

Adaptive Audio and the Player Experience in *Pikmin*

How does the adaptive audio of the *Pikmin* video game series complement the player experience?

Word Count: 3996

Table of Contents

1. Introduction	
1. What <i>Is</i> Pikmin?.....	2
2. Scope of Research.....	3
3. Methodology.....	3
2. Adaptive Audio	
1. Basics of Adaptivity.....	5
2. Scoring the Scene: Boss Fights.....	8
3. Generative Techniques	
1. The Ever-Changing Caves of <i>Pikmin 2</i>	13
2. The Technical Aspect: How Is It Possible?.....	16
4. Case Study: Submerged Castle	17
5. Conclusion	21
Works Cited	22

1. Introduction

1.1. What Is Pikmin?

Published by Nintendo in 2001 for its newest console, the GameCube, *Pikmin* remains quite a unique game. The player is placed in the shoes of Captain Olimar, a two centimeter-tall spacefarer who crash lands on an unknown planet implied to be an abandoned Earth. Using the help of the titular Pikmin, small plant-like creatures, the player must collect ship parts scattered across the planet to repair Olimar's ship within thirty days before his suit's life support runs out. Each in-game day lasts thirteen minutes, and while the player is encouraged to split up their squad of Pikmin to more efficiently complete tasks, any Pikmin not rounded up by sunset will be left behind to be eaten by nocturnal predators. The focus of the game is trying to hone one's efficiency in order to get as much done in each day as possible without overextending oneself.

A sequel, *Pikmin 2*, would be released for the GameCube as well in 2004, adding new types of Pikmin, a second controllable captain in the form of Olimar's coworker, Louie, and would shake up gameplay with the addition of explorable caves underneath main areas.

Additionally, *Pikmin 3* would release for the Wii U in 2013 and *Pikmin 4* would release for the Nintendo Switch in 2023, continuing to innovate upon the series' core concepts.

With the series spanning over two decades, available technologies for game development evolved considerably from the first two games to the newer ones, and the way video game music composition is tackled shifted as a result. On top of this, composers for the series have changed over time. Hajime Wakai composed for the first three games, joined by Kazumi Totaka for *Pikmin 2* and by Asuka Hayazaki and Atsuko Asahi for *Pikmin 3*, only to ultimately hand off the reins for *Pikmin 4* to the returning Hayazaki and series newcomers Kenta Nagata and Soshi Abe.

Regardless of the shifting composers, each soundtrack retains a level of atmosphere and a knack for adaptability that the series is known for.

1.2. Scope of Research

The research question for this paper is **how does the adaptive audio of the *Pikmin* video game series complement the player experience?** In studying this question, the techniques utilized by the scores' composers will be identified and analyzed in order to come to a greater understanding of the relationship between music and gameplay and how to more effectively score video games. In order to do this, notable aspects of the *Pikmin* series' soundtracks will be discussed broadly, followed by examples of particular pieces of music to demonstrate how the discussed techniques create a more engaging and immersive experience for players.

1.3. Methodology

Unfortunately, video game soundtracks—and especially the relatively small *Pikmin* series—are not typically the focus of academic study. As a result, my research began with a look into academic articles on film scores, which share a similar purpose to that of video game music (namely to score a scene or intensify the audience's emotions). I later got my hands on the book *Writing Interactive Music for Video Games: A Composer's Guide* by Michael Sweet, a helpful source that consolidated much of my background knowledge of video game music systems into something citable.

In order to get anything specifically *Pikmin*-related, however, I had to venture further out into the internet, into the realm of fan wikis and YouTube videos. The principal figure here was Maxx Bradley, known online by the alias “Scruffy”, a jazz pianist and graduate from the

California Institute of Arts with an MFA in Music Composition (Bradley, “About Scruffy”), and a prominent figure in the *Pikmin* fan community. The Pikipedia (*Pikmin* wiki) page “Music in *Pikmin 2*”, originally written by Bradley, was what originally piqued my interest in the subject and what provided many of the basic details for how music in the *Pikmin* games functions.

