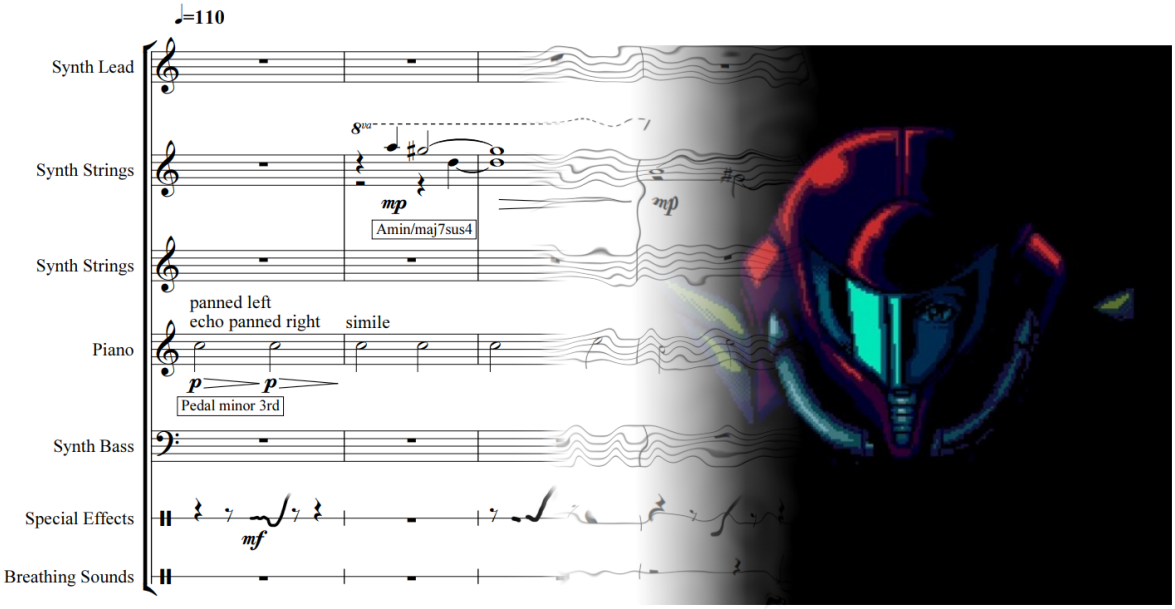
Music in Metroid

Evolution from Constraint



MUSI 490 Dissertation

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Abstract

The aim of this dissertation is to explore the evolution of music in video games from 1980 to the early 2000s, and to determine its distinctive features. This exploration will use three case studies of game music, involving the games *Metroid* (1986), *Super Metroid* (1994), and *Metroid Prime* (2002). The period under study encapsulates a time of drastic technological change, as well as an expanding of the target audience for games. Technical limitations in the sound types and number of voices available to composers combined with the family-friendly marketing decisions of game giants like Nintendo in the 1980s to create stylistic trends which endure to this day. While the hardware of early game systems determined the palette of sounds available to composers, the artistic direction of the games had the largest effect on the music. A focus on games designed for family play, and largely aimed at children in the 1980s encouraged fun, friendly musical styles, often in major tonalities and with jazz influences. *Metroid*, released in 1986, reacted against this trend by exploring the influence from darker films such as *Alien*, and the music followed suit, being darker and avoiding the pop-like melodies common in other games of the period. As sampling technology advanced in the 1990s, more convincing sounds were available to composers, but it was still the artistic direction of games that drove the musical styles. In the 1980s and 1990s, music was an important element of immersion for the players of games, and generally played constantly while a game was operating. By the 2000s, games had expanded to a wide variety of genres, and more immersive 3D games were beginning to preclude the need for constant music, supplanted instead by diegetic sound effects. Game audio technology by this time had advanced to the point where audio almost indistinguishable from real sound was commonplace, and game composers were able to record live musicians for use in game scores, including full orchestras and choirs as game budgets increased. The varied artistic directions for games post-2000 inspired a wealth of different musical styles, from rock to horror to electronic dance music, however 'retro' scores inspired by the game music of the 1980s and 1990s can still be found in many games.

Acknowledgments

I would like to thank my supervisor Anthony Ritchie for his hard work in proof-reading and guiding me throughout this project. Thanks to the Something Nerdy Studios discord for insight on early NES and SNES audio capabilities, Paul Fox for spotting some errors on my timeline chart, and of couse my wonderful partner Sonia Mobassem for her support. I would also like to thank the youtube creators SynaMax and 8-bit Music Theory for their extensive research into game music.

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Glossary of Terms

12 TET – 12 Tone Equal Temperament, the standard modern tuning system with 12 notes to an octave.

8-bit / 16-bit / 32-bit – Measure of the amount of information a computer can store or read at any time.

ADPCM – Adaptive Differential Pulse-Code Modulation, a system for encoding digital audio which was close to lossless CD quality, but with degradation in the high and low frequencies.

APU – The four-channel sound processor of the Nintendo Entertainment System / NES.

Atari 2600 – A game console released in 1977.

Bit rate – How many bits (0s and 1s) a computer could read or store at any given time.

Byte – Measure of data size, consisting of 8 single bits (each a 0 or 1).

CD – Compact Disc.

Chip Tune – Music made for the basic waveforms of PSGs, or inspired by music made for PSGs.

CPU – Central Processing Unit, the core logic processor of a computer.

DMC – Delta Modulation Channel – the basic sampler for the NES.

Famicom – "Family Computer" another name for the Nintendo Entertainment System / NES.

FM – Frequency Modulation, a way of creating timbral depth by altering one waveform with another.

FPS – First-person Shooter, a genre popularized by *Doom* and *Quake* where the player experiences the game from the eyes of the protagonist, in a 3D environment.

Gameplay – The part of the game designed for entertainment, where the player directly controls elements on screen. This is the majority of most gaming experiences.

Homophonic – A musical texture with one main melodic line, which is accompanied by chords or chordal parts.

Lossless – An audio industry standard term that refers to digital audio which has not lost information from the original acoustic sound. Generally defined as CD quality (16-bit / 44.1 kHz) or above.

LUFS – Loudness Units Full Scale, an audio industry standard measure of perceived loudness

MB – Mega Byte, measure of data size which is 1,000,000 bytes.

Metroid – A fictional predatory / parasitic species that siphons energy from its prey, generally causing death.

Menu – A group of linked static screens, designed to display options for a game, and not designed for

entertainment purposes.

MIDI – Musical Instrument Digital Interface – a system for computers to communicate with synthesizers, as well as a format for sharing music between programs.

MP3 – MPEG-1 Audio Layer III, an encoding format for audio data released in 1991.

NES – Nintendo Entertainment System, an 8-bit game console released in 1983.

Nintendo – Video game developer and publisher, originally based in Japan.

PC – Personal Computer, a home computer such as a Pentium or Macintosh

PSG – Programmable Sound Generator, a computer chip that can generate basic audio waveforms.

ROM – Read Only Memory, a data storage medium that is hardwired, and cannot generally be altered.

Sample Rate – How often discrete data values are created when converting analog audio signal into digital data.

Samus Aran – The main character of the Metroid series. A bounty hunter hired to investigate and deal with alien threats.

Sega Mega Drive – a 16-bit game console released in 1988.

Side-scrolling – A 2D game where characters “scroll” across a flat background.

SNES – Super Nintendo Entertainment System, a 16-bit game console released in 1990.

S-SMP – The Super Nintendo's eight-channel audio system.

VHS – Video Home System, a magnetic tape to store audiovisual data, popular in the 1980s and 1990s

Waveform – The shape of a soundwave, especially simple shapes such as sine wave, sawtooth wave or square wave.

Wall-to-wall – Music that is present in every section of the game, and does not generally stop while the game is operating.

1. Introduction

In this dissertation I will be exploring the evolution of music in video games from 1980 to the early 2000s, a period that encompasses the major technological advances in game audio, as well as showing the crystallization of stylistic trends in game music composition. I will be seeking to answer the question:

> How has music evolved in video games since the early 1980s, and what are some of its distinctive features?

I will examine these changes through case studies in three games from the Metroid franchise published by Nintendo:

- *Metroid* (1986), with a score written by Hirokazu Tanaka
- *Super Metroid* (1994), with a score by Kenji Yamamoto and Minako Hamano
- *Metroid Prime* (2002), with a score by Kenji Yamamoto and Kouichi Kyuma

The Metroid franchise is a useful example, as the series is widely acclaimed, popular, and often at the forefront of musical experimentation and sound design for video games. The original *Metroid* also serves as an interesting example of counter culture; which helps us define the extant game culture of the era, and how *Metroid* reacted against it.

Since musical material from the original *Metroid* was re-used, re-arranged and re-interpreted in the later games, this series provides us with a good horizontal slice of video game music from the audio constraints of early game systems in the 1980s, through the sampling technology of the 1990s, to the high-quality audio of the 2000s.

I will study three musical cues which are present in each of the three Metroid games chosen, a total of nine cues. The cues are named as follows:

- Title Music / Title Sequence / Title Theme
- Item Acquisition Fanfare
- Game Start / Appearance of Samus Fanfare

Each of these three tracks has a specific function within the game; the title music plays during the menu screen at the start of the game (a static non-gameplay scene, with options to change settings and start the game), while the item acquisition and game start fanfares play any time you pick up an important item, and when your character appears respectively.

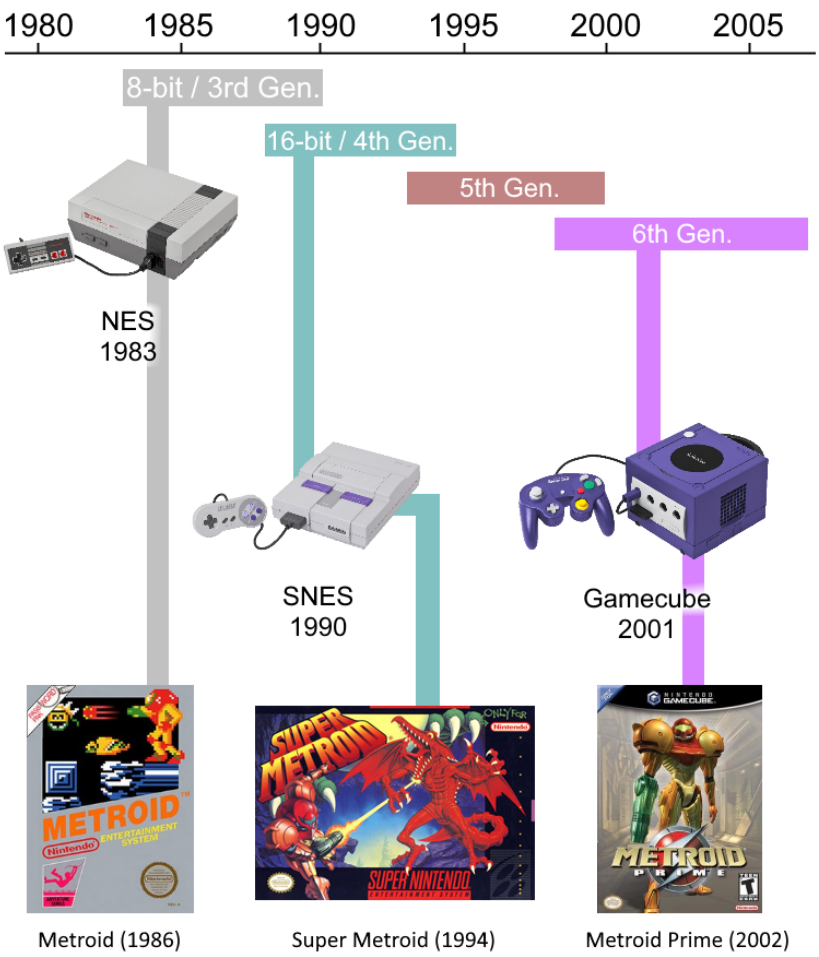

Figure 1. Timeline of Game Consoles and their Related Metroid Title

I will also look at music heard during gameplay, which serves to provide an immersive background for the player's main game experience, which in the *Metroid* series is exploration and combat. Although there is not any single gameplay cue that is present in all three games,[1] I can still compare general aesthetics and technological limitations in these pieces. Comparing and contrasting the musical material from these three games, and relating the differences in material to the audio capabilities of the systems these games were released on will provide a good insight into what kind

1 Although the track known as "Silence" is present in *Metroid* and *Super Metroid* and has a very similar analogue in *Metroid Prime*

of effect technology had on musical and aesthetic choices made by the Metroid composers.

