegetic sounds can be either dynamic or non-dynamic, non-diegetic sounds can be classified using a similar structure. Non-dynamic non-diegetic audio would be something which occurs within a game world but without a player's choice. Collins highlighted a game's introductory film or unavoidable cut scene as one

such example. In addition to the introduction of dynamic audio, Collins has also discussed how certain actions could be classified as extra-diegetic rather than purely diegetic. This would include a player's navigation through the menu in order to reach the game itself. (Collins, 2008) While these additional terms can prove very useful when discussing the role of audio in video games, in order to more fully analyse the role of audio in video games, we must first examine how the role of audio has changed throughout time.

Early examples of video games began to appear throughout the early 1950s and into the 1960s within research labs and universities, but it was only in the 1970s that video games truly came to prominence amongst the general public. Magnavox created the world's first home video game console with their 1972 Odyssey console. Whilst technically the first console available to the general public, it lacked the capacity to produce sound. (Chang, Kim, & Kim, 2007) The first console with audio capabilities was the Atari Pong, which became the first widely consumed video game console upon release in 1975. Pong included sound effect onomatopoeias which played when the ball touched either the paddles or the walls of the pitch. In addition to Pong, creation of popular games such as Taito's Space Invaders (1978) and Namco's Pac-Man (1980) truly established video games as a new staple of home entertainment. At the time of their release, these games were revolutionary. Both of these games included their own iconic 8-Bit soundtracks which are still remembered fondly today. The release of home consoles such as the Nintendo Entertainment System, Commodore 64 and the Atari 2600 allowed players to bring the arcade into the comfort of their own living room and signalled a change in how video games were received by the wider public. As one could imagine, the technological constraints of these consoles played a huge role in the limitations of these games in terms of both graphics and audio. Many of these early consoles relied on devices known as programmable sound generators to produce any form of audio output. As described by Collins in 2008 "…Programmable sound generators, which were subtractive synthesis chips that offered little control over timbre and were normally restricted to square waveforms, with limited possibility for manipulation…" (Collins, 2008, p.212) For the most part, companies purchased standard versions of programme sound generators from one of two main producers, either Texas Instruments or General Instruments. However, some companies like Atari did decide to produce their own chips in-house.

In these early days, audio was used exclusively in the background of games. As the audio chips required code in order to replicate the desired audio, most sound design for games was done by programmers rather than musicians. Due to their limited knowledge of music composition and the general disregard afforded to audio in games at this time, it was not uncommon for games produced during the late 1970s and early 1980s to use existing tracks in their games. In particular, there was a phenomenon centred around the use of classical music as a background to seemingly unrelated games such as Tetris (Alexey Pajitnov, 1984). Collins posits that this application of classical music could be related to the lack of musical skill afforded to those working in game development at the time. Perhaps in the earlier days this may have been a factor, but Gibbons (2009) argues that in certain cases, the use of classical music may have been an attempt to expand the game world to include compatible audio elements. Using the 1991 Pirates (MicroProse) game as an example, he links the game's use of classical music as an attempt to stir feelings of nostalgia and history in its players. Whether it was successful or not is up to interpretation, but in the same article he cites the importance of establishing some form of connection between a chosen audio track and the game in which it is featured. Discussing the use of classical music in Captain Comic (Colour Dreams, 1988), he acknowledges the incongruous relationship between the classical soundtrack and otherworldly gameplay as detracting from the gameplay experience. (Gibbons, 2009) In a sense, the tendency for a poor audio selection to detract from the game's theme served as an early example of the important role it played in player reception.

Nevertheless, not all games during this period relied on classical music to soundtrack their game worlds. From early on in the development of video game systems, there was a link to popular music. This is a relationship which we will discuss in greater detail in the following chapter, but is still very evident in video games even today. Journey were the first band to share both their namesake and music with a video game, leading to the creation of the 1982 game Journey's Escape (Data Age, 1982). Playable in both arcades and at home on the Atari 2600 gaming system, the game allowed players to listen to the music of Journey whilst attempting to rescue the band from mobs of their fans. This game was the first of many crossovers which took place throughout the 1980s and 1990s, with other popular musicians such as Michael Jackson and Aerosmith also contributing their music and likeness to video games.

(Aerosmith's Revolution X released in 1994 by Midway and Michael Jackson's Moonwalker released in 1988 by U.S. Gold). (Collins, 2008)

As games continued to develop and evolve, so too did the role played by audio. When discussing the evolution of audio in video games, Chang, Kim, & Kim (2007) stated "… the role of game audio depends on the content, progressive manner and mood of the game, defined by its requirements for sound and music with characteristics that produce immersive atmosphere according to the game's storyline…". (Chang, Kim, & Kim, 2007, p.6) Particularly in the early days of video games, audio served as a periphery figure to the storyline of most games. It was only as we progressed through the mid 1980s and into the 1990s that audio began to gain a more prominent role. Early examples of gameplay directly impacting on the player's audio experience can be seen in games developed by the artist Toshio Iwai such as Otocky (ASCII Corporation,1987) and SimTunes (Maxis, 1996). Released by the ASCII Corporation, Otocky is an early example of procedural music production within games. As the player moves through the levels, they must interact with the game world. These in-game actions produce a melody. In SimTunes, the player creates musical notes by drawing creatures on the screen. The notes are then played by releasing bugs which crawl over the notes, creating sound. (Collins, 2009)
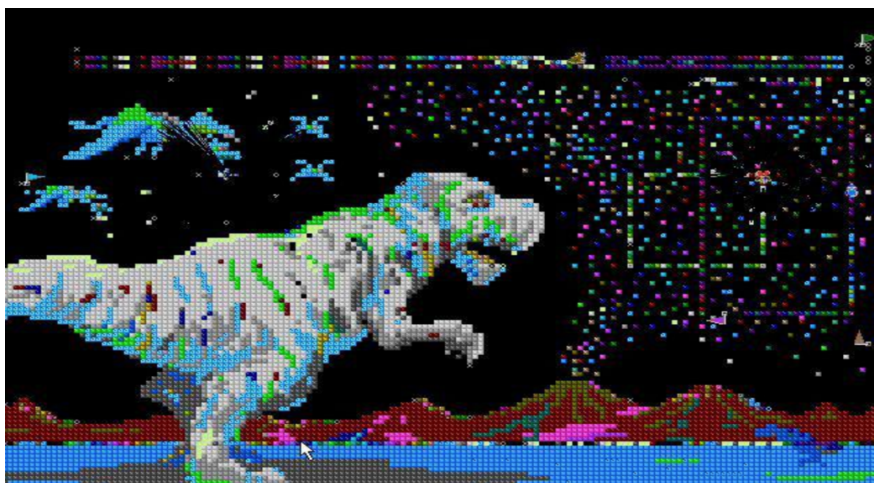