As for the games’ music tracks themselves, there exists no official releases of sheet music. I thought I faced the daunting task of transcribing everything myself, but that is where another figure in the *Pikmin* fan community comes in: Jonathan Langan, known online as “Olimar12345”. A variety of transcribed video game songs are available for download on his personal website, and I will be using his piano arrangement sheets for music examples throughout this paper, edited for clarity of what I hope to demonstrate. Anything transcribed myself is noted as such and made in the music notation software Musescore. It is also worth mentioning that with the exception of the original, none of the *Pikmin* games ever received official soundtrack releases. The vast majority of the games’ tracks have no official titles, and as a result, this essay will be adhering to fan-created titles used on the aforementioned Pikipedia music pages or Langan’s sheets.

Fan wikis and internet sources are not guaranteed to hold up to the same standard of quality or accuracy as academic sources, though they remain the most prominent source of info on *Pikmin* games. In practice, passionate fans can constitute the most reliable authority on a video game series besides the developers themselves—the dedication of certain fans to uphold the reliability of wikis when anybody can edit them is impressive. As for Bradley and Langan, both hold degrees in music study (Langan), lending them a certain amount of credibility. The sources used for this essay may not entirely follow standard conventions of an academic paper, but I have reason to believe that they are adequate.

2. Adaptive Audio

2.1. Basics of Adaptivity

Adaptive audio is when a game's soundtrack dynamically shifts in response to the gameplay happening on-screen. Almost all games have some baseline level of adaptivity in the sense of switching music tracks when the player makes it to a new level, dies, gets a power-up, etc., but as technology advanced, more intricate forms of adaptivity became possible. Michael Sweet outlines two common adaptive techniques: horizontal resequencing and vertical remixing (62-63), with the former referring to the transition from one piece of music to another as outlined above, and the latter referring to the use of layers that are added to or removed from the base music track based on the state of the game.

Since its first entry, *Pikmin* has utilized both of these techniques, displayed most prominently in the series' area themes. On top of each standard area theme, *Pikmin* has variations for when the player enters combat in which a layer of percussion and harsher instruments will fade in to signify a heightened sense of danger. Under a similar principle, near the end of any day, the player will receive an alert that the sun is setting, briefly interrupting the music before it returns with stripped back instrumentation and a music box taking over the main melody for a calmer mood. This transition is more akin to horizontal resequencing, though the combat variation can still be applied on top of the sunset mix, and all variations of each theme are stored in the same audio sequence file ("JAM file list"). It is a relatively simple system, but it allows the music to dynamically reinforce the mood conveyed on-screen at any point.

Pikmin 2 would expand the system into something more complicated, adding a plethora of new contextual mixes to each area theme ("Music in *Pikmin 2*"). The combat variation was

split into more specific “enemy near” and “enemy attacking” variations, the former adding an extra instrument to the main theme that serves as a warning, and the latter adding in a layer of percussion to raise intensity. Going hand-in-hand are two new mixes for when Pikmin are working on a task and for when Pikmin are carrying treasure, the former adding a steady, rhythmic complement to the main track, and the latter building on top of that with yet another new instrument, usually doubling the track’s main melody. Furthermore, whenever the player walks near a particular type of flower in the game, synth strings will be added as harmony in the background. As before, each of these variations can stack on top of the sunset mix as well.

Pikmin 2’s adaptive systems go beyond these few contextual mixes, however. With the introduction of a second playable character, music additionally shifts based on which character the player is currently controlling, swappable at any time with the press of a button. While controlling Olimar, each theme has a standard duple feel to it, whereas switching to Louie gives the music more of a triple feel, in effect coming across as a swung rhythm (example shown in Figure 1). Furthermore, the song’s tempo will be reduced by 30% when the player drops below half health, and the melody will even skip random notes if the player’s Pikmin numbers have been reduced significantly (“Music in *Pikmin 2*”), both contributing to a feeling of being worn down as the player performs poorly. These miscellaneous conditions interact with all other possible music variations to create a complicated web of possibilities for what the music can sound like at any moment.

“Awakening Wood”

Pikmin 2

Hajime Wakai

The image displays two staves of musical notation in bass clef, 4/4 time. The top staff is labeled 'Olimar' and includes a tempo marking of ♩ = 100. The bottom staff is labeled 'Louie' and features a triplet of eighth notes in the first measure, with brackets and the number '3' indicating the triplet. Both staves show the first two measures of the piece, with notes and rests clearly visible.

Figure 1.