This dissertation will focus on game systems known as “consoles”, which are computers designed to be plugged into a television at home, and designed specifically for gaming. Focusing on consoles will allow me to narrow the research down to a single area, rather than looking at arcade machines and home computers in addition to consoles. All the games chosen to study were designed for consoles exclusively.

I will start with a brief introduction to music in video games in chapter 2, showing how game consoles evolved and the general lexicon for describing and categorizing these systems and the aesthetics associated with each era. I will then review the literature available for study in this field and the problems associated with researching music in video games, especially the lack of scholarly research on games released after 1990.

Chapter 3 will go into more detail on the 8-bit era (1983 - 1987), looking at the style of graphics and music present in games from this period, and the culture behind creating games in the mid 1980s. I will examine the audio capabilities of the Nintendo Entertainment System (NES), looking at the hardware and sound types available, as well as the technical aspects of writing a game score for the NES. A case study in the first *Metroid* game will provide examples and reference material to analyze the musical and game styles of the period, albeit through the point of view of a reaction against the norm of that *Metroid* encapsulates. My main area of focus will be on the limitations of writing music for 8-bit systems, and how these limitations caused composers to develop a unique style, which has endured in game music to this day.

Chapter 4 will focus on the 16-bit era (1987 - ~1993), going into detail on the audio capabilities of consoles such as the Super Nintendo Entertainment System (SNES), and the industry's early attempts to move towards more cinematic gameplay, music and sound design. I will consider the synergy music in this era has with the visual aesthetics of 16-bit games, and look at the musical progress (or lack of) from the 8-bit era. I will examine the role of the composer as sound-designer and audio programmer and compare this to the adjacent 8-bit and later periods. I will draw case

studies of musical examples from *Super Metroid* and show how the music changed with the increased limit of voices (from 3 melodic voices to 8), and the ability to sample real sounds. Chapter 5 will examine the game music after the mid 1990s, which I call the "high-quality audio era", as game systems were able to reproduce audio close to lossless[2] by this time. Audio compression technology allowed for large amounts of high-quality music to be included with games in this era; however, looking at *Metroid Prime* will show us that the composers made a conscious decision to continue to use synthesizers in order to keep with the science fiction aesthetics of the Metroid series. I will go into detail about the synthesizers and sample libraries used for the creation of the *Metroid Prime* score, and use musical examples to illustrate the freedom that game composers of this era had.

2 An audio industry standard term that refers to digital audio which has not lost information from the original acoustic sound. Generally defined as CD quality (16-bit / 44.1 kHz) or above.

2. Project Outline

2.a. Introduction to Music in Video Games

Music has been present in video games since the mid 1970s, and since that time has been consistently developed in terms of the technology available to create, play and implement it in a game. Al Alcorn, the creator of one of the first video games with sound, *Pong* (1972), was instructed by his then employer at Atari to add sound to the game at a late stage in development, and proceeded to use a timer already built into the game's circuitry to directly generate audible tones.[3] Alcorn described the effect as "the sounds that were already in the machine",[4] since no specific audio hardware was initially present. By the late 1970s, music was generally produced directly from a computer chip in a game system's hardware, known as a Programmable Sound Generator, or PSG. These devices were built to be able to generate basic waveforms such as square waves, triangle waves, sine waves, and noise. Due to the sounds being generated directly from a computer chip, this type of music became known as "chip music" or "chip tunes".

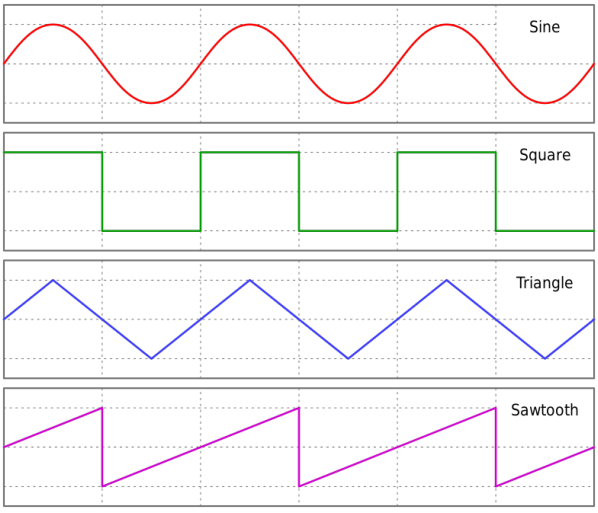

Figure 2. Basic Waveforms

Square waves with their peaks lengthened or shortened are known as pulse waves, and these were

3 Cass, S. 2020. Al Alcorn, Creator of Pong, Explains How Early Home Computers Owe Their Color Graphics to This One Cheap, Sleazy Trick. *IEEE Spectrum*. https://spectrum.ieee.org/al-alcorn-creator-of-pong-explains-how-early-home-computers-owe-their-color-to-this-one-cheap-sleazy-trick

4 Kent, Steven L. (2001). *The Ultimate History of Video Games: The Story Behind the Craze That Touched Our Lives and Changed the World*. New York: Random House. p. 41-42.

some of the most common, especially for melodic lead voices. See Figure 2 for examples of these basic waveforms. These early audio devices had a distinct sound, utilizing the very pure and steady sine and triangle waves, the harsher pulse waves, and often using short bursts of noise to simulate percussion.

By the mid 1980s, basic sampling could also be used for the generation of sound. Sampling allows an audio device to recreate a real recorded sound. This is done by taking samples of an analog sound at regular time intervals and converting these sampled points into digital data. Early sampled sounds had a distinct telephone or cheap transistor radio sound, especially when used for speech. They did well at creating short percussion sounds and were even used for bass lines at times, but until the 1990s, sampling remained a limited capability in game audio. From the late 1980s, other methods of sound generation were slowly introduced, such as Frequency Modulation (FM), where one waveform can alter another. By the 1990s sampling could be used to create entire soundtracks, and the quality had increased greatly, although it was still audibly lower quality than lossless formats such as the Compact Disc.

In terms of composition, music in arcade games in the late 1970s was usually confined to short loops of material, and introductory or ending flourishes.[5]

Compositions for game music gradually extended to become larger scale by the 1980s, with the introduction of more capable audio hardware in consoles like the NES and Sega SG-1000 (both released in 1983). Due to the limitations of voices, arpeggiation was a common technique to create the illusion of chords, and while homophonic textures were the norm, two-part counterpoint was also utilized at times. Soundtracks of this era were generally bright, in a major key and emphasized fun, which was in line with Nintendo's marketing focus on wholesome family values (their NES being called the “Family Computer”, or “Famicom” in Japan).[6] This period saw a formation of

5 Collins, K. *Game Sound : An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design*, MIT Press, 2008. p. 9.

6 https://tanookisite.com/nintendo-censorship/. Nintendo of America's Video Game Content Guidelines, ca. 1994 has been preserved on this website, and lists the following content as "inconsistent" with Nintendo's Values: sexually suggestive / explicit content, languange which denigrates members of either sex, random/gratuitous or excessive violence, graphic depiction of

stylistic trends in game music, which we will explore further in the following chapters.

Early game systems were generally divided by the "bit rate" of their Central Processing Unit (CPU), which describes how many bits (individual 0 or 1 signals) of information the system could read in a single operation, or how many bits it could store in a single memory location. This is a simplified explanation, and each system had its own specialized internal architecture, but game systems before the mid 1990s were generally assigned bit rates by their manufacturers often as a marketing component, especially during times when a new bit rate was becoming available. Some game systems were also categorized by a generation number, such as "first generation", "second generation" and so on, describing significant advances in technology and grouping alike systems together. The definition of different generations is generally well delineated and agreed upon; however bit rate is less defined, especially when bit rate became less of a measure of power after the mid 1990s. Bit rate is still a useful categorization method, especially in the 1980s and early 1990s due to it being the primary measure of power between different game systems.

Bit rate, or "bittage" has become more of a description of the visual aesthetics and audio quality of the games in these eras, and the terms are still used to this day. For example, a modern game created in a retro art style might be described as having an "8-bit" look. The relationship between generation, bit rate and the rough release year of various consoles is shown in figure 3. A more extended version in picture form is displayed on the following page (figure 4).

Generation	Bit Rate	Year	Examples
1st	-	~1972	Magnavox Odyssey, Home Pong Series, Coleco Telstar
2nd	8-bit	~1977	Atari 2600, Fairchild Channel F, Intellivision
3rd	8-bit	~1983	NES, Sega Master System, Atari 7800
4th	16-bit	~1990	PC Engine, SNES, Sega Mega Drive, Neo Geo
5th	32 / 64-bit	~1995	Sony Playstation, Nintendo 64, Sega Saturn, Atari Jaguar
6th	32 / 64-bit	~2000	Sony Playstation 2, Nintendo Gamecube, Sega Dreamcast

Figure 3. Console Generations and Bit Rate

death, domestic violence, excessive force in sports games, ethnic, nationalistic or sexual stereotypes and symbols, profanity or offensive gestures, encouraging of illegal drugs, smoking or alcohol consumption, and subliminal political messages. Games with any of these features would not be approved or published by Nintendo.

While 8-bit CPUs were in use from the mid 1970s, the 8-bit era is not considered to start until 1983, with the release of the NES and Sega SG-1000, which had considerably more advanced audio and graphics capabilities compared to earlier 8-bit systems such as the Atari 2600. These systems had dedicated audio chips, more memory available for storing musical compositions, and had more stable tuning than consoles like the Atari 2600, allowing composers to write complex, longer and more polyphonic works. The Atari 2600, released in 1977, had the ability to produce 2 voices simultaneously, however it generated pitches by taking a base frequency of 30 KHz and dividing it by 32 different values.[7] While this worked from an engineering standpoint to generate different pitches, the resulting musical scales available to composers were incredibly awkward to use, with notes missing, and many pitches with microtonal deviations of up to 50 cents from 12 Tone Equal Temperament (TET). Understandably, creating polyphony or even basic counterpoint with such a system was difficult. Composers for the Atari tended to stick to a single lead voice, since there "was little chance of finding compatible lead and bass voices".[8] With the introduction of the NES in 1983, the situation drastically improved. The NES' audio chip, the APU, could produce up to 5 voices simultaneously, and had a stable 12 TET tuning. Although the sounds available for each of the voices were limited, composers now had the tools required to create much larger scale compositions, and more complex polyphony. By the 1990s, systems such as the SNES could produce 8 voices simultaneously[9], and had the ability for each voice to be based on a sample of a real instrument or sound. The number of voices and the quality of sampled audio increased as time went on.

In the mid-late 1990s, systems like the Sony Playstation (released in 1994), started using CDs to store their game data on. This increase in storage size, along with advances in audio compression technology such as the mp3 allowed systems of this era to reach sound quality almost equal to that of a CD (indistinguishable from live sound), however it was not always used due to longer loading

7 Collins, K. (2008) p. 21.
8 Collins, K. (2008) p. 23.
9 Collins, K. (2008) p. 45 – 46.

Game System Timeline

= Audio Capabilities

Audio Abbreviations:

PW: Pulse Wave
Sq: Square Wave
Ns: Noise
Tr: Triangle Wave
WT: Wave Table
DMC: Delta Modulation Channel
FM: Frequency Modulation
Perc: Percussion
PCM: Pulse-code Modulation
Smp: Samples
ADPCM: Adaptive Differential Pulse-Code Modulation

Era

64-bit
32-bit
16-bit
8-bit

1970 1975 1980 1985 1990 1995 2000 2005

Console

Nintendo


NES
1983
5 Ch: 2 Sq, Tr, Ns, DMC


Game Boy
1989
4 Ch: 2 Sq, WT, Ns
Stereo


SNES
1990
8 Ch: Smp


N64
1996
24 Ch: ADPCM,
100 Ch: PCM (theoretically)


Gamecube
2001
64 Ch: ADPCM


Game Boy Advance
2001
6 Ch: 2 Sq, Tr, Ns, 2 PCM
PCM for stereo music


Magnavox Odyssey
1972
None

ATARI


Atari 2600
1977
2 Ch: PW/Ns, PW/Ns

SEGA


SG-1000
1983
4 Ch: 3 Sq, Ns


Master System
1986
4 Ch: 3 PW, Ns
Japan Only:
Yamaha YM2413 FM Chip
11 Ch: 6 FM, 5 Perc
or
9 Ch: 9 FM


Mega Drive / Genesis
1988
6 Ch: 6 FM or 5 FM, 1 PCM


Saturn
1994
32 Ch: FM / PCM


Dreamcast
1998
64 Ch: PCM / ADPCM

SONY


Playstation
1994
24 Ch: ADPCM


PS2
2000
48 Ch: ADPCM
hybrid 32/64/128

Home Computer


Commodore 64
1982
3 Ch: 3 (any) Ring Mod.