Figure 1. A screenshot from SimTunes (Maxis, 1996)

Both games offer an interesting perspective on interactivity and musicality within games. SimTunes in particular raised the question of it being considered a game at all, as it lacked a set goal. SimTunes is an example of what could be labelled as an

"Electronic Instrument Game". (Pichlmair & Kayali, 2007) Pichlmair and Kayali classify it as such due to the open ended nature of the audio within the game, likening it to the playing of a real musical instrument. However, electronic instrument games are not the only form of audio-centric games.

The more commonly known example of audio-centric games would be known as rhythm games. Pichlmair and Kayali define rhythm games as games which expect the player to match the rhythm of a preloaded track using a controller, citing Guitar Hero (Activision, 2005) and Dance Dance Revolution (Konami, 1998) as examples. In both Guitar Hero and Dance Dance Revolution, players are tasked with interacting with the game through specific controllers. In Guitar Hero, the player uses a controller shaped like a guitar. On the guitar, the console's buttons are arranged in a format which is symbolic of a real guitar.



Figure 2. A screenshot from Guitar Hero (Activision, 2005)

For Dance Dance Revolution, the controller is a dance mat which the player must step on. In both examples, players must press the buttons of their controllers in the sequence they are shown on screen in order to accrue points and bonuses. In order to progress through the levels, they must reach a certain level of points. Game difficulty is reflected by the speed at which the instructions are displayed on screen and the sequence in which they are displayed. While players are not necessarily creating the audio themselves within the game, there are elements of contribution similar to that of

electronic instrument games such as Otocky. For example, if a player misses a note in Guitar Hero, there is a small amount of negative feedback akin to strumming the wrong note on a real guitar. While not as impactful as the creation of audio in Otocky, it is still an example of a player's in-game activity impacting their audio experience. In either case, both electronic instrument games and rhythm games offer examples of how music can play a starring role in conventional video games. There are however, other games which not only include music in a prominent role but actually utilise only audio. The early 2000s saw research into audio-only games for the first time. These games were targeted at those with visual impairments and saw developers attempt to create a 3D Audio experience for those who would struggle to interact with video games in a conventional sense. (Röber & Masuch, 2005). Research was also conducted examining the application of audio games within a context beyond recreational enjoyment. One such study was conducted to see what role, if any, the playing of audio games could have in a therapy and learning. (Targett & Fernström, 2003)

At this point, it would be fair to assume music is the primary device for audio but this is far from the case. One of the most crucial elements of storytelling within games is dialogue, a feature of games which has perhaps has benefited most from the evolution of audio within video games. In the early days of video games, most dialogue was communicated on a textual basis. Information was presented visually on screen with users able to navigate through by pressing buttons. As sound became more prominent in games, these textual conversations began to be paired with audio effects which played the role of actual conversation. 1979 saw one of the earliest examples of recognisable vocals on a video game console with the release of Mattel's "Intellivision" console. While the console itself did not have the capacity to produce intelligible audio, when paired with the "Intellivoice" adapter which was an external add on, certain games could then generate audible speech. (Chang, Kim, & Kim, 2007, p.3) As the technology evolved, consoles in the mid 1980s saw the introduction of a second audio chip which could be paired with the existing programmable sound generators. These supplementary chips could be used to serve one of two purposes. On one hand, it could be used to simply store additional audio which increased the available audio in a game. However, it was more commonly used as a specific speech chip, storing any vocal dialogue required for the gameplay. (Collins, 2008) The presence of dual chips

in consoles was a double-edged sword. While it solved the issue of storing different sounds for different purposes, it also created new errors in which the player experienced audio interference at parts where the audio from both chips overlapped.

As video games continued to evolve and expand moving towards the 21st century, the use of dialogue in video games became increasingly prevalent. In sharp contrast with the popular puzzle and side scroller games of the 1980s and early 1990s, developers began to create more complex narratives in their games. The freedom afforded by communication amongst characters was a huge factor in this. Particularly as we move into more current times, the role of dialogue and speech has become a huge factor of players' agency within games. Open world games such as the Assassin's Creed series (Ubisoft, 2007 - 2018) have been lauded for their use of dialogue with players tasked with uncovering hints and tips about their mission by interacting with non-playable characters. However, this level of freedom can come at a cost. Due to the limited range of phrases for each non-playable character, situations can arrive in which speaking to a number of people in a row may result in repetition of phrases delivered by NPCs as you hear the same phrases over and over again. A famous example of this occurred in the The Elder Scrolls: Skyrim released by Bethesda in 2011. While the game received critical acclaim for its graphics and gameplay, it was widely ridiculed for the limited catchphrases assigned to non-playable characters which were repeated to an excessive amount. (Domsch, 2017)

This level of freedom and interactivity is one of the more pure examples of a player's agency impacting their audio experience. It is the player's choice with whom they interact. It is the player's choice if they decide to interact with nobody at all. Even if the choices within the game are not meaningful to the outcome of the plot, they can still provide a crucial influence on how the player views their own experience of the characters and the game itself. This idea of audio impacting on the player's experience will be more fully examined in my next chapter, which will examine the role of soundtracks within video games.