*First two measures of “Awakening Wood” from Pikmin 2
for both Olimar and Louie, transcribed myself.*

Due to shifting technologies for music processing in video games (discussed in more depth later in this essay), *Pikmin 3* and *Pikmin 4* scaled back to a less complicated system, though notably made music variations global (occurring regardless of the player’s proximity to the event causing them). As such, a perceptive player can use changes in the music to understand what is happening to Pikmin on the complete other side of an area—for example, knowing that they are in danger because the combat percussion kicks in even when there are no enemies near the player themselves.

All of these features of adaptivity allow the score of each *Pikmin* game to effectively complement the actions of the player and the situations they find themselves in during standard gameplay. While the majority of the *Pikmin* series is spent exploring areas utilizing this adaptive system, other techniques are implemented during certain segments of gameplay where a different mood must be struck, the most notable of which being climactic boss encounters.

2.2. Scoring the Scene: Boss Fights

The most basic goal of any score, whether it be for film or for a video game, is to underpin what is happening on-screen and to intensify the emotions present in a scene. The biggest factor separating film and video game scores, however, is that games are an interactive medium, and thus the score can never know what exact situation the player has placed themselves in. As Michael Sweet puts it, adaptivity becomes necessary for gameplay and music to synchronize (61).

The perfect example comes in the form of boss fights, peaks of action and tension that must be scored as such despite the fact that the composer can never know how each player tackles the boss. To solve this dilemma, *Pikmin 2* crafted a dynamic scoring system for boss battles that was expanded on in *Pikmin 3*.

After a brief musical and visual introduction to the boss, the battle begins with a loop of frantic strings and abrasive horn blares in an atonal fashion (Figure 2.1). The piece uses an irregular time signature, contributing to a feeling of tension and unfamiliarity (Langan notes it as alternating between 4/4 and 3/4, whereas Bradley is quicker to label it as 7/8 (“Music in *Pikmin 3*”).

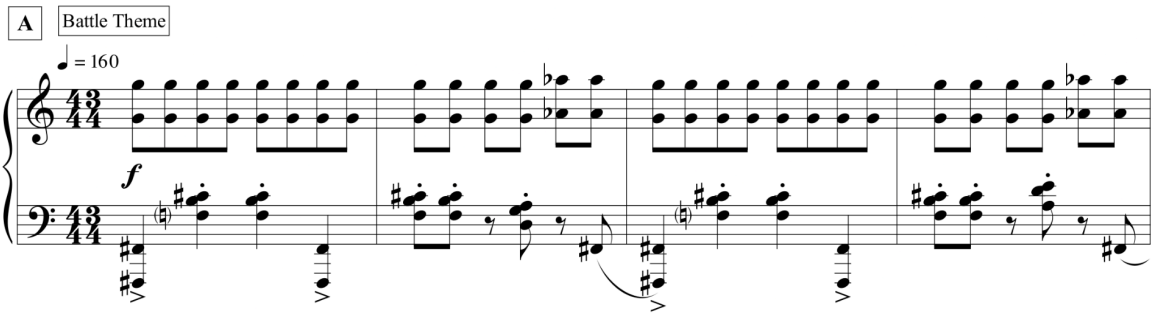


Figure 2.1

*The beginning of Pikmin 3's main boss theme loop (Hayazaki).
The treble clef notates strings, while the bass clef notates brass.*

A higher brass melody comes in not long after, ramping up the intensity of the song even further. In regards to adaptivity, there exist a variety of transition bars out of this loop (Figure 2.2). At any moment, if the boss begins to prepare an attack, threaten Pikmin, or become vulnerable, the music will play a quick transition piece to move from one loop to another (an example of horizontal resequencing).