Amiga 1000
1985
4 Ch: (2 stereo) 4 PCM


486
1989


Pentium Processor
1993
x86, capable
of 46-bit virtual

PC Soundcards

AdLib: 9 Ch: FM
1987

Sound Blaster:
11 Ch: ADPCM/FM
1989

Sound Blaster 16
18 Ch: ADPCM/FM
Stereo CD Quality
1992

Data Storage


8" Floppy Disk
1971


5¼" Floppy Disk
1976


3½" Floppy Disk
1981


CD ROM
1988

MP3
1993


DVD ROM
1996

times required to enter the music in the game system's memory for playback. By the mid 2000s, high-quality audio was the norm for most game systems, however the stylistic trends crystallized by the early days of PSGs and chip tunes remained deeply ingrained in game composition.

Games are generally divided into different sections and subsections. The following names and function of these sections will be referred to in this dissertation.

- "Menu" or "Title screen" - A static series of prompts to change the settings, start the game, and load and save game states. This section is not intended to be entertaining.
- "Gameplay" - the section of the game intended to be entertaining and highly interactive. This is the section players will spend the most time in – the actual playing of the game.
- "Introduction" - a non-interactive opening section of a game (usually before the Menu / Title Screens, or upon starting gameplay for the first time), which can be film-like and is generally narrative-driven.

2.b. Literature Review

Literature surrounding the creation and implementation of music in the 8-bit era has been recently published, and covers a wide range of topics. Karen Collins' *Game Sound* (2008)[10] provides a good source for early NES games, with interviews from the composers, commentary on the visual and audio aesthetics of 8-bit games, as well as discussing the role of programming in early game audio work. *I Am Error*, by Nathan Atlice (2017)[11] provides good technical details on the NES hardware, as well as how composers worked with it. Various interviews with Hirokazu "Hip" Tanaka, the composer for the original *Metroid* game help to illustrate the culture of video game music in this period, as well as the steps he took to react against it. Alexander Brandon's interview "Shooting from the Hip"[12] is one of the best in this area, with Weinbach's "The Legacy Music Hour Episode 18: Hirokazu Tanaka"[13] filling in gaps about Tanaka's influence. Both interviews neglect to go into

10 Collins, K. (2008)

11 Altice, N. (2017). I am error: The Nintendo family computer/entertainment system platform. MIT Press. Cambridge, London.

12 Brandon, A. (2002). *Shooting from the Hip: An Interview with Hip Tanaka. gamedeveloper.com*. https://www.gamedeveloper.com/audio/shooting-from-the-hip-an-interview-with-hip-tanaka

13 Weinbach, B. Switch, R. F. (2011) Episode 18: Hirokazu Tanaka. *The Legacy Music Hour.*

detail about the exact process and equipment used to compose music for the NES, as they were conducted many years after the music was written. They do, however provide a general insight into the processes used to encode the music into the game systems, and the aesthetic inspiration and intent of Tanaka's score.

Andrew Schartmann provides two good texts covering the 8-bit era, the first of which is his 2018 PhD thesis *Music of the Nintendo Entertainment System: Technique, Form and Style*,[14] which looks at the audio architecture of the NES, how composers wrote for it, and discusses looping and compositional styles from this period. This text has excellent examples of how musical material was combined with code to create effects, as well as ways that composers used the limited palette of instruments to create new sounds, such as using a triangle-wave to create kick and hi-hat sounds. The second text Schartmann provides is his book *Maestro Mario: How Nintendo Transformed Videogame Music into an Art*,[15] which provides specific examples on the influence of science fiction films on the *Metroid* game designers and composer Tanaka, as well as exploring the use of silence and atonal elements in Tanaka's score. *Maestro Mario* also looks at ways in which the *Metroid* score goes against the norms of game music in the 1980s, contributing in a significant way to the evolution of game music.

The 16-bit era has significantly less academic research focused on it directly, however it is often covered in passing by more general texts such as *The Palgrave Handbook of Sound Design and Music in Screen Media: Integrated Soundtracks* by Greene & Kulezic-wilson (2018).[16] Karen Collin's *Game Sound* also covers this period, discussing the hardware of the SNES, as well as

http://www.legacymusichour.com/2011/03/legacy-music-hour-episode-18-hirokazu.html.

14 Schartmann, A. (2018). *Music of the nintendo entertainment system: Technique, form, and style* (Order No. 10927904). Available from ProQuest One Academic. (2088951371). Retrieved from https://www.proquest.com/dissertations-theses/music-nintendo-entertainment-system-technique/docview/2088951371/se-2?accountid=14700

15 Schartmann, A. (2018). *Maestro Mario: How Nintendo Transformed Videogame Music into an Art* [Kindle Edition]. Thought Catalog. https://www.amazon.com/Maestro-Mario-Andrew-Schartmann-ebook/dp/B07932XZ8Z/ref=sr_1_1?qid=1652606265&refinements=p_27%3AAndrew+Schartmann&s=digital-text&sr=1-1

16 Greene, L., & Kulezic-wilson, D. (2018). *The Palgrave Handbook of Sound Design and Music in Screen Media: Integrated Soundtracks*. Palgrave Macmillan. https://link-springer-com.ezproxy.otago.ac.nz/book/10.1057/978-1-137-51680-0

addressing a supposed lack of progress in the construction and playback of game music in this period compared to the previous 8-bit era. Collins also touches on the driving force for innovation in this period, comparing it to the previous era and highlighting how composers and sound designers working in game studios were now often at the forefront for innovation in game audio technology.

Once again, interviews with the composers form a backbone of understanding in this period, with interviews such as one undertaken by Nintendo.com in 2017, "Super Metroid Interview with Sakamoto-san and Yamamoto-san",[17] providing good details on the composition process and ethos behind working in this era. These interviews are most easily accessed online, with game companies such as Nintendo hosting their own websites and posting content related to their games.

Since the internet is a place where people, and especially gamers, tend to congregate and share information, it provided an invaluable tool for research. Game and game music discussions were widespread, detailed and often exhaustively researched. Documentation of the audio hardware of most consoles can be found online, on sites such as vgmpf.com for systems like the NES[18] and SNES.[19] Nesdev.com goes into more detail on the specifics of the NES audio chip (the APU),[20] while wikipedia regularly collates various sources into a good quick reference on all the systems covered in this dissertation, such as the Gamecube.[21] Google spreadsheets operated by the VGM Resources Community formed an exhaustive list of the synthesizers and sample libraries used in various game soundtracks, which is an ongoing project cataloging the music of thousands of games.[22] These spreadsheets included detailed information on *Super Metroid* and *Metroid Prime* specifically.

Information on games made after 1995 was harder to come by, with few academic books or articles

17 Sao, A. (2017), Super Metroid Interview with Sakamoto-san and Yamamoto-san. *Nintendo.com*. https://www.nintendo.com/super-nes-classic/interview-super-metroid/
18 http://vgmpf.com/Wiki/index.php?title=RP2A03
19 http://vgmpf.com/Wiki/index.php?title=S-SMP
20 https://www.nesdev.org/wiki/APU
21 https://en.wikipedia.org/wiki/GameCube_technical_specifications
22 https://docs.google.com/spreadsheets/d/1JJBlHHDc65fhZmKUGLrDTLCm6rfUU83-kbuD8Y0zU0o/htmlview

on the games and even less on the game music of this era. Rod Munday's chapter “Music in Video Games” in the 2007 book *Music, Sound and Multimedia: From the Live to the Virtual*[23] provides some insight into the styles of music being written for video games once technology was no longer a limit, as well as proposing a number of interesting theories on game music in general. Munday examines the difference between film and game music, and how they shouldn't (and in his opinion can't) be the same thing. He also looks in depth at the function of music in modern games, theorising that immersion is the ultimate goal, and that the exact music per se is less important. I will address these claims, as well as his claim that game music “no longer exists”[24] in this dissertation. Online sources were again of great help in understanding the game music of this period, with developer and composer interviews available on sites such as Music4Games.net, where Jason Napolitano conducted an interview with *Metroid Prime* composer Kenji Yamamoto,[25] as well as other personnel from Retro Studios (the studio responsible for developing *Metroid Prime* in collaboration with Nintendo). This interview yields good insight into the design and musical choices behind the more modern Metroid games, and although it focuses on the third *Metroid Prime* game, there is significant detail about the initial *Metroid Prime* title. Another excellent source on the music of *Metroid Prime* is a youtube channel run by Max Petrosky,[26] who goes into great detail on the specific synthesizers and sample libraries used for the soundtrack. His channel *SynaMax*, shows actual hardware synthesizers such as the E-mu Proteus 2000 and Orbit-3 playing isolated notes that are identical to those heard in the music of *Metroid Prime*. This provides an insight into the tools available to composers in this era, showing how they freely combined synthesizers and sample libraries to create their scores.

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23 Munday, R. (2007). Music in Video games. In J. Sexton (Ed.), *Music, Sound and Multimedia: From the Live to the Virtual* (pp. 51-67). Edinburgh University Press.

24 Due to the extreme variety in game music soundtracks. Munday, R (2007). p.51.

25 Napolitano, J. (2008), Metroid Prime 3 With Kenji Yamamoto and Retro Studios. *Music4Games.net.* https://www.originalsoundversion.com/a-blast-from-the-past-metroid-prime-3-corruption-with-kenji-yamamoto-and-retro-studios/

26 Petrosky, M. (2022). *Metroid Prime Synth Patches*. SynaMax youtube, https://www.youtube.com/watch?v=JlShEmFvyqo&list=PLiqpukU6_PxuTKGV46tZFzGDcDSHSvcVb

Material looking at the relationship between game and film music was fairly common in most general texts. However, an in-depth study manifested in Zach Walen's 2007 Case Study: “Film Music vs. Video-Game Music: The case of Silent Hill”, a chapter from *Music, Sound and Multimedia: From the Live to the Virtual.*[27] This chapter provides an examination of the semiotics, function, and use of diegesis or atmosphere in film and game music. This text paid special attention to the experience of the viewer or gamer, making the early distinction that games are “played rather than viewed”.

2.c. Methodology

I plan to conduct this project using a hybrid approach that will include analysis of literature, musical analysis, online analysis, and comparative analysis. This approach is best suited to revealing the evolution of style, technology and culture around video game soundtracks.

Research will be conducted using the books and papers available, to inform conclusions about style, culture, technological limitations of the periods chosen, and the changes to these factors over time. The musical analysis will consist of transcribing music from the selected Metroid games. I will be examining the melodic, harmonic, timbral, instrumentational and structural features of the pieces chosen, and determining what technological limitations, if any, influenced the music. MIDI files created by transcribers in online communities will be useful in lieu of actual scores, as generally games do not have written scores. I will import these MIDI files into my notation programs, cleaning them up, and carefully checking and adding to them to make sure the transcription is accurate. In cases where no MIDI file exists, I will transcribe by ear, utilizing spectrograph plugins to analyze the audio of the original music, and attempt to match the pitches shown by the spectrograph. This approach will allow accurate transcription of more complex chords. Note that all musical transcriptions are carried out by the author unless stated otherwise. Detailed musical analysis will allow us to trace the developments in game music and determine its distinctive

27 Whalen, Z. (2007). Case Study: Film Music vs. Video-Game Music: The case of Silent Hill. In J. Sexton (Ed.), *Music, Sound and Multimedia: From the Live to the Virtual* (pp. 51-67). Edinburgh University Press.

features.