## Chapter Two

As discussed in previous chapters, the application of audio in video games varies across a number of different roles. The most widely recognisable of these roles is the video game soundtrack. In this chapter, I will first discuss the different types of soundtracks which have been applied throughout the history of video games. I will then provide a brief case study where I examine how three similar games utilise different soundtracks to create memorable gameplay experiences, before then finishing with a brief review of adaptive soundtracks. Firstly, what do we mean by the phrase soundtrack?

The term "Soundtrack" is one that was originally developed and applied to describe the inclusion of audio in films. As was the case with many terms formally applied to films and movies, the use of soundtrack is now commonly used to describe musical features or scores in video games. Whalen (2004) described video game music as "…the parts of the soundtrack that are pre-composed and recorded for playback to accompany specific locations or events in games…". (Whalen, 2004, p.7) Initially, video game soundtracks were constrained by the technology of the time. They were often treated as an afterthought, and in many cases the soundtracks were chosen by the video game's programmers due to the technical expertise required to include it in the game. (Collins, 2008) This led to situations where games were developed with a specific aesthetic and desired impact on the player, which were not reflected in the game's soundtrack. As such, it became clear that the inclusion of poor audio had the ability to detract from a player's experience. (Gibbons, 2009) However, as consoles began to evolve and games began to develop into more detailed projects, there was a renewed focus on the video game soundtrack. Games such as Aerosmith's Revolution X and Journey's Escape proved there was a market for games which utilised popular music in their soundtracks. (Collins, 2008) Similarly, certain games began commissioning composers to create soundtracks which are unique and designed specifically for the game itself, much like how a film's score is composed. One such example of this method is the game Silent Hill, developed by Konami and released in 1999 which featured an original soundtrack composed by Akira Yamaoka. (Whalen, 2004) As games began to branch into different genres, it became clear that different games required different approaches for their soundtracks to be effective. For

some genres such as action and adventure games, it was felt that audio needed to be a subtle feature, something which can influence the player without their full awareness. (Berndt & Hartman, 2008) In other genres such as horror or survival games, the soundtrack was seen as playing a pivotal role in the player's interaction with the world. One such example is the aforementioned Silent Hill soundtrack, which would alert players of impending threat through audio changes. Differing genres were not the only thing impacting the application of soundtracks in video games. The ever-increasing level of player agency ensured that not only did a soundtrack have to be specifically tailored to its gameplay, but there was an increase in demand for players to have a certain level of input to their own audio experience. The variations of player agency again spanned a wide range of inputs, from simply adjusting the audio volume, to skipping amongst a predetermined playlist to even uploading their own custom playlist in some instances such as the Grand Theft Auto series (2001 – 2013). The variations of video game soundtracks and applications are endless and growing longer by the day.

These different applications are perhaps most recognisable when discussed in the context of existing games. As such, I have chosen three games which I will now discuss. Each of the three games have been released by Rockstar Games, and while they share a similar style of gameplay, they each use their soundtracks differently, but to great effect. Rockstar Games was founded in 1998 following the acquisition of BMG Interactive by Take-Two Interactive. (Johnston, 2000) Since the purchase of BMG Interactive, Rockstar Studios have gone on to revolutionise the video game industry, releasing a number of award-winning games under several of their subsidiary companies. For this study, I am going to discuss three of these series in particular. The chosen titles I will be examining include the Grand Theft Auto Series (2001 – 2013), The Red Dead Redemption Series (2004 – 2018) and L.A. Noire (2012). For the purposes of this study, I will be focusing on the Grand Theft Auto games released after the purchase of BMG Interactive. The two Grand Theft Auto games released under BMG Interactive (1997–1999) are top-down 2D games as opposed to the 3D open-world games produced by Rockstar. While featuring a number of key elements seen in the series' later iterations, they do not feel as relevant when discussing the Rockstar developed titles.  I have chosen these games in particular for a number of reasons. Firstly, each game features a unique musical soundtrack which reflects the

narrative of the game. These soundtracks are approached differently in each game which makes for an interesting comparison when examining their relationship with the player. Each game is based around an open-world platform. Players have a say in how they progress through the game, wielding a large amount of freedom to navigate and explore the world beyond the game's central plotline. In addition to the freedom of players being able to choose their own path is the ability for the player to customise their experience within the game. Players have the choice to choose what missions they would like to do, the order in which they'd like to complete them and how they would like to interact with non-playable characters. This freedom is reinforced by the level of input provided to the player regarding how they would like their own characters to appear aesthetically. This includes what clothes they wear, what car they drive and even how their hair is cut. This level of customisation is also afforded to the player's audio experience. Players have a certain level of agency over the musical soundtracks which appear throughout the games. In the case of our three chosen games, perhaps the most pertinent influence is that of time and setting. Each of the games I will be talking about are set in vastly different locations and periods of time. The soundtracks of the games are imperative in capturing the zeitgeist of those different eras.