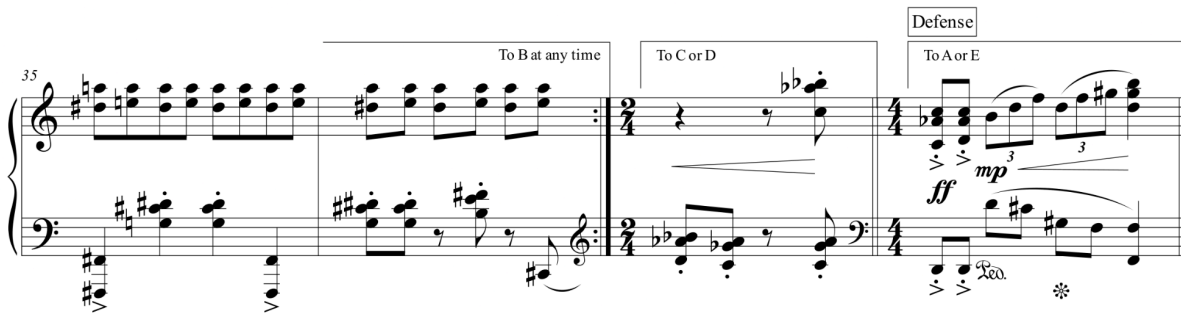


Figure 2.2

Transition bars from the theme's main loop to others.

Whenever the boss attacks, the melody is handed off to panicking woodwinds, with a high-pitched brass accompaniment underneath (Figure 2.3). Whereas the main battle loop leans

heavily towards the lower register (not just with its brass, but also with a booming timpani), the music now cuts said register completely out, creating a stark contrast that quickly grabs the player's attention. While the main loop underscored the menacing stature of the boss, the attack loop instead scores the player's frantic attempt to escape danger.



Figure 2.3

Attack loop. Woodwinds notated on top, brass underneath.

For a longer attack in which the Pikmin are held in danger before being killed, a separate loop is played instead (Figure 2.4). This loop sounds desperate rather than frantic, combining the lower register of the main loop with the higher register of the standard attack loop. While both parts give off a sense of danger, the low brass calls to mind the lurking boss while the woodwinds represent the captive Pikmin.

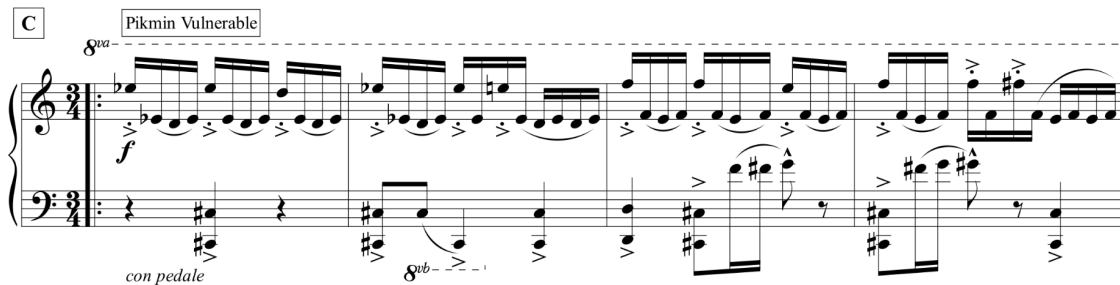


Figure 2.4

Second, longer attack loop. Woodwinds are notated above, with brass below.

Notably, a quick stinger plays anytime Pikmin die at this point to emphasize the moment before another transition bar quickly loops the music back around (Figure 2.5).

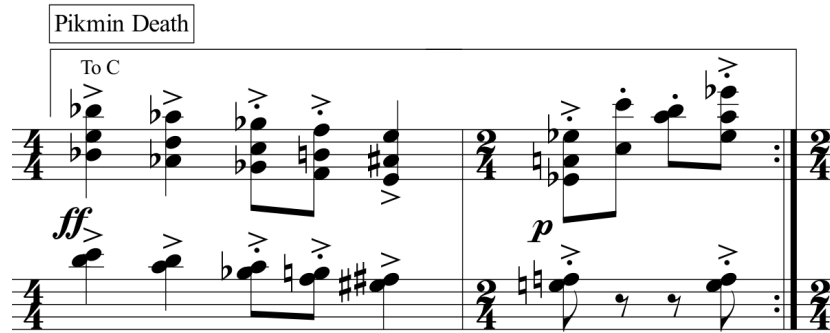


Figure 2.5

Quick stinger played when Pikmin die, followed by a transition gesture.

When the boss becomes vulnerable, trumpets join with woodwinds to launch into a triumphant tune signaling the possibility of victory on the horizon (Figure 2.6).



Figure 2.6

Vulnerable boss loop. Trumpets and woodwinds notated together on top, French horns below.