The online analysis undertaken will involve studying interviews with the original Metroid composers, as well as documentation and research on the game systems that each Metroid game was designed for. This section of analysis will help me gather information about the creative and technical decisions made by the composers, as well as understanding the sounds available and how these sounds influenced their composition.

Comparing the musical material from Metroid games of different eras will form the majority of the comparative analysis undertaken for this project, which will allow me to understand the evolution of stylistic features as technologies improve, as well as showing how the musical material was re-interpreted by the later composers. I also hope to show how the general style and aesthetic of the first *Metroid* remains constant, even as technology improves and limitations reduce. Comparison between the Metroid series and other games will help to show the distinct features of Metroid music, as well as understanding the general trends in game music composition in each era.

3. *Metroid* and the 8-bit Era (1983 - 1987)

3.a. Video-Games and Nintendo in the 1980s

In the early 1980s, creating a soundtrack for a video game was not something that could be accomplished by a composer, but instead, required a specialist knowledge of programming on the specific system the game was being designed for. *Metroid* composer Hirokazu Tanaka sums this up as follows:

> Most music and sound in the arcade era (*Donkey Kong* and *Mario Brothers*)[28] was designed little by little, by combining transistors, condensers, and resistance. And sometimes, music and sound were even created directly into the CPU port by writing 1s and 0s, and outputting the wave that becomes sound at the end. In the era when ROM capacities were only 1K or 2K, you had to create all the tools by yourself. The switches that manifest addresses and data were placed side by side, so you have to write something like '1, 0, 0, 0, 1' literally by hand.[29]

Games created in this era were sometimes created by a single person,[30] who had to create the game's code, art and sounds. Larger game companies could afford to have more specialized programmers responsible for creating the music, however they were often responsible for a game's sound effects as well. The distinction between music and sound effects can be seen as the distinction between diegetic and non-diegetic sound in film. Diegetic sounds in a game are those that the characters, environment and enemies emit, which would be audible if one were inside the game world. The sound of a character jumping, or the growl of an enemy are examples of diegetic game sound, and these are generally called "sound effects". Non-diegetic sound would be most music heard while playing a game, and specific sounds like the sound of a cursor moving in a game menu. Music in video games is almost always non-diegetic, while most sound effects heard during gameplay[31] are diegetic, regardless of era. The usual exceptions apply for diegetic music emitting from inside the

28 *Donkey Kong* was released in 1981, *Mario Brothers* in 1983.
29 Brandon, A. (2002)
30 Collins K. (2008) p. 36.
31 "Gameplay" refers to the interactive section of a game, designed to be entertaining, where a player is generally controlling a character or objects on screen. See page 10 for a description of different sections of video games.

game world, and non-diegetic sound effects in specific situations (usually non-gameplay), but these terms help to provide an understanding of the distinction between music and sound effects.

While non-programmer composers did still write musical scores for games in this period, their work was generally handed to a programmer to implement into the game's code, meaning they had less control over the final product, and generally just handed over the sheet music or an audio recording of their score.[32] It wasn't until MIDI took over in the mid to late 1980s, and more standardized composing tools and interfaces between computers and game code were introduced that non-programmer composers were able to directly shape the final products of their musical scores.

Karen Collins describes the situation in the early to mid 1980s: “The impact of this division between the specialized knowledge of music and programming could well be one of the reasons why sound effects were so prominent in these early games, and why some of the audio in the 8-bit era was unconventional in many ways, since many companies did not employ sound or music people but, rather, relied on programmers."[33]

While a reliance on programmers to create audio often resulted in lower quality works, occasionally the programmers hired to make audio for games were also musicians and composers. It was this combination of composer and programmer in the 8-bit era that gave the best results, as the composer could program their music directly into the hardware, understanding the limitations and possibilities that their music could take advantage of. This combination of programmer and composer would have a unique influence on the music of this period, and examples of the interaction between these two fields will be shown later in this chapter.

In the early 1980s, three companies were vying for position on the home video game console market: Atari, Nintendo and Sega. Atari had released their 2600 model in 1977, but by the time of the 1983 release of Sega's SG-1000 and Nintendo's NES, the Atari 2600 was shown to be well behind in terms of graphics, audio and gameplay. The release of the SG-1000 and NES ushered in

32 Samzenpus., & CanHasDIY. (2014). ″The Fat Man" George Sanger Answers Your Questions About Music and Games. *Slashdot.org.* https://features.slashdot.org/story/14/03/02/2041246/the-fat-man-george-sanger-answers-your-questions-about-music-and-games

33 Collins K. (2008) p. 36.

the 8-bit era, and the popularity of the NES was widespread. Sega meanwhile struggled to break into the home video game market, even though their console had technical specs on par with the

Atari 2600 (River Raid, 1982)

NES (Ninja Gaiden, 1988)

Figure 5. Comparison of Atari 2600 and NES Graphics

NES[34]. Figure 5 shows a comparison of Atari 2600 and NES graphics.

Nintendo was founded in Japan in 1889. The company initially produced playing cards and novelty toys, but by the late 1970s was designing and selling game consoles, starting with the *Color TV-Game* system in 1977. By the early 1980s, Nintendo was operating a "ruthlessly rationalized business strategy",[35] which combined with careful brand marketing and intellectual property management, a deal with Japanese electronics giant Ricoh to secure cheap custom microchips,[36] and an intense focus on game quality, gave Nintendo a massive edge over their competitors. Nintendo essentially revived the home video game market in north America,[37] and by 1990 controlled 90% of it.[38]

In 1980, Nintendo hired their first composer-programmer, Hirokazu Tanaka.[39] Tanaka was initially hired as a sound designer (having studied electronic engineering at university),[40] but being a

34 Harris, B., & Harris, B. (2014). *Console wars : Sega vs nintendo - and the battle that defined a generation*. Atlantic Books. p. 27.
35 Kline, S., Dyer-Witheford, N., & de, P. G. (2003). *Digital play : The interaction of technology, culture, and marketing*. McGill-Queen's University Press. p. 109.
36 Kline, S., Dyer-Witheford, N., & de, P. G. (2003) p. 111.
37 Kline, S., Dyer-Witheford, N., & de, P. G. (2003) p. 111.
38 Harris, B., & Harris, B. (2014). p. 27.
39 https://nintendo.fandom.com/wiki/Hirokazu_Tanaka
40 Brandon, A. (2002)

musician,[41] he began taking on music composition duties for Nintendo's arcade games, starting with *Space Firebird* in 1980.

Tanaka and Yukio Kaneoka (Nintendo's main sound engineer in this period) worked together to create the custom audio hardware for the NES, which was released in 1983. Being involved in the design of the audio hardware would prove invaluable to Tanaka as his game music work at Nintendo progressed.

The audio capabilities of the NES were in stark contrast to that of the Atari 2600. The Atari's audio came from a custom computer chip called a Television Interface Adapter (TIA). This chip handled the display and audio output, as well as input from the player's controllers.[42] The TIA could only produce 2 voices of music simultaneously, and due to tuning constraints, composing for the Atari was incredibly awkward. Notes were missing from many of the available scales, and some notes were as far out of tune as 50 cents.[43] The NES on the other hand had a custom audio chip, the APU

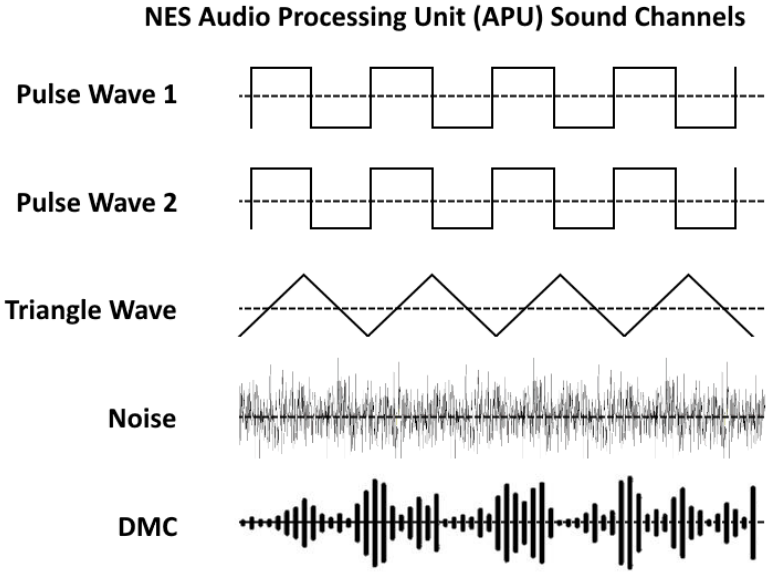


Figure 6. APU Sound Channels

(Audio Processing Unit), which Nathan Atlice describes as “far outclassing its peers” and as a “rich platform for musical expression”.[44] The NES' APU was capable of five simultaneous voices; two

41 Tanaka played gigs around Osaka and Tokyo with his reggae band *the Shampoos.* https://en.wikipedia.org/wiki/Hirokazu_Tanaka
42 https://en.wikipedia.org/wiki/Television_Interface_Adaptor
43 Collins, K. (2008) p. 21.
44 Altice, N. (2017) p. 253.

pulse waves, one triangle wave, one noise wave, and a “Delta Modulation Channel”, or DMC, capable of playing rudimentary samples of recorded audio[45] (Fig. 6).

North American advertising for *Mario Bros.*

Super Mario Bros. gameplay

Figure 7. *Super Mario Bros.* (1983 Arcade, 1986 NES)

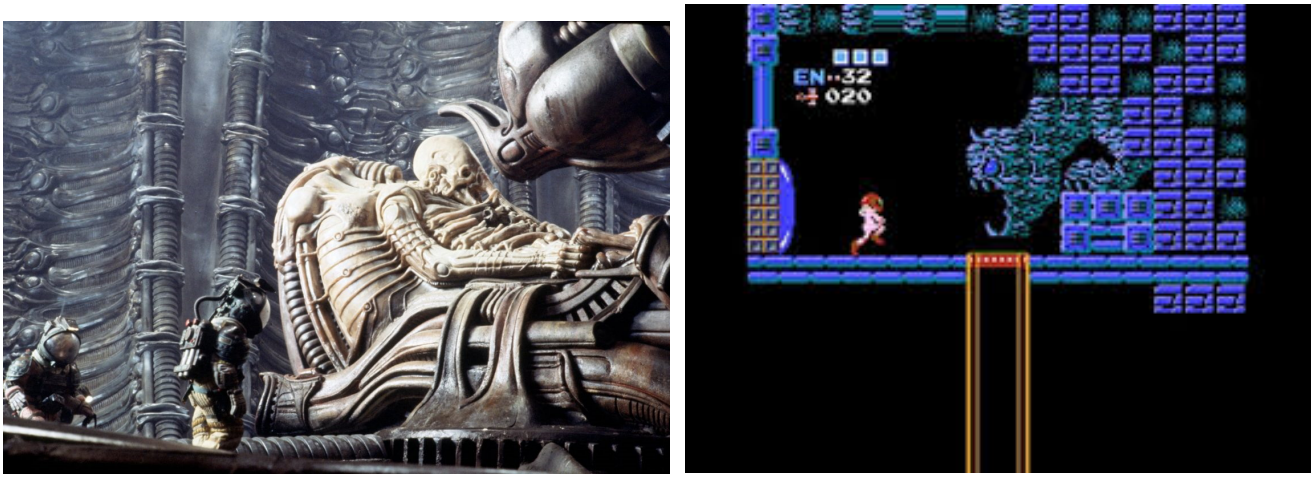
The *Metroid* series of video games began in 1986 with the release of the original *Metroid* on the NES. This game was in many ways a departure from other games of this period in its tone, difficulty, and music. The development team for *Metroid* were heavily influenced by Ridley Scott's 1979 film *Alien*, especially artist Yoshio Sakamoto.[46] A Swiss artists called H. R. Giger was responsible for the more gruesome organic character and set design in *Alien*, and his influence is clear to see in the background and character art of *Metroid*, as shown in Fig. 8.