The Red Dead Redemption series covers a period of time starting from the 1880s with Red Dead Revolver (Rockstar Games, 2004) up to 1914 in Red Dead Redemption (Rockstar Games, 2010). A number of other titles in the series such as Red Dead Redemption Two and Red Dead Redemption: Undead Nightmare (Both by Rockstar Games also) take place within this period of time. All of the Red Dead titles are based primarily in the south of America with certain levels taking place abroad. L.A. Noire is a stand-alone game, set in the year 1947. Published by Rockstar Games in 2012, as the title would suggest, the game is based in Los Angeles, California. The Grand Theft Auto series shares a similar structure to that of Red Dead Redemption, with a number of releases spanning a large period of time. Grand Theft Auto: Vice City Stories (Rockstar Games, 2007) is set in 1984, making it the first game chronologically in the series of 3D games. Grand Theft Auto: V, (Rockstar Games, 2013) which is the most recent release in the series, is set in 2013. While each of the Grand Theft Auto games feature a number of distinct areas and neighbourhoods, for the most part each game is located in one of three major locations: Vice City, Liberty City or Los Santos. Across this catalogue of games, Rockstar Games have a timespan of almost 120 years which

must be represented in a unique and distinctive manner. While there are obvious visual and technological markers which players can use to distinguish where and when the game is set, one of the most effective ways Rockstar communicate these differences is their use of soundtracks.

Throughout all of their games, Rockstar's use of soundtracks has been widely applauded. Rolling Stone referred to the soundtrack of Red Dead Redemption Two as one of 2018's biggest albums (Leight, 2018) while The Guardian rewarded the soundtrack for Grand Theft Auto V with a 4/5 review. (Mokoena, 2014) Within the different games, each soundtrack is specifically tailored to create a sense of immersion for the players. In order to do this, Rockstar employ a diverse range of techniques for composing their soundtracks which are actually represented across the games being discussed. At this point, I will be choosing one game from each of the Red Dead Redemption and Grand Theft Auto series to discuss in greater detail. This has been done to provide an insight into the specific approaches which were used throughout the wider series. The chosen games are Red Dead Redemption Two (2018) and Grand Theft Auto: Vice City. (2002)



Figure Three. Covers from each of the chosen titles.

(Rockstar Games, 2002, 2011 & 2018)

Red Dead Redemption Two features a uniquely composed orchestral soundtrack which includes a number of scores designed for specific elements of the game. The

soundtrack was composed by Woody Jackson, a Los Angeles based composer. Jackson was tasked with creating a vast soundtrack which could match the grand scale of the game's world. This is completely different to the approach used in Grand Theft Auto: Vice City which is composed entirely of licensed tracks from musicians who were popular during the era of which the game is set. L.A. Noire is unique in that it exists as a midway point between these two different approaches, combining licensed tracks with original compositions. L.A. Noire was awarded "Best Original Soundtrack" at the 2012 BAFTA Video Game Awards. (BAFTA, 2012) Not only did Jackson compose the soundtrack for Red Dead Redemption Two, but he also contributed to the soundtracks of a number of Rockstar Games previously mentioned including Red Dead Redemption, L.A. Noire and Grand Theft Auto: V. (Wood, 2019) There are obvious factors at play when establishing which soundtracks are best suited for games.

The soundtrack for Grand Theft Auto: Vice City has had a lasting cultural influence. Physical copies of the soundtrack which were originally released by Epic Records in 2002 are still available for sale online. (Discogs, 2002) As the title would suggest, much of the gameplay is centred around cars and driving-based missions. This type of gameplay is one that lends itself to affording the players a real-world sense of agency regarding their audio experience. Vice City featured 7 unique radio stations, with each station specialising in a specific genre. As will be discussed in the following chapter, audio can play a pivotal role in immersing players within the game world. Vice City's setting amongst the highly aesthetic 1980s club scene in America benefitted greatly from an equally iconic soundtrack, which not only contributed to the player's overall experience but was crucial in reaffirming the setting of the storyline. The main delivery device for Vice City's soundtrack is the radio within the player's chosen vehicle. Mirroring real life, players had the choice of which radio station to listen to. This selection allowed users to customise their game experience in a way few others allowed at that time. As the player drove to and from the various missions, they had the ability to choose their own personal soundtrack from within the larger selection provided by Rockstar. Of course, this approach to soundtracks was not universal amongst all Rockstar Games.

When establishing the soundtrack for Red Dead Redemption Two, Rockstar would not have had access to the same wealth of available songs as they did for Grand Theft Auto: Vice City due to the technological differences between the eras represented in the game. Without a readily made stream of songs to choose from, they had little choice but to compose their own unique soundtrack. In doing so, it added a uniquely vintage element to a very modern game. As discussed in an interview with MIX Online, Jackson approached the soundtrack for Red Dead Redemption Two from a variety of different angles, choosing to compose three separate scores. Each score was specifically composed to suit different aspects of the gameplay. His "Narrative" score was created to accompany crucial plot points and can be heard in the background whilst completing missions. The "Environmental" score can be heard in specific locations, such as campsites or passing by saloons in one of the towns. The third score is the "Interactive" score, which is the audio available as you roam amongst the wilderness. (Jackson, 2019)

Whereas players in Vice City could implement their audio agency through the use of their in-vehicle radios, the same delivery device could not be implemented in Red Dead Redemption Two. Instead, the soundtrack is delivered in a manner which is more fitting of the time. While the narrative score is relatively standard in that it follows the games linear central plot without deviation, the player's agency becomes a prominent feature of both the environmental and interactive score. Players have the choice of attending saloons or campsites in different parts of the map. Upon entering the building or area, they will experience music which is relative to their surroundings. Different elements of agency are displayed by the interactive soundtrack which plays in the background as you move between areas which can adjust itself to reflect in-game actions. This is most evident when engaging in activities which alter the character's "Honour" rating, such as committing crimes or engaging in acts of vigilantism. For example, the act of committing a crime is reflected in the soundtrack by the chiming of a bell. For a few moments after the crime, the musical soundtrack reflects a sombre tone which lingers until you have moved away from the crime scene or until any witnesses who may report your actions to the authorities have been silenced. Similar changes to the soundtrack are observed when engaging in combat with rival gangs. During battles, the soundtrack moves to tracks with a faster tempo. This increased pace continues throughout the conflict, only subsiding when all your enemies have

been defeated. While it is done differently to Vice City, the end result is the same. The player is influencing the type of soundtrack which they experience through their in-game choice.