At the conclusion of any of these loops, another transition bar will be played to send the music to another loop or back to the main one (Figure 2.7). In fact, the “Pikmin Vulnerable” loop even has two different transition bars back to the main loop based on if Pikmin died during the

boss's attack or not, allowing the moment to be properly colored with a sense of either triumph or despair.

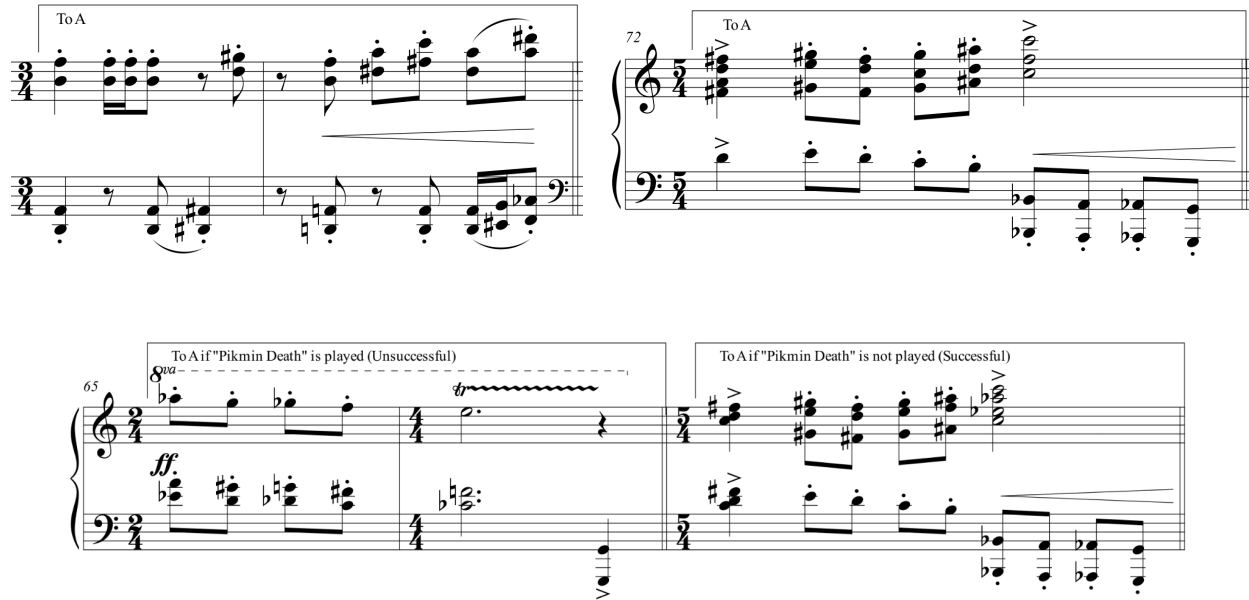


Figure 2.7

Various transition phrases.

With this dynamic system of audio, *Pikmin 3* is able to surpass the issue of synchronization that video game scores face. The game is able to properly score the fight as it happens, reacting both to the behavior of the boss and of the player. The score is able to thus more effectively convey the atmosphere of tension that the scene demands than it otherwise could, emphasizing both the danger of the boss and the ultimate feeling of triumph upon its defeat to create an overall much more satisfying experience for the player.

3. Generative Techniques

3.1. The Ever-Changing Caves of *Pikmin 2*

One of the defining aspects of *Pikmin 2* is its introduction of caves, multi-floored dungeons that strip away the time limit of the surface to instead focus on combat and resource management in areas that are, within certain parameters, randomly generated. This random generation, paired with oftentimes nonsensical aesthetics, lends these areas a certain surreal atmosphere. The task of reflecting this in the game's score prompted composers Hajime Wakai and Kazumi Totaka to get creative, devising a system of random music generation to complement the unique atmosphere of caves.

Randomization in music is not a particularly new idea, explored previously by composers such as John Cage (Sweet 115). For video games, however, the programming of the game itself can continuously randomize elements of the piece so that it is ever-changing, never repeating itself in quite the same way. *Pikmin 2* aims for exactly that.

The theme for fiery sublevels (referred to henceforth simply as "Fire") serves as a good introduction to *Pikmin 2*'s approach to cave music. Pictured in Figure 3.1 below are three variations of the main theme I personally encountered while playing the game, along with the underlying tabla rhythm. While a steady rhythmic base is laid down by a tabla, the melody, played by a muted trumpet, is given room to more or less improvise. The rhythm the trumpet plays remains constant for each phrase, but the pitches do not.