The story behind *Metroid* involves a bounty hunter called Samus Aran, sent to investigate a space pirate base on the alien world of Zebes. The space pirates are ruthless, attempting to create a biological weapon by mutating a rare parasitic species known as the Metroid. This story is a far cry from the plumber Mario dealing with a mild pest infestation in *Super Mario Bros.*: the player in *Metroid* would be exploring a hostile, unknown planet, all alone. *Alien*'s tagline "In space, no one can hear you scream", is also fitting for the story and gameplay of *Metroid*.

Most NES games provided a relatively easy to navigate left-to-right linear path, however *Metroid*

45 Altice, N. (2017) p. 253 – 257.
46 Schartmann, A. (2018). Chapter IV. Continued Success: The Birth of Two NES Legends (location 1012)

required players to manually draw on paper a map of their progress, which was often vertical as well as horizontal. While a basic map is provided in the game's manual, it would be impossible to actually navigate and progress through the game using this alone. This factor added to the game's



Alien (1979) *Metroid* (1986)

Figure 8. Comparison of *Alien* and *Metroid* Artistic Styles

difficulty, which was already on the high due to difficult enemies, small platforms requiring precision jumps, and the amount of trial-and-error required for progress.

3.b. The Music of *Metroid*

Musically, composer Hirokazu Tanaka's score for *Metroid* at times deviates from the norms of this period in three main ways: stylistically, technically, and by blurring the distinction between sound effects and music. Tanaka said the following about the stylistic state of game music during *Metroid's* inception: “Then, sound designers in many studios started to compete with each other by creating upbeat melodies for game music. The pop-like, lilting tunes were everywhere”.[47] Tanaka describes the game industry as being “delighted” by these trends[48] but he realized that upbeat, pop-like tunes would be completely out of place in *Metroid*. Tanaka decided the score for *Metroid* would be “the antithesis for that trend. I had a concept that the music for Metroid should be created not as game music, but as music the players feel as if they were encountering a living creature. I wanted to create the sound without any distinctions between music and sound effects.”[49]

47 Brandon, A. (2002)
48 Brandon, A. (2002)
49 Brandon, A. (2002)

This synthesis of sound effects and music, of diegetic and non-diegetic, would be at the core of Tanaka's musical direction.

If we compare the title music of *Super Mario Bros.* to *Metroid*, we start to see the separation of styles between the more mainstream games and *Metroid.* Since title music generally provides an introduction to the tone and gameplay experience of a game, shaping a player's expectations, comparing these two pieces of music also shows us the general divide in tone between the two games. The "Ground Theme" (used for the title / menu screen) from *Super Mario Bros.* (fig. 9) is a conventional, triadic piece, making heavy use of chord tones in its melody, and stays within a major tonality, with some chromatic passing and approach tones, as well as occasional secondary dominants. The "Title Music" for *Metroid* (fig. 10) however, utilizes droning open fifths on D and A, with a minimal melodic outline in the high register. This outline does strongly suggest D natural minor / D Aeolian, but the D – Bb – F of the opening provides contains a minor 6^{th} that does not resolve conventionally, but rather drops down to the third scale degree. In this melody, the third scale degree feels unresolved, as if it was a moment of tension, rather than just outlining the third of the tonic chord.

These two title tracks also differ in their use of repeats (generally known as "looping" in video game music). *Super Mario Bros.*' "Ground Theme" has a regular pattern of repeats, generally repeating each section once before moving on to the next. Each repeating section is either 4 bars or 8 bars long. The form of the ground theme is as follows:

Intro (2 bars)

A (4 bars), **A**, **B** (8 bars), **B**, **C** (8 bars), **C**, **A**, **A**, **B** variation (8 bars), **B** var, **C**, **B** var

Ending (3 bars)

Metroid's "Title Music" on the other hand (see appendix 1), while initially making use of an 8 bar **A** section repeated, then goes on to introduce an 8 bar **B** section which, while repeated three times, has a new variation and/or additional voices added with each repetition. After the variations on this **B** section, there is a quite unusual change to a 6/8 time signature, with a linear **C** section 10 bars long,

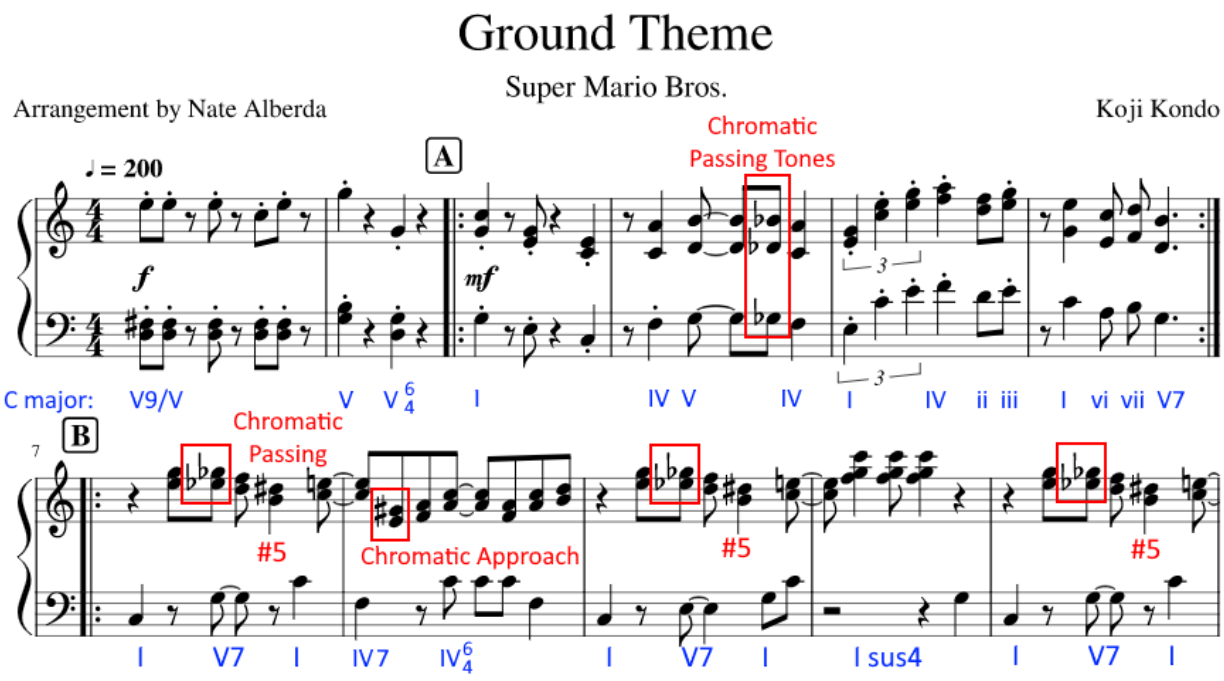


Figure 9. ***Super Mario Bros.*** **Main Theme / Title Music**

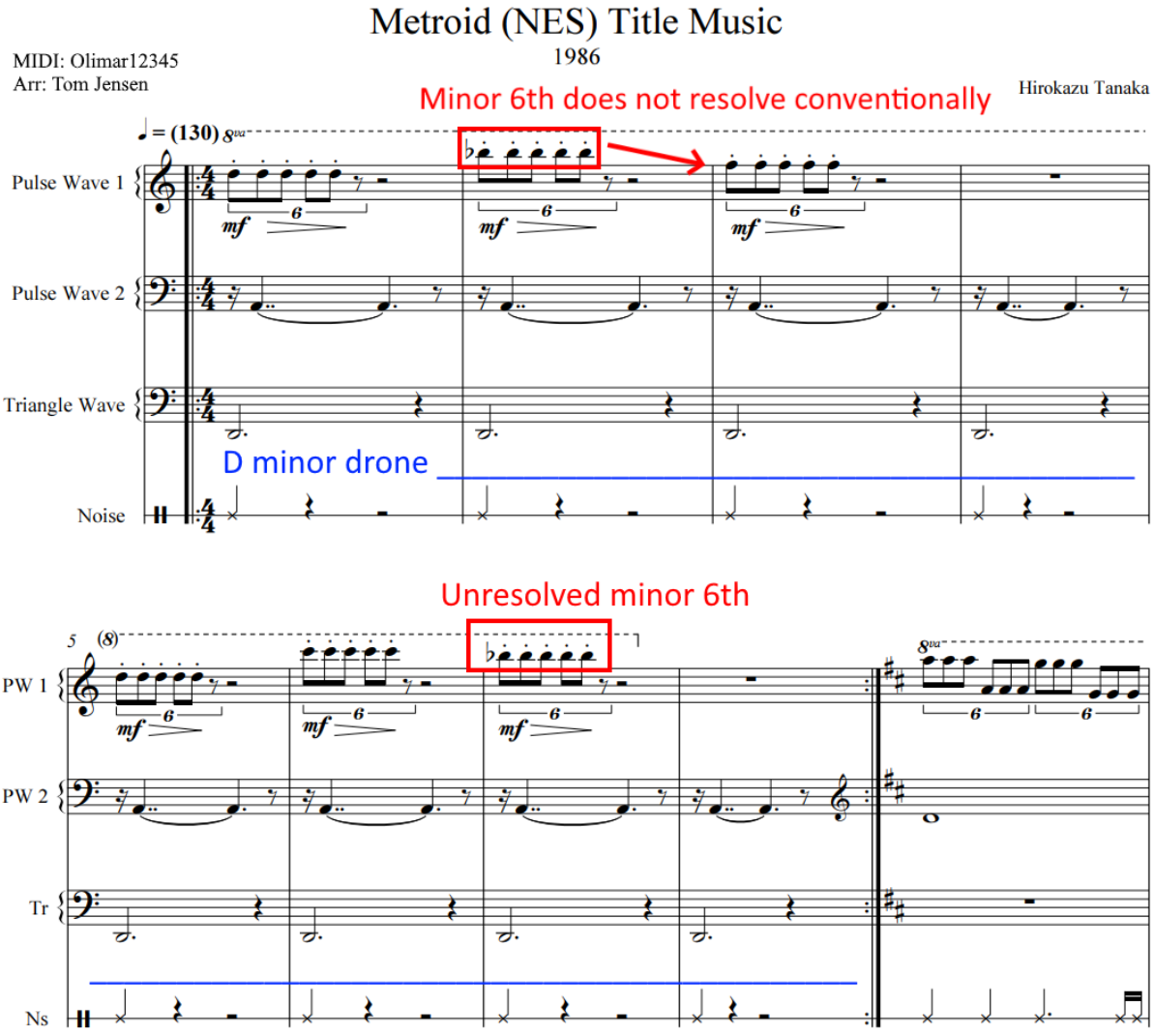


Figure 10. ***Metroid*** **Title Music**

after which there is static 4 bar variation of the opening **A** section. The track then loops back to the start.

The *Metroid* "Title Music" has the following structure:

A (8 bars, 4/4 time), **A**, **B** (8 bars), **B** with additional voices (8 bars), **B** additional voices and variation (8 bars), **C** (10 bars, 6/8 time), **A** variation (4 bars, 4/4 time)

If we compare the amount of material and the amount of repeats between the two pieces, it becomes clear how much the *Mario* music relies on repetition (fig. 11).

Piece	Length (bars)	Length including repeats (bars)
Ground theme – *Super Mario Bros.*	**33**	**85**
Title Music – *Metroid*	**46**	**54**

Figure 11. Length vs. Repetition in Mario and Metroid

Repetitions increase the length of the *Mario* "Ground Theme" by around 157%, while repetitions only increase the length of the *Metroid* "Title Music" by around 17%.