The midpoint of these two approaches is the award-winning L.A. Noire soundtrack, which features a hybrid of the two previously mentioned methods. Combining original compositions from Jackson and other composers, along with licensed tracks from the 1940s, players have a unique audio experience which remains accurate of the time. In a similar application to Red Dead Redemption Two, L.A. Noire uses a set soundtrack to accompany the game's storyline. As disclosed to the Rolling Stone magazine by composer Andrew Hale, the score was heavily influenced by the film noir movement. Soundtracks in film noir were notable for their use of jazz which was a popular genre during the time. As discussed by Ness (2008), jazz-based scores were particularly useful for capturing the sense of depravity which was not only a key theme of film noir, but is also a focal point in many of the missions throughout L.A. Noire. (Ness, 2008) Hale described the process for scoring the game as being very similar to how he would score a film, and it is evident in the final product. (Hale, 2011) Particularly in the moments where the soundtrack has been designed specifically to reflect the mood of a certain plot point, the game takes on certain cinematic qualities. More so than the two previously discussed games, L.A. Noire follows a fairly linear plot throughout the game, and while there is scope for players to free roam, there is far less to be accomplished by the players doing so. However, when players are not completing specific tasks, their audio experience becomes akin to that of Vice City. Through the use of the radios, licensed tracks from the era are played. In line with the structured plot line, L.A. Noire only offers players one radio station which they can listen to while driving. Whilst somewhat limiting the player's agency when compared with Vice City, players are still afforded the choice of listening to the station or turning it off altogether and enjoying the soundscape of the city.

Despite the different applications of soundtracks in each of the discussed games, the role of player agency is evident. By allowing players an input on their audio experience, they begin to see elements of themselves in their game play. They can form a bond with certain songs, associate certain tracks with memories and in some ways, it can become the soundtrack to their own lives. While these games represent player agency

in a very straightforward manner, it is not the only way in which players can impact the soundtrack of a video game.

One form of soundtrack which has become increasingly prevalent in recent times is adaptive soundtracks. In a manner similar to the interactive soundtrack featured in Red Dead Redemption Two, adaptive soundtracks respond to in-game actions which then alter the games soundtrack to communicate these changes. (Collins, 2008) Early forms of adaptive soundtracks began appearing in the late 1980s with RBI Baseball (Namco, 1987) one such example. In RBI Baseball, the soundtrack changed to reflect when a player had someone waiting on one of the bases. (Erikson and Lindau, 2013) Adaptive soundtracks are particularly widespread in a lot of Nintendo games. One famous example is the soundtrack for various games in the Mario series. One famous example is New Super Mario Bros, (Nintendo, 2005) which was released on the Nintendo DS. As the player moves amongst the different maps from the menu, the soundtrack changes to reflect the different regions which you are passing through. Similar examples can be found in other Nintendo titles such as The Legend of Zelda series (1986 – 2019). Adaptive music has received renewed attention in recent times, with a focus on how it can be made even more uniquely generated to reflect an individual player's actions, rather than simply reacting to a single trigger (like changing location). Naushad and Muhammed (2013) wrote a paper which examined how particular datasets can be isolated and used to drive adaptive soundtracks within games. They proposed a method of pairing tracks with certain data accrued through gameplay. In their example, they proposed the generation of sound relative to a player's health at a given moment in gameplay. Similarly, Hutchings and McCormack (2019) discussed a number of approaches which could prove beneficial to games seeking to create more personalized adaptive soundtracks using specific algorithmic techniques. (Hutchings & McCormack, 2019)

Adaptive soundtracks are yet another example of player agency effecting their audio experience. Having now covered the relationship between player agency and musical soundtracks, in the following chapter I will begin to analyse how the in-game actions of players can affect sounds within the game world including both diegetic and non-diegetic sound. I will also discuss the impact of game audio on levels of immersion for players and discuss the role ambient sound in video games.

## Chapter Three

This chapter will first examine the role of diegetic and non-diegetic sound across different forms of media, with a particular focus on film. Having established a foundational analysis regarding the use of diegetic and non-diegetic audio in film, I will then use this information in examining the role played by diegetic and non-diegetic audio in video games. This analysis will then evolve into discussing the importance of soundscapes in video games through the role of audio in player immersion. This discussion of player immersion will primarily focus on the horror and survival game genres of video games.

As technology developed throughout the latter half of the Twentieth Century, so too did the approaches to how audio was applied in different forms of media. This evolution is evident throughout film, television and video games. One of the most revolutionary developments was the application of diegetic and non-diegetic sounds. Diegetic sound refers to audio created by on-screen actions or that exists within the world. Non-diegetic sound refers to audio which takes place off screen or outside the world. With the introduction of the Dolby Stereo system in film theatres during the 1970s, filmmakers had the ability to spread sound amongst the audience. (Kerins, 2007) Initially, this secondary sound source was primarily used for background audio. However, with the emergence of digital sound in the 1990s, there was even more freedom afforded to filmmakers to experiment with their application of diegetic and non-diegetic sound. With this new range of choice for placing sounds, there was a renewed focus on the role of audio in films. As discussed by Kerins in his article "Discourses on Diegesis: Constructing the Diegesis in a Multi-Channel World", with the new technology "atmospheres and ambiences could envelop the audience, enhancing the aural illusion that the theatre space itself had been replaced with an environment matching the one seen on screen". (Kerins, 2007, p. 1) This quote illustrates that the role of effective audio in media cannot be overstated. Within audio, the application of both diegetic and non-diegetic sound in particular can have a large influence on levels of audience interaction. Stillwell (2007) discussed how films are increasingly attempting to blur the lines between what audiences perceive as diegetic and non-diegetic, creating sounds which exist in somewhere between the borders. (Stilwell, 2007) One example Stillwell used to highlight this blurring of borders is the

use of audio as a transitional technique, identifying a number of films which use the same track as both diegetic and non-diegetic sound when moving between scenes. Stillwell's research examining the "fantastical gap" has itself gone on to be the focus of research. Smith (2009) used Stillwell as the starting point for developing their own model for discussing the division between diegetic and non-diegetic sound in films. (Smith, 2009) This concept of sounds existing somewhere between the margins is particularly relevant when attempting to discuss the role of diegetic and non-diegetic sound in video games.