“Fire”

Pikmin 2

Kazumi Totaka

The musical score is for the track "Fire" from the game Pikmin 2, composed by Kazumi Totaka. It is in 4/4 time with a tempo of 100 beats per minute. The score is written for Trumpet and Tablas. The Trumpet part is in treble clef, and the Tablas part is in bass clef. The music is marked *mf* (mezzo-forte). The score is divided into six systems, each starting with a measure number (5, 9, 13, 17, 21). The Tablas part consists of a rhythmic pattern of eighth notes and rests, while the Trumpet part features melodic lines with various intervals and rests.

Figure 3.1

Three possible phrases for “Fire” (transcribed myself).

This variation in pitch allows the theme to repeat much longer without growing stale on the player’s ears, but regardless, it *is* a very minimalistic piece. That is where *Pikmin*’s contextual mixes come back in. Different parts are added to the music based on what is happening on-screen, and this is no different for caves. When near an enemy, an extra layer of percussion in the form of congas is added, alongside the addition of a synth bass that randomizes in a similar fashion as the melody, but adapts in such a way that the two never create dissonance. When an enemy begins attacking the player, an added synthesizer harmonizes the main melody (again following random variation) and a drum kit kicks into a basic backbeat. Yet even this backbeat bears traces of randomness, as shown in Figure 3.2. With no discernible pattern, any measure’s second snare hit may be delayed by half a beat, interrupting the rhythmic flow of the piece and introducing a small element of tension—a push and pull force.

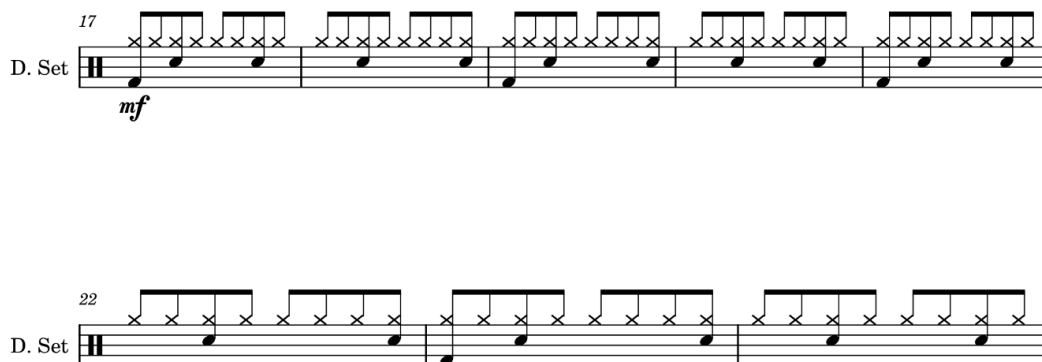


Figure 3.2

Example drum beat during the battle variation of “Fire” (transcribed myself).

While only one example, *Pikmin 2*’s other cave themes follow a similar formula. Each is minimalistic to start, but is fleshed out with added instruments in any one of five possible

contextual mixes. This is all not to mention the duple to triple shift that occurs anytime the player switches between Olimar and Louie, the slowed tempo when the player is low on health, or the missing melody notes when the player's squad of Pikmin has been reduced to low numbers. The game is able to consider all these separate variables on top of randomization to produce music tracks that are not only constructing themselves in real time, but also dynamically reacting to the player and their situation. As I researched the topic, I was left wondering how in the world *Pikmin 2* was able to create such a complicated system.

3.2. The Technical Aspect: How Is It Possible?

The level of adaptivity and randomization that *Pikmin 2* achieves sounds incredibly ambitious for a game originally released in 2004. And yet, the complexity of its soundtrack is possible directly *because* it is a game from 2004. While the 1.5 gigabytes of space available on a GameCube disc (Dailey) was leaps above the previous generation of video game consoles, it is still not a lot by today's standards. In order to fit much music on the disc and still have enough room for the actual game, a system of sequenced audio was utilized. Essentially, instead of storing each song as its own audio file, sequences of music were programmed that would be played back in real time, triggering a series of smaller audio files in the form of instrument samples that could be sped up or slowed down to alter pitch and thus create a cohesive piece of music. Similar concepts can be seen through MIDIs and soundfonts, which can be much more efficient storage-wise than having a collection of fully pre-rendered audio files (streamed audio). As technology advanced, however, games had more leeway to use streamed audio without worrying about storage space. *Pikmin* itself made this leap from sequenced to streamed audio with *Pikmin 3*, explaining why certain features of adaptivity from *Pikmin 2* had to be dropped—streamed audio simply is not as flexible.