Harmonically, the **B** and **C** sections of the *Metroid* "Title Music" contain a more traditional approach, outlining a D major key, although this harmony is applied in an unconventional fashion, likely due to Tanaka's grounding in rock and reggae music rather than traditional theory.[50] Tanaka describes himself as "not being an expert on classical music", however he was familiarized with the

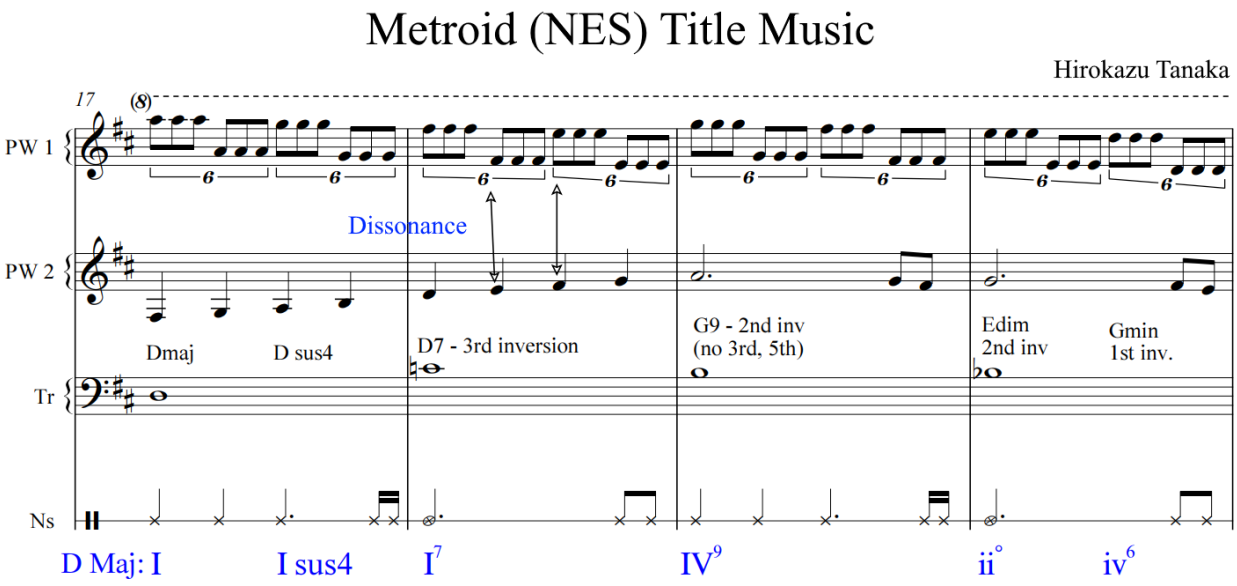


Figure 12. Metroid Title Music, bars 17 – 21

50 Weinbach, B. Switch, R. F. (2011)

works of the classical canon through listening to records at an early age.[51]

Bar 18 of the *Metroid* "Title Music" gives a good example (see fig. 12) of some of these unconventional applications of traditional harmony. This bar begins with the chord C natural, D, F#, outlining a D dominant seventh chord in third inversion, with no fifth. The bar contains repeated dissonance, on the second and third beats in the upper two voices, as the E naturals and F#'s clash and are swapped between the voices to clash again. This is the result of a contrapuntal effect: contrary motion between the first and second pulse wave channels. The next bar we have a G9 chord, followed by E diminished and G minor chords, providing a plagal cadence using mode mixture. The borrowed chords in this case are common in the classical idiom – ii dim and minor iv chords, however we do not see this kind of mode mixture in the *Mario* music. The change to 6/8 is also striking, and quite unusual for game music of the period. This change in meter helps to provide a forward drive in the music, and may hint at the gameplay of unlocking new areas experienced in *Metroid*.

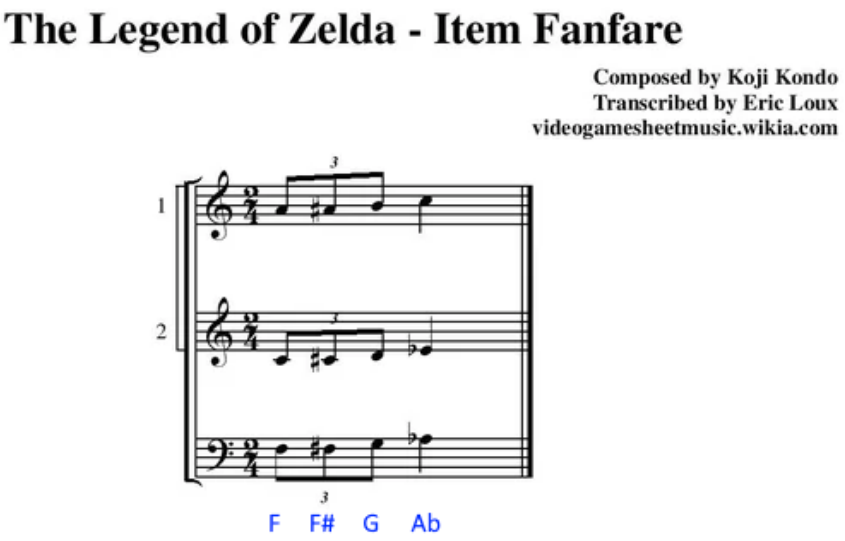


Figure 13. *The Legend of Zelda* (1986) Item Fanfare

Another good example of *Metroid*'s stylistic deviations from the norm are evident in the item acquisition fanfare. This music occurs when the player acquires an important item, and is designed to be triumphant and encourage feelings of success in the player. Most games in this period tended

51 Weinbach, B. Switch, R. F. (2011)

to have a simple two or three note motif when an important item is collected, as shown in the "Item Fanfare" music of *The Legend of Zelda* (fig. 13), which features a major chord rising by semitones.

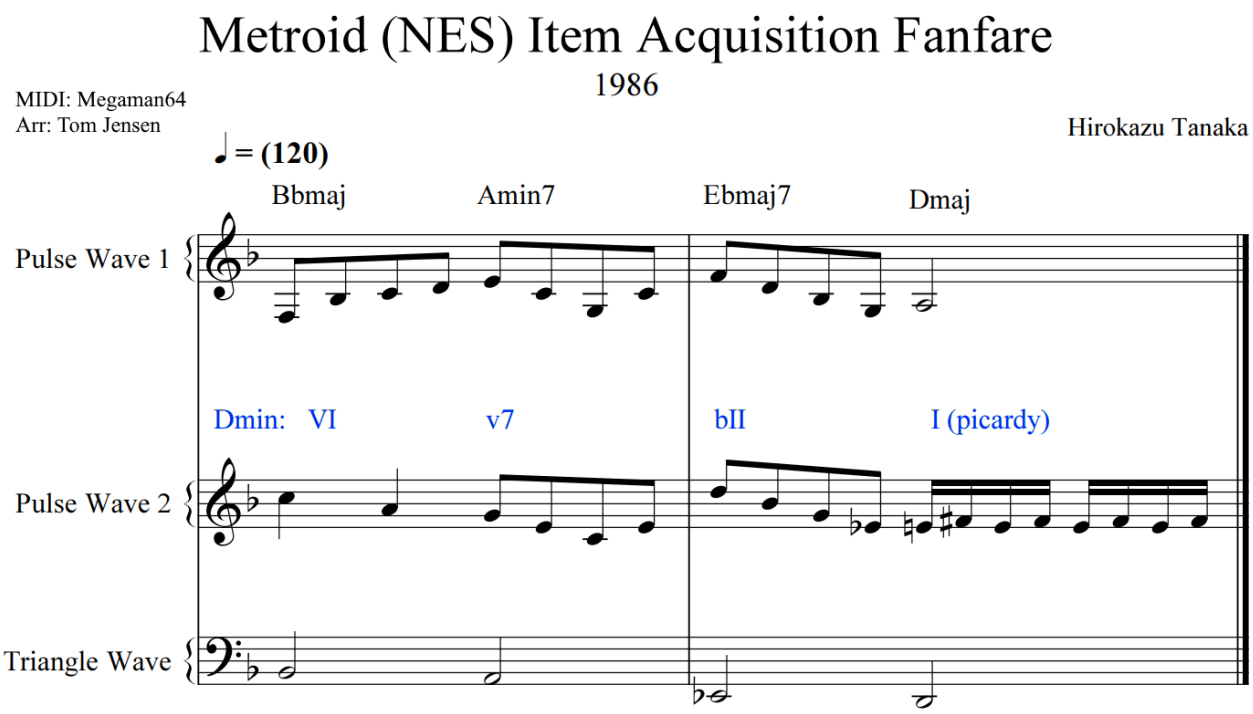


Figure 14. *Metroid* Item Acquisition Fanfare

The *Metroid* "Item Acquisition Fanfare" on the other hand (fig. 14), features a full chord progression and picardy cadence, including a minor v7 chord (in D minor). Tanaka also overcomes the three-voice limit of the NES hardware by using a trill to imply the four-part harmony of the final chord.

This expanding of the three NES voices is more clearly present in the *Metroid* "Game Start" music (fig. 15), where Tanaka makes use of a wide trill / tremolo in the second pulse wave channel throughout the entire fanfare. In this piece of music, we also see the unconventional approach of Tanaka's harmony, as we start with a quite striking major 7th between the Eb in the bass and D in the lead voice. This piece (in D minor) utilizes a bII7 chord in the first bar, and a Bbmaj / C chord in the second bar, and, although the bass and lead voices follow a logical musical line, it is the combination of the two lines, especially in the first beat of the first bar, that creates an unorthodox effect. The end result for both of these pieces is a sophisticated harmony, more in line with jazz traditions than classical due to the use of major seventh chords, and altered chords such as the bII.

Figure 15. *Metroid* Game Start Fanfare

Using trills, tremolo, and more commonly arpeggiation to push the boundaries of the NES's three-voice limit would become a distinctive feature of game music by the late 1980s, and early 1990s as exhibited by composers such as Tim Follin, and music made by the game developer Sunsoft. Music in this later stage of the 8-bit era would rely heavily on fast arpeggiation, as well as making use of the DMC channel to play samples (especially for bass lines) during gameplay. Tim Follin's "Title Screen" theme for the 1990 game *Solstice* is a good example of this later 8-bit style (see fig. 16), which would become synonymous with modern chip tunes, created in the 8-bit style.

Tanaka at times also used the NES voices in unconventional ways. The triangle wave channel was generally used as the lowest voice in a piece at this time, acting as a bass line due to being more

difficult to control.[52] Tanaka however occasionally used this voice in a lead melodic role, in the high register, such as in the piece "Ridley's Hideout".[53]