Järvinen (2002) highlighted the similarities between soundscapes in both video games and films. Using the existing parameters used to describe sound in films, he attempted to classify sound in games with a similar criteria. He identified diegetic sounds in video games as forms of sound which exist and are produced within the game world. Non-diegetic sound would be used to describe a games soundtrack which is changed by the events in the game, but does not necessarily interact with the game world directly. (Järvinen, 2002) These definitions are similar to that posited by Ekman (2005). Ekman described diegetic sounds as sounds reflecting in-game actions. Non-diegetic sounds were those which existed outside the game world and were a reflection of events which occurred outside of this. (Ekman, 2005) Diegetic and non-diegetic sound take on a new role within a video games. Whereas in film, the filmmaker has full control over the production and creation of diegetic sounds, video games are far more dynamic. Diegetic sound in video games must reflect the movements and actions of the player as they navigate through the game. While non-diegetic sound is closer to its film counterpart, it is equally versatile in its application. Järvinen discussed different applications of non-diegetic sound in games relative to specific genres. One such example of non-diegetic music is the use of popular music soundtracks in sports games as the FIFA Series (EA Sports, 1993 – 2019), which has been a mainstay in the video game world since the early 1990s. FIFA: Road to World Cup 98 (EA Sports, 1997) was the first game in the series to include a licenced soundtrack. Since then, each game in the series has been accompanied by a soundtrack compiled of popular songs from the time of release. These songs are played throughout the loading of the game and navigation amongst the menu and settings, but are not played during the actual matches. That is not to say the game is without diegetic audio. In FIFA 98, matches are accompanied with commentary and the sound of a cheering crowd, both

of which react to in-game actions, whether that be the commentary team discussing a player's missed shot or the crowd celebrating a goal. The use of non-diegetic music is particularly prominent amongst the sport simulation genre of games. This template of having diegetic sound within matches but any additional actions in the game being accompanied by a musical soundtrack can be found in a wide range of sports simulation games. I believe this template to be so successful for sports games for a number of reasons, but in particular as it reflects the real life experience of watching sports. When you are watching a football match, you only hear the sounds of crowd or the commentary during actual gameplay. Either side of the action, you are hearing television advertisements or real world punditry, neither of which could be accurately included in a video game. The developers are trying to recreate that atmosphere in their games by creating a simulation which is reflective of real life experiences. In doing so, these games use non-diegetic audio on their menus in order to highlight the importance of diegetic audio when it is present in the game. The diegetic audio is a signifier of the task at hand. While it is certainly a popular example, sports simulation is not the only genre which utilises non-diegetic sound. I will now discuss the role of diegetic and non-diegetic audio in levels of player immersion within soundscapes.

According to Järvinen, "the soundscape of a game is always the sum of the in-game world sound (diegetic) and off-game world sound (non-diegetic)". (Järvinen, 2002, p. 119) Soundscapes are a crucial consideration when discussing a player's level of immersion within a game, and is a frequent feature of studies regarding levels of player immersion. The term immersion is used to describe a level absorbing involvement or participation in a task, which for the purpose of this study is the playing of a video game. Chandrasekera, Yoon & D'Souza, (2015) conducted one such study which examined the role of audio soundscapes in games as a navigational tool. In their study, participants were exposed to three different environments within a virtual world, which they then had to navigate around. These three environments included one with no audio and only visual aids, one with no visuals and only audio aids and one which encompassed both audio and visual aids. Participants completed questionnaires both before and after their experiences. This study found evidence to support their initial hypothesis that the use of isolated audio soundscapes can have a greater influence on immersion in a virtual world than isolated visual stimulus. (Chandrasekera, Yoon, & D'Souza, 2015) There are a number of different theories as to why sound in

particular is seen as having a larger impact on player immersion than visual stimuli. One theory examined by Liljedahl (2011) related to a study by the Interactive Institute in Sonic Studios. Similar to the work conducted by Chandrasekera, Yoon & D'Souza, the Interactive Institute created a game which relied heavily on audio and provided very little in the way of visuals. Their theory was that by reducing the visual stimulus, players would be forced to rely heavily on their audio abilities. This forced increased levels of concentration from the players, which in turn lead to a greater sense of immersion as players attempted to focus solely on completing the game. (Liljedahl, 2011) These results provided evidence to suggest that the presence of audio had contributed significantly to the player's sense of immersion within the game world. Evans (2018) conducted a similar study which examined levels of immersion between subjects playing a game with music compared to playing a game without music. Similarly, the results showed increased levels of immersion amongst the group playing the game with music. (Evans, 2018) While it is easy to identify the importance of audio to levels of immersion in studies which are designed specifically to investigate this phenomenon, it is identifying the importance of soundscapes in video games which is most relevant to this paper.