Pikmin 2 uses BMS files for its audio sequences, containing information for every possible variation of a track, with elements programmatically toggled or edited based on feedback from the game (“Pikmin 2 BMS file list”). In addition, each cave theme has a corresponding CND file, which manipulates BMS files as the game runs to produce randomization (“Pikmin 2/Unused Music”). BMS files for cave themes contain a variety of possible gestures—pre-composed phrases that vary in length—for each instrument, and CND files randomly pick gestures to play to puzzle piece together a music track in real time. Some instrument gestures are randomized in conjunction, while others are randomized independently (as in the “Fire” example, the bassline suited the melody, but the drum line was completely independent), allowing for countless possibilities over how any song is constructed.

Through the creativity of *Pikmin 2*’s composers, what was seemingly a limitation was turned around to create an innovative system of music synthesis. The products of said system score the scenes they accompany fantastically and at the same time create a welcome level of variability in the music, imparting on the player a heightened sense of surreality to match the randomly generated cave layouts, alongside a greater listenability to the score, as music becomes grating much more slowly when it repeats slightly differently every single time.

4. Case Study: The Submerged Castle

Hidden in the very back of *Pikmin 2*’s third area lies the Submerged Castle, a single cave that is not like the others. As soon as the player delves in, they are hit with the dull banging of a steel drum of some sort and a dissonant choir (Figure 4), the former almost calling to mind the sounds of dripping water and the latter quickly conveying a strange mood, as choirs make no appearance throughout the rest of the soundtrack. While the steel drum largely conforms to the

key of C major, the choir makes heavy use of minor and diminished chords taking a chromatic movement downwards, creating not just a sense of contrast, but dissonance. Furthermore, while the two parts have simple rhythmic structures, the choir is offset by half a beat from the steel drum, preventing them from lining up well. It crafts an eerie atmosphere that quickly alerts the player that something is off about this cave in particular.

Of essential note here is that the Submerged Castle is the only cave in *Pikmin 2* that does not feature any form of adaptivity, nor any form of randomization. The music will remain static regardless of what is happening on-screen and will loop the exact same way every time. The effect generated is powerful. Even if the player cannot pinpoint exactly what is wrong, they will subconsciously pick up on the fact that *something* normally present is missing. The cave itself presents no signs it is any different from the other caves in the game, yet the music clearly communicates otherwise, crafting a feeling of dread and suspense that only grows the longer the player spends in the cave without anything abnormal happening.

“Submerged Castle”

Pikmin 2

Hajime Wakai

$\text{♩} = 84$

Steel Drums

Choir Synthesizer

St. Dr.

Synth.

p

mf

Descending minor chords

Dissonant note clusters

Half-diminished seventh chords

Slightly more melodic, but still dissonant

Diminished chords

p

5

Figure 4

Full annotated score of “Submerged Castle”, adapted from Langan’s sheets (Wakai).

Suspense is finally released once the player spends too long on any sublevel, upon which, with a whoosh, a crash, and a roar, the Waterwraith drops from the ceiling, an invincible enemy that will ruthlessly pursue the player and attempt to bulldoze their Pikmin squad.

The previously eerie music is replaced with an urgent 5/4 piece making heavy use of spiccato strings (Figure 5.1). The extra beat added every three measures in “Submerged Castle” is removed to create a stronger driving momentum, eventually building to a climax in which brass hits take center stage before the song loops (Figure 5.2).



Figure 5.1

Extract from “The Waterwraith Is Coming!” (Wakai). Both clefs are played by strings.



Figure 5.2

The climax of “The Waterwraith Is Coming!” Accented treble clef chords are brass hits.