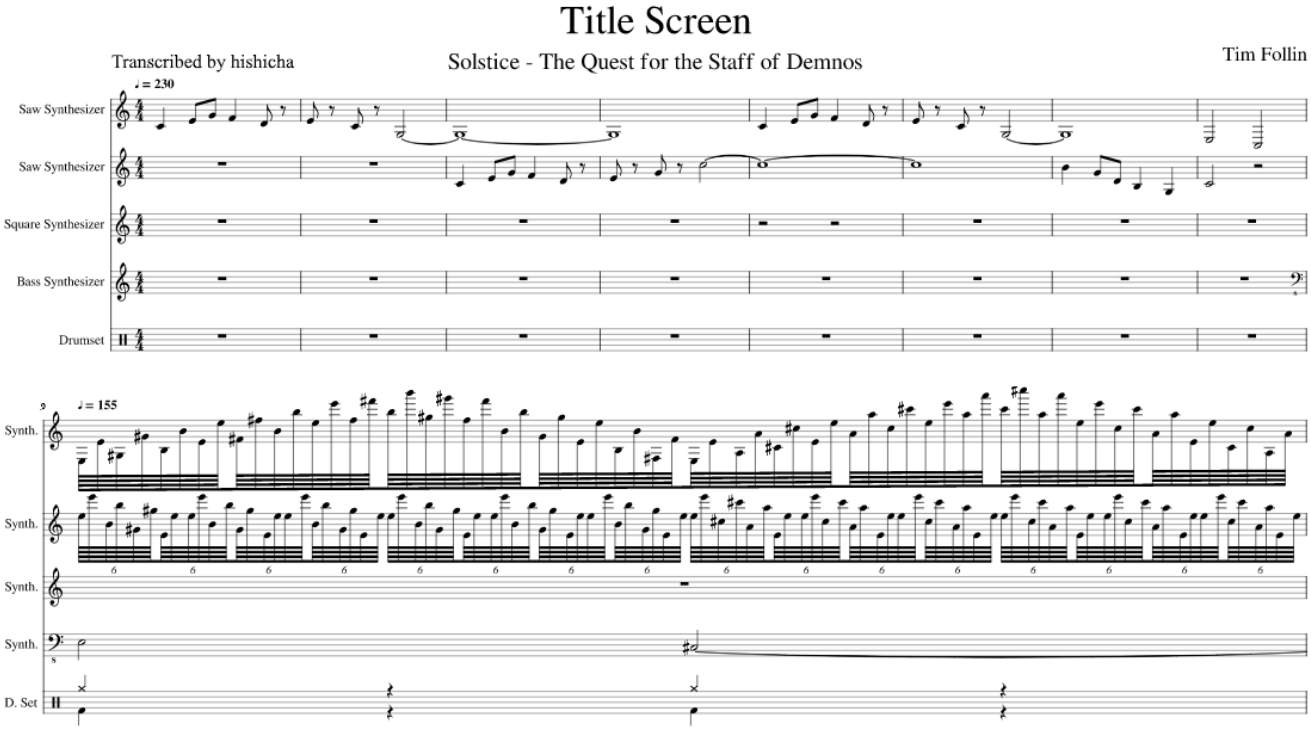


Figure 16. *Solstice* (1990) Title Theme – Tim Follin

Technically, Tanaka was able to use his expertise as a programmer, and familiarity with the NES audio hardware to "Maximize the sound chip capability",[54] as he wrote his own sequencer to play the music in *Metroid*, rather than using any pre-made systems as other composers generally did. Tanaka describes this as "a strong element of my uniqueness".[55] With his ability to directly affect the audio hardware of the NES, Tanaka was able to create special effects in both the music and sound effects. Karen Collins goes into detail about Tanaka's unique effects in her book *Game Sound*: "By altering the volume and adjusting the timing of the two pulse channels, phasing, echo effects, and vibrato could be simulated, as in *Metroid*'s "Mother Brain" and "Kraid"".[56]

An example of the phasing effect can also be heard in the *Metroid* "Title Music", in the interaction

52 https://www.nesdev.org/wiki/APU#Triangle_($4008-400B) The triangle-wave had no volume control, and so was either on at full volume, or off.
53 Schartmann, A. (2018). Chapter II. Technology, Artistry, and the Rise of the NES (location 528)
54 Brandon, A. (2002)
55 Brandon, A. (2002)
56 Collins, K. (2008) p. 26.

between the triangle wave and the lower pulse wave.

The final, and perhaps most significant way in which the score for *Metroid* went against norms of the 8-bit period, was in the blurring of lines between non-diegetic music and diegetic sound effects.

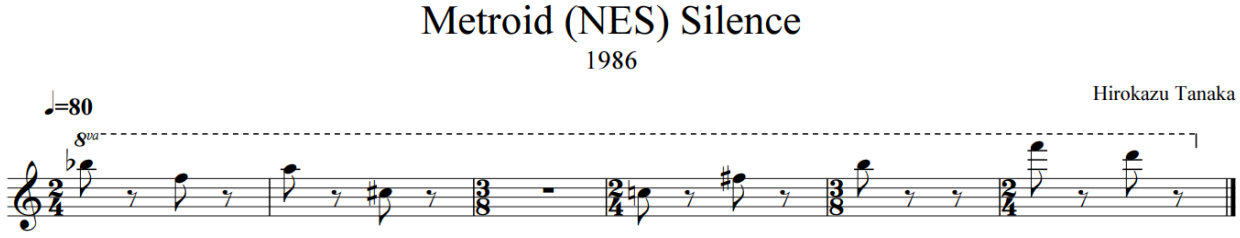


Figure 17. Atonal Melody from "Silence" (Schartmann Transcription)

In the track "Silence", Tanaka presents a depiction of a beeping computer, and the humming of machinery, often used in areas featuring pipes, vents or other mechanical or computer imagery. William Gibbons describes this piece as consisting of "two elements: an atonal melody and a 'burbling', quasi-pitched pattern in the bass. The two elements seem (but are not actually) random, and their offset metric patterns and tempo never lining up in any way that would suggest that they are part of a unified musical whole. In a similar vein, the melody itself seems to eschew any kind of predictability".[57] This "atonal" melody is shown in Fig. 17. According to Andrew Schartmann's transcription, "Silence" also follows an irregular metric pattern, with bars of 3/8 interjected into the 2/4 rhythm. This irregular metric patter in the upper voice is exaggerated by the bass voice, which forms a polyrhythm due to looping material of a different length. This material reflects the chaotic nature of real computer beeps and mechanical fans, which do not usually register to the listener as music.

This piece is perhaps the most important of Tanaka's rebellions against stylistic norms of the 8-bit period, and heralds the focus on diegetic sound that games decades later would prefer in order to create realism in audio environments. Schartmann describes this piece as "perfectly in line" with Tanaka's aesthetic goals,[58] that of immersing the player in a lonely, dangerous, and foreign

57 Gibbons, W. "The Sounds in the Machine: Hirokazu Tanaka's Cybernetic Soundscape for *Metroid"*, in Greene, L., & Kulezic-wilson, D. (2018). p. 351.

58 Schartmann, A. (2018). Chapter IV. Continued Success: The Birth of Two NES Legends

environment.

While aspects of the original *Metroid* score were certainly going against the norm of the 8-bit stylistic trends, other parts of the score would not be out of place in games of the period. William Gibbons, writing in the *Palgrave Handbook of Sound Design and Music in Screen Media*, describes the majority of the original *Metroid* score as **"**comfortably within players' horizons of expectations for game music of the 1980s", but notes that the "moments of rupture", where the score goes against traditions, stand out, as they tend to be at "structurally significant moments".[59]

The 8-bit period was a time when music in video games was becoming more respected, and establishing stylistic trends. Tanaka himself sums this up: "The sound for games used be regarded just as an effect, but I think it was around the time *Metroid* was in development when the sound started gaining more respect and began to be properly called game music."[60]

In summary, technical limitations in the early-mid 1980s drove a style of largely homophonic writing, with a strong melodic focus. Game composers in this period could write with 3 or 4 voices, with few limits on complexity, they could alter volume and meter, and reach durations of up to almost 7 minutes.[61] Trills, tremolo and arpeggiation were used to overcome voice limitations and create richer harmonies. Major tonalities and 'fun' musical styles, influenced by the family-friendly direction of gaming giants like Nintendo, combined with the bright waveforms of 8-bit audio chips and use of arpeggiation to create a distinctive style of music that would become associated with video games up to the present day and beyond.

59 Gibbons, W. in Greene, L., & Kulezic-wilson, D. (2018). *The Palgrave Handbook of Sound Design and Music in Screen Media: Integrated Soundtracks*. p.351

60 Brandon, A. (2002)

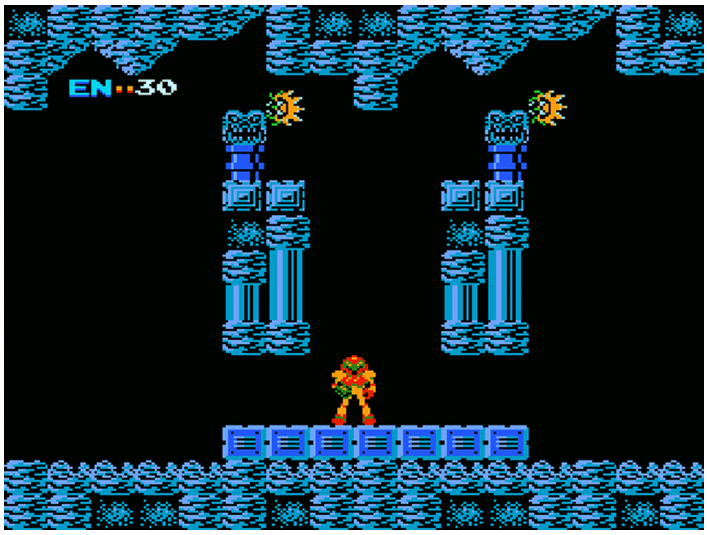
61 explod2a03 (2009) post. Straight Dope Message Board. https://boards.straightdope.com/t/longest-nes-bgm-song/510891/11

4. *Super Metroid* and the 16-bit Era (1987 – 1993)

4.a. Technical Advancements in the 16-bit Era

In 1987, the "PC Engine" console was released in Japan by NEC Home Electronics,[62] a company which largely specialized in home computers. This console was the first of what would become known as the fourth generation of game consoles, also known as 16-bit consoles. The PC Engine (also known as the "TurboGrafx-16" in America), sold well in Japan, and initially performed well after its 1989 release in America, but two giants in the console industry would quickly eclipse it, both in Japan and America. Nintendo and Sega, prompted by the success of the PC Engine, began working on their own 16-bit consoles, the Super Nintendo Entertainment System (SNES) and the Sega Mega Drive (also known as the Sega Genesis).

The advance in technology from 8-bit to 16-bit systems was mostly felt in the graphics and audio capabilities. Actual CPUs remained 8-bit (in the case of the PC Engine), or hybrid 8-bit / 16-bit in the case of the SNES. Only the Sega Mega Drive had at least 16-bit architecture, with a 32-bit instruction set and registers.[63] While this increase allowed CPUs to perform more advanced operations, it was the dedicated sound and graphics devices that made the games of this period look



Metroid (NES), 1986

Super Metroid (SNES), 1994

Figure 18. Comparison of NES and SNES Graphics

62 https://en.wikipedia.org/wiki/Fourth_generation_of_video_game_consoles#TurboGrafx-16
63 MC68000 Semiconductor Technical Data. Motorola. http://datasheets.chipdb.org/Motorola/68000/mc68000.pdf

and sound far above their 8-bit predecessors (see fig. 18).

Games systems of this period could handle transparencies (note the water at the bottom of the *Super Metroid* example in fig. 18), as well as special effects like falling rain, lightning, and pseudo-3D effects such as the famous "Mode 7" of the SNES (see fig.19), which allowed a flat plane to be angled away from the player, and then rotated and panned to mimic the ground moving under a character. More colors were also available to game developers, allowing for much richer color palettes. For example, the NES could create 54 colors (although only 25 could be displayed at a time),[64] while the SNES could create 256 colors (see fig. 20).

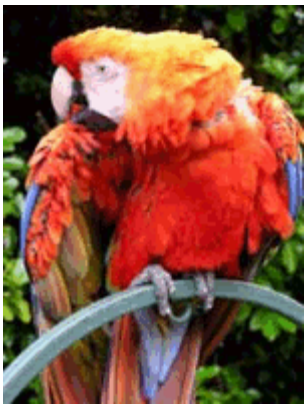
Figure 19. "Mode 7" pseudo-3D effect in Mario Kart (SNES), 1992

Audio capabilities in this period had also advanced significantly. Two developments in audio technology would drive the sounds of the 16-bit period: FM synthesis, and improved sampling. The Sega Mega Drive would rely purely on a type of synthesis called "Frequency Modulation" or FM synthesis to generate sounds. FM synthesis uses one or more waveforms to alter another, allowing for much richer sounds than just using a single waveform, as complex harmonics and timbres can be created.[65] [66] The Sega Mega Drive could produce 6 channels of audio, each with a programmable

64 https://www.nesdev.org/wiki/PPU
65 https://musictech.com/guides/essential-guide/how-fm-synthesis-works/
66 https://en.wikipedia.org/wiki/Frequency_modulation_synthesis

FM synthesizer. Stereo panning was also possible for each channel, allowing much more spatial

NES: 56 Colors



SNES: 256 Colors

Figure 20. Color Palette Comparison Between NES and SNES

effects than earlier systems.[67]

The SNES on the other hand, could produce 8 channels of audio, and relied purely on sampled sounds.[68] While the NES was capable of producing rudimentary samples of recorded sound, the resolution of these sounds was only 8-bit, and only one channel could create them. The S-SMP audio system of the SNES upped this sample resolution to 16-bit, and no longer had any issues of sample playback interrupting CPU operations, as was the case in the NES.[69] [70] This increased resolution of the sample rate, and the ability to play 8 channels of sampled audio simultaneously, is what made the SNES such a technological step up from the NES, and allowed composers to essentially record their synthesizers or instruments for use in their scores, rather than relying on the basic waveforms available to composers of the 8-bit era.