O'Keefe (2011) set out to highlight the impact of soundscapes in video games by comparing them to the role of true soundscapes which exist in everyday life. Approaching sound from a sociological perspective, O'Keefe identified how the presence of ambient sound can prove to be a crucial feature of a soundscape, both in a virtual and real world. O'Keefe argued that the most accurate soundscapes in games were those which reflected realistic soundscapes. At times, it could be said that video game soundscapes tend to eliminate elements of soundscapes which in daily life may be classified as noise but without this noise, the soundscape is not accurate. For example, the presence of traffic in urban areas is often lamented for its intrusion in daily life. However, if you were to play a game set in a city which did not have the sound of idling cars and horns beeping, would you be able to fully immerse yourself in the game world and accept the environment as an urban city? O'Keefe discussed this in order to highlight the necessity of pairing your gamescape with an accurate soundscape. The presence of noise was another feature mentioned by O'Keefe when discussing the importance of ambient sound in soundscapes. Ambient sound is that which encompasses everything within an area or space. (O'Keeffe, 2011)

According to O'Keefe, it is a necessary feature of any soundscape which is attempting to provide depth and perception to draw players into a state of immersion. (O'Keeffe, 2011) The importance of ambient sound in soundscapes is a sentiment echoed by Liljedahl (2011). Liljedahl stated "Ambient or background sounds are the sounding counterpart to the graphic background. Having no ambient sounds is like having a pitch-black visual background and can be perceived as an almost physical pressure on the ears". (Liljedahl, 2011, p. 32) This comment only reinforces the significance of soundscapes within games. Without proper audio elements, players may struggle to immerse themselves in the game world. Grand Theft Auto: Vice City (Rockstar Games, 2002) is one such game which has an exemplary use of soundscapes. Set in the coastal location of Vice City, the game features a variety of sounds and noises within the soundscapes. Players experience the sounds and noise of an urban environment but they are contrasted with the ambient sounds of rolling waves and chirping birds along the coast. These different audio experiences are key to creating a sense of separation between different locations of the game and are reflective of a real life audio experience. There are certain sounds which players expect to hear when in specific locations. People understand what it sounds like to drive through a city and will notice if a game does not reflect that. Similarly, when standing beside a large ocean, players will expect to hear the crashing of waves. Without that sense of reality, players may struggle to fully immerse themselves in the gameplay. In this sense, games which attempt to mirror real life soundscapes are wielding a double-edged sword. On one side, they know what the soundscape should sound like and are merely attempting to recreate it. However, in the same way that developers have expectations of what a game may sound like, so too do the players. If the soundscape does not align with a player's expectation it can become difficult for players to fully immerse themselves in a game.

The sense of immersion felt by players of video games has become an increasingly popular field of research as of late. In particular, there are a number of studies which have been conducted investigating the role of audio as a means for player immersion in video games. One genre which is a particularly popular subject for these studies are horror or survival games. Traditionally, horror or survival games follow a standard template. The game's central character tends to be isolated in an unknown area or location. They are tasked with surviving attacks from enemies and completing set

tasks. The games tend to be associated with dark and gloomy aesthetics, similar to a traditional horror film, and are often accompanied by similarly dark soundtracks. Audio is seen as a crucial building block within horror games for building the mood of the game. As discussed previously, levels of immersion tend to be raised when there is a lack of visual stimulus, which could be a contributing factor to the dark themes frequently featured in horror games. (Roux-Girard, 2011)

In his research, Roux-Girard discussed a number of different horror games which utilised audio in a similar fashion to horror films. Sound was identified as a crucial element of creating the mood of the game which was intended to draw the player in before scaring them. In his writing, he discussed the importance of player agency in contributing to the soundscape of a horror game. Roux-Girard identified five forms of in-game sound generation: the player, the allies, the enemies, the game world and the game system. The impact of a player's own actions in a game cannot be understated when examining their role amongst the soundscape. Playing with a heightened sensitivity to sound, players could begin to question whether the sounds they hear are from their own movements or that of their enemies. This uncertainty is designed to feed into the sense of unknown that is common throughout horror games. When a player is unsure what they are approaching, they are unable to mentally prepare for what is to come. The goal of horror games is to create a sense of unease and tension within players but must be sure that in doing so, they do not create a tension so great that players do not want to continue with it. In this sense, horror and survival games approach their soundscapes from a different perspective to the aforementioned example of Grand Theft Auto: Vice City. While Vice City is attempting to immerse players in a similar fashion to horror games, it is constrained by its setting within the real world. Players know what to expect from a real world soundscape and will recognise a sound which diverges from this expectation. For example, if you were playing Vice City and you heard the sound of an unknown monster approaching it could lead to you losing any sense of immersion you may have had in the game. This reaction would be natural, as you are not expecting to encounter any monsters in what is meant to be representative of a real world. While you could argue that both horror and survival games offer approximations of the real world, in most games it is made clear from the opening cut scenes or gameplay that this is not the same reality we are living in. They operate on the understanding that players will expect the unexpected.

Perron (2004) discussed how certain games will use audio to elicit specific emotional responses from players, citing the use of audio as a warning device as a popular feature amongst horror games. Silent Hill (Konami, 1999) famously used a handheld radio which was carried by the player's character to alert of approaching enemies. When near enemies, the frequency of the radio would begin to increase even if the enemy was not visible. This awareness of unseen foes was a deliberate feature of the game intended to increase levels of anxiety and anticipation from the players. (Perron, 2004) Grimshaw (2009) has conducted similar research into the use of audio in the game Left 4 Dead (Valve, 2008) which used a wolf's howl as an audio device to advise players of enemies approaching. Grimshaw identified these kind of audio indicators as threat sounds, specifically designed to elicit the feeling of being under attack. (Grimshaw, 2009) Both of these examples are key factors of their respective soundscapes. They act as indicators that the player is in danger and will need to react. These threat sounds are something which Grimshaw would later classify as being affective sounds. In his work with Nacke (2011), they defined affective sounds as being "a discrete, conscious, subjective feeling that contributes to and influences an individual's emotions" (Nacke & Grimshaw, 2011, p. 265)