These two themes work together perfectly to create a tense atmosphere. Removing any sense of variability has a strong impact precisely because it is otherwise a constant throughout the game, and the suspense built up by such an eerie, unchanging theme is paid off in spectacular fashion when the Waterwraith finally appears and the music kicks into a more intense piece. The score massively contributes to making the Submerged Castle one of the most memorable segments in all of *Pikmin 2*.

5. Conclusion

The research question for this paper was **how does the adaptive audio of the *Pikmin* video game series complement the player experience?** In the end, the expansive adaptive systems implemented by the *Pikmin* series give its score the ability to react to the needs of the game, scoring the scene with the appropriate atmosphere that it requires at any moment. In turn, this provides the player with a much more engaging experience, as music and gameplay synchronize with each other better than otherwise possible.

As technology advances, the ways in which music composition is tackled changes in response. *Pikmin* has seen this itself, with the dynamic systems of adaptivity and intricate music randomization of *Pikmin 2* having to be left behind in the switch from sequenced audio to streamed audio. On the other hand, *Pikmin 3* and *Pikmin 4* added plenty of their own musical innovations. How does one balance the benefits of both old and new technologies? Do new innovations ever provide reason to fully replace outdated systems? It is a question society always has and always will grapple with as civilization moves forward.

Works Cited

Bradley, Maxx. "About Scruffy." *Scruffy*, <https://scruffymusic.com/about>. Accessed 9 Dec. 2023.

Bradley, Maxx ("Scruffy"). "Music in *Pikmin*." *Pikipedia*, 27 May 2015, https://www.pikminwiki.com/Music_in_Pikmin. Accessed 20 July 2023.

Bradley, Maxx ("Scruffy"). "Music in *Pikmin 2*." *Pikipedia*, 7 June 2015, [pikminwiki.com/Music_in_Pikmin_2](https://www.pikminwiki.com/Music_in_Pikmin_2). Accessed 19 July 2023.

Bradley, Maxx ("Scruffy"). "Music in *Pikmin 3*." *Pikipedia*, 29 June 2015, https://www.pikminwiki.com/Music_in_Pikmin_3. Accessed 20 July 2023.

Dailey, Bryan. "Nintendo GameCube Special Edition." *Audio Video Revolution*, 1 June 2003, <https://web.archive.org/web/20111027231706/http://www.avrev.com/home-theater-accessories/game-systems/nintendo-gamecube-special-edition.html>. Accessed 29 Dec. 2023.

Hayazaki, Asuka. *Boss Battle*. Arranged for piano by Jonathan "Olimar12345" Langan, 8 Dec. 2018, <https://drive.google.com/file/d/16J7B4wnO9lULkQjKMxsOIMNX3HnGTar0>.

"JAM file list." *Pikmin Technical Knowledge Base*, 28 July 2018, https://pikmintkb.com/wiki/JAM_file_list. Accessed 21 Dec. 2023.

Langan, Jonathan. "About." *VGM Sheet Music by Olimar12345*, <https://vgmsheetmusicbyolimar12345.com/about>. Accessed 28 Dec. 2023.

Pikmin. GameCube, Nintendo, 2001.

"Pikmin 2 BMS file list." *Pikmin Technical Knowledge Base*, 28 Aug. 2021, https://pikmintkb.com/wiki/Pikmin_2_BMS_file_list. Accessed 20 Aug. 2023.

Pikmin 2. GameCube, Nintendo, 2004.

“Pikmin 2/Unused Music.” *The Cutting Room Floor*, 10 Oct. 2023,

https://tcrf.net/Pikmin_2/Unused_Music. Accessed 21 Oct. 2023.

Pikmin 3. Wii U, Nintendo, 2013.

Pikmin 4. Nintendo Switch, Nintendo, 2023.

Sweet, Michael. *Writing Interactive Music for Video Games: A Composer’s Guide*. Pearson Education, 2015.

Wakai, Hajime. *Submerged Castle*. Arranged for piano by Jonathan “Olimar12345” Langan, 8 Dec. 2018, <https://drive.google.com/file/d/1Mx-v0JsOWijdzLByj8-LUsrX1iaXnrY>.

Wakai, Hajime. *The Waterwraith is Coming!* Arranged for piano by Jonathan “Olimar12345” Langan, 8 Dec. 2018, <https://drive.google.com/file/d/1eKCTQnS-qZEpYsepcWkCZUI7AuTBqNiV>.