The SNES also had the ability to pan channels left and right, and incorporate basic effects like delay. Soundtracks of this era would make use of stereo effects and simulated reverb, both on the SNES and Sega Mega Drive. Panning, FM synths, sampling and effects like delay and reverb would be distinctive features of 16-bit era soundtracks.

In addition to these technological advances, two factors made writing music for games in the 16-bit

67 https://en.wikipedia.org/wiki/Yamaha_YM2612
68 https://www.copetti.org/writings/consoles/super-nintendo/
69 https://en.wikipedia.org/wiki/Super_Nintendo_Entertainment_System#Audio
70 https://www.copetti.org/writings/consoles/super-nintendo/

era much more user-friendly: the widespread usage of MIDI (the system allowing computers and synthesizers to communicate using a universal standard), and software allowing composers to convert MIDI data into data usable by game consoles.[71]

A shift had also occurred in the intended audience for video games, with companies like Sega intentionally targeting a more mature market: teenagers.[72] This shift allowed game designers to create games with darker thematic tones.

4.b. *Super Metroid*

By the early 1990s, Nintendo's R&D1 division was working on a new *Metroid* title for the SNES. Yoshio Sakamoto, the artist whose vision shaped *Metroid* with his *Alien* inspiration, would be the writer and director for this new game, titled "Super Metroid".[73]

While the original *Metroid* was inspired by the visual look of *Alien*, *Super Metroid* would take the inspiration of film to the next level. "We had a strong desire to make something that people would compare to a movie" Sakamoto said in an interview with Akinori Sao in 2017.[74] This is evident

Figure 21. *Super Metroid* Composer Kenji Yamamoto (middle left), and Writer / Director Yoshio Sakamoto (middle right), with two other Nintendo game designers[75]

71 Collins, K. (2008) p. 45 - 46.
72 Harris, B., & Harris, B. (2014). p. 121.
73 https://en.wikipedia.org/wiki/Super_Metroid#Development
74 Sao, A. (2017), Super Metroid Interview with Sakamoto-san and Yamamoto-san. *Nintendo.com*.
75 Far left: Toru Osawa, creator of *Kid Icarus*, far right: Hiroji Kiyotake, *Wario* creator.

from the opening sequence of the game, where dramatic text over a black screen is interspersed with camera pans over a moody, dark and destroyed laboratory scene. The gameplay and theme would be the same as the original *Metroid:* exploring an alien world, all alone, but this time with a working map system to allow players to more easily find their bearings. By this period it was no longer expected that players would map anything on paper, and while the game still required players to search around and use their own initiative, the artificial difficulty of not providing a map had gone out of fashion.

Covering musical duties for *Super Metroid* would be Kenji Yamamoto and Minako Hamano. Yamamoto had been working at Nintendo since 1987, providing music for titles such as *Mike Tyson's Punch-Out* on the NES, and working alongside *Metroid* composer Hirokazu Tanaka on titles like *Famicom Wars*.[76] Hamano had been working at Nintendo since at least 1993, and had scored titles such as *The Legend of Zelda: Link's Awakening*.[77] *Super Metroid* was eventually released in 1994, and is still widely acclaimed as one of the best titles in the Metroid series.[78]

4.c. The Music of *Super Metroid*

The music written for *Super Metroid* would take advantage of the new technology available to composers at Nintendo, namely much higher quality audio sampling, and the ability to have 8 audio channels playing at any one time. Yamamoto describes the audio system of the SNES as providing an "expressiveness" which was "remarkably richer" compared to the NES.[79]

Now that recording real audio was an option for game music (albeit still at a lower quality compared to modern CD-Quality audio sampling), Yamamoto "pushed the performance of the Super NES hardware to the limit", and due to his having programming background and working on the audio systems of the SNES, "was able to play sounds that you didn't often hear in video games

https://nintendo-online.de/artikel/report/20982/inside-nintendo-61-die-mystische-geschichte-der-kid-icarus-reihe

76 https://en.wikipedia.org/wiki/Kenji_Yamamoto_(composer,_born_1964)

77 https://www.imdb.com/name/nm0357344/ Information on exactly when Hamano started work at Nintendo proved difficult to find.

78 https://www.gamesradar.com/best-metroid-games/, https://www.nintendolife.com/guides/best-metroid-games-of-all-time?page=2

79 Sao, A. (2017)

Manufacturer	Synthesizer / Library	Bank	Patch Name
E-MU Systems	Proteus/1	Bank 0	000 Stereo Piano
E-MU Systems	Proteus/1	Bank 0	002 InChoirIrie
E-MU Systems	Proteus/1	Bank 0	008 MiniMoogBass
E-MU Systems	Proteus/1	Bank 0	017 Verb Flute
E-MU Systems	Proteus/1	Bank 0	019 F. Horn Sect
E-MU Systems	Proteus/1	Bank 0	030 Latin Drums
E-MU Systems	Proteus/1	Bank 0	045 Wide Marimba
E-MU Systems	Proteus/2 XR	Bank 0	050 Timpani
OMI	Universe of Sounds Vol. 1	French Horn	6 French Horns
OMI	Universe of Sounds Vol. 1	Full Brass	Octave Brass
OMI	Universe of Sounds Vol. 1	Strings Acoustic	Random Pizzicato/ Tremolandi
OMI	Universe of Sounds Vol. 2	Drum Kits	Big Groove
OMI	Universe of Sounds Vol. 2	Drum Kits	Room Drums
OMI	Universe of Sounds Vol. 2	Full Orchestra	Evil Orchestra
OMI	Universe of Sounds Vol. 2	Full Orchestra	Orch Hits 2
OMI	Universe of Sounds Vol. 2	FX Household	Water Works
OMI	Universe of Sounds Vol. 2	FX Sci Fi	Electronic Ambience 2
OMI	Universe of Sounds Vol. 2	FX Sci Fi	Friday 13
OMI	Universe of Sounds Vol. 2	FX Sci Fi	Plasma Gun
OMI	Universe of Sounds Vol. 2	FX Sci Fi	Space Ships
OMI	Universe of Sounds Vol. 2	Percussion	Cowbells Blocks Shakers
OMI	Universe of Sounds Vol. 2	Percussion / Pitched	Kemal Drum 1
OMI	Universe of Sounds Vol. 2	Piano Acoustic	Baby Grand
OMI	Universe of Sounds Vol. 2	Piano Electric	Digital Piano
OMI	Universe of Sounds Vol. 2	Synthesizer	Brass Synthesized
OMI	Universe of Sounds Vol. 2	Voice	Boys In the Band
OMI	Universe of Sounds Vol. 2	Voice	Female Choir
OMI	Universe of Sounds	Snares 1	Snares 1
OMI	Universe of Sounds Vol. 3		(DX7 Bass)
OMI	Universe of Sounds Vol. 3	FX Comedy	Mud
OMI	Universe of Sounds Vol. 3	FX Music	Alien Landscape
OMI	Universe of Sounds Vol. 3	Strings Synthesized	Midi Strings
Yamaha	TX802	Bank B	21 VibraPhone

Figure 22. Table of Known Sounds Used in Super Metroid

back then, like a women's chorus".[80] Although the SNES was able to sample real sound, composers of this period tended to sample sounds created by synthesizers they owned, or were owned by the company they worked for. These could be hardware synthesizers, or sample libraries. A list of known samples used in Super Metroid soundtrack is shown in figure 22.[81]

80 Sao, A. (2017)
81 https://docs.google.com/spreadsheets/d/1JJBlHHDc65fhZmKUGLrDTLCm6rfUU83-

The Yamaha TX802 and the Proteus 1, by E-MU Systems, were rack-mounted synthesizers (see fig. 23) which could be controlled by MIDI signals. The “Universe of Sounds” was a sample library released by Optical Media International (OMI) in 1986, which by the early 1990s would have been distributed in a CD (see fig. 24). These tools allowed composers access to many different instruments and sound effects, with which they could sample small sections and create sound sets to playback on the SNES.

By the time of the early 1990s, video game music had evolved to cover a number of different genres, from the ambient synth pads of *Donkey Kong Country* to the rock-inspired soundtrack of *Mega Man X*, to the wide variety within scores such as those for *Super Castlevania IV*, or *Final*

Figure 23. Yamaha TX802 and E-MU Proteus 1 Synthesizers

Fantasy III, to use examples from SNES. While the score for the original *Metroid* at times went against stylistic norms for the 8-bit period, by the time of *Super Metroid*'s release in 1994, the elements that set the original *Metroid* score apart were much more widespread. As such, the study of the *Super Metroid* score becomes one of understanding the stylistic norms of the 16-bit period, both musically, and with respect to the industry's desire to create more dramatic experiences for players.

The opening sequence of *Super Metroid* presented a complete change from the static title screens of

kbuD8Y0zU0o/htmlview List of known sounds taken from the VGM Resource Community

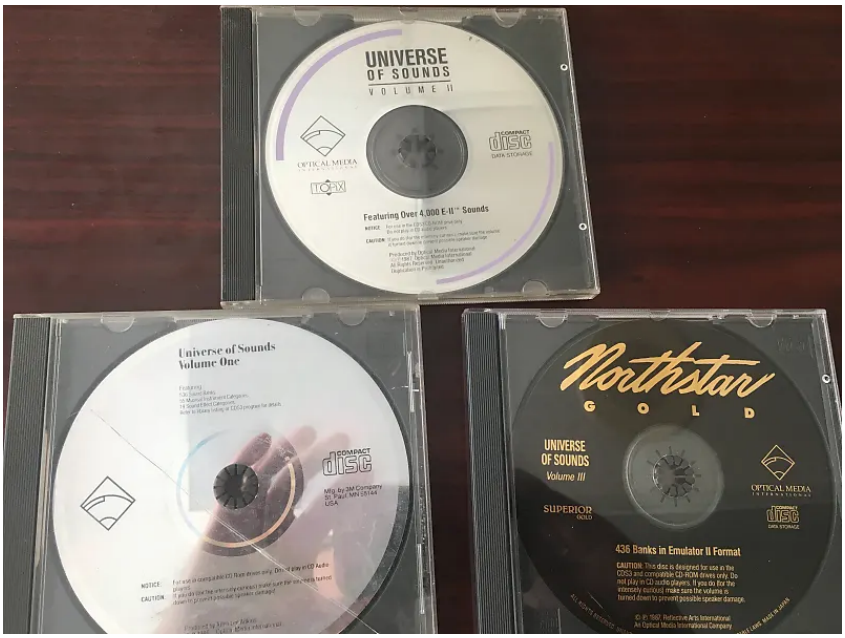


Figure 24. OMI "Universe of Sounds" Sample Libraries, in CD format

the 8-bit era. Upon starting the game, we are presented with a cinematic introduction video, which director Sakamoto planned out using a VHS tape beforehand.[82] Sakamoto describes that "We put a lot of effort into how to present the text, having the camera move so you see a collapsed researcher, revealing that the strange cries come from a baby Metroid, and so forth."[83]. To accompany this dark and foreboding cinematic introductory sequence, an equally dramatic and tense score was created by Yamamoto and Hamano,[84] timed exactly to the visual elements and pacing. This synchronicity between a pre-planned visual sequence and music, while common in the film world, was something that video games were only just starting to grapple with in the early 1990s.

Zach Whalen describes film music as accomplishing "some of the most dramatic emotional aspects of the immersive experience of film, all the while acting for the most part without the viewer's being conscious of it",[85] and goes on to indicate that there is an "ontological status to the film space" which "provides a point of departure when approaching game music". While this may be true for gameplay music in general during this period, for cinematic scenes in games (later referred to as "Cut Scenes"), the departure is not so distinct, as we are essentially presented with a film

82 Sao, A. (2017)
83 Sao, A. (2017)
84 Information on which composer wrote which piece of music was extremely scarce, so I will assume that both composers worked on each piece of music in some way.
85 Whalen