Affective sound can be found in most games which feature audio elements, and is seen as being a contributing factor to a player's level of immersion and enjoyment. While affective sound can be found in most media, its role in video games can be far more impactful than other media. You may have affective sound in a film which affects a viewer's emotions, it does not impact the remaining outcome of the story. The viewer cannot change the film's narrative path. However, affective sound can impact a player's emotion, which in turn influences their future actions within the game. A players in-game action can lead to the generation of a sound, which in turn affects the player's next move. This cycle can drastically affect how the player proceeds with each move, right until the game itself has finished. Granted, these individual choices may not have any bearing on the overall narrative of the game itself, but it can impact the player's experience with the game as they play. If a player is sufficiently immersed, they may feel as if each choice they make is crucial to how the plot unfolds. The greater the level of thought they allocate to their choices, the greater their sense of immersion as they progress. While in reality, these choices may have little to no influence on what is actually happening in the game, a truly immersed player will have the ability to

suspend their disbelief and treat their actions in the game world as being as influential as their real world and audio can be a pivotal point of this process.

From the use of diegetic and non-diegetic audio as a means of guidance to the effect of soundscapes on immersion, audio is an incredibily versatile weapon in a game developers arsenal. The importance of audio for player immersion is particurlaly prominent in games which exist within the horror or survival genre of games. As discussed in a number of studies, this heightened sense of immersion could be specifically linked to horror games due to their tendency to operate amongst the shadows, hiding enemies amongst the dark and forcing players to rely on their audio senses.

## <u>Conclusion</u>

Throughout the course of this study my goal was to highlight the evolution of audio in video games with a particular focus on how player agency can impact their audio experience.

Having completed my literature review, I set about tracing the origins of audio from its original iteration as an afterthought in arcade games, to its status as a crucial element of modern video games. It would seem that the role of audio in video games developed in tandem with technological advances in video game consoles. The role of audio in games was originally limited by technological constraints such as a lack of space or limited knowledge on how to program the games with sound. Consoles with larger memory stores and more accessible systems allowed game developers to redevelop how they utilised the audio of video games. As such, we began to see games with more intelligent applications of audio.

One such application was the increased use of dialogue within video games. Having examined the role of dialogue in games, it is clear that there are positive and negative effects it may have on players. When done correctly, dialogue can prove to be an incredibly useful tool for allowing players to create their own narrative for navigating through games. Certain titles allow players to converse with non-playable characters throughout the game world, exhibiting an element of agency as the player can choose who they would like to speak with. However, this can also lead to players disengaging with the world in certain instances, such as the repetition of set phrases by non-playable characters.

Similar levels of player agency were found in my comparative study of a selection of Rockstar Games. By discussing the role of musical soundtracks in Grand Theft Auto: Vice City, Red Dead Redemption Two and L.A. Noire, I was able to examine how the different musical soundtracks displayed different elements of player agency. This included players selecting the radio station they listened to in Vice City, players influencing the soundtrack of Red Dead Redemption Two through their criminal actions or in L.A. Noire by simply opting to listen to no soundtrack at all and instead enjoy the natural soundscape of the city. It also emphasized how different approaches

to musical soundtracks may be required for different genres of games. Through their musical soundtracks, each of these games allow players to immerse themselves fully in the game world and influence their experience from within. In doing so, they allow people to create unique gameplay experiences which can be specifically tailored to their personal preferences and how they intend on playing the game.

This study of musical soundtracks in Rockstar Games provided an interesting comparison point for examining the application of adaptive soundtracks in Nintendo Games. Adaptive soundtracks include elements of player agency as reflected in New Super Mario Bros which altered the games standard soundtrack to reflect the part of the map you were playing at a particular moment in time. However, adaptive soundtracks are an example of games reflecting player agency without having to react to specific stimulus. No matter who is playing New Super Mario Bros, the soundtrack will change relative to where you are stood. It is not impacted by any variables such as how long the game has been played or by how many lives you have remaining. Yet, it is influenced by players choosing which map to play. This is an example of a less specific but equally important example of player agency in video games.

Having discussed the importance of musical soundtracks in games, I then moved on to discussing the role of diegetic and non-diegetic sound in games. This was done in conjunction with examining the role of audio on player immersion in horror and survival games. These topics were discussed together as in many horror-centric games, the use of diegetic audio is considered a key tool for navigation throughout the missions. This focus on diegetic audio allowed for further examination of how a player's in-game choices can contribute to their audio experience through the production of diegetic sound. The use of diegetic and non-diegetic sound was one of the best examples of how versatile audio can be within games. Comparing the use of diegetic audio in sports simulation games and horror games is one such demonstration of how it plays a pivotal role in both genres of games and yet is approached and applied in a completely different manner. This diversity is equally present in the use of non-diegetic audio across differing genres too.

Overall, this study has shown that the role of audio in video games has drastically changed throughout time. In particular, the ability of players to influence their audio experience has become a key part of the modern video game experience. This influence can be seen throughout many games, whether it is reflected in the games dialogue, its musical soundtrack or in the way it utilizes diegetic and non-diegetic sound. Based on the findings of this study, there is a strong correlation between the development of music in video games and technological advances in video game consoles. With the arrival of a new wave of consoles on the horizon such as the PlayStation Five and Xbox Series X which are slated for release in late 2020, it will be interesting to see what each console offers to players in terms of an audio experience and how this may impact the role of audio in future games. Similarly, the increased prevalence of virtual reality gaming in the home has opened a whole new world for how players are immersed in video games. In the coming years I expect to see the role of audio within virtual reality games and simulations become an increasingly popular research topic amongst academics.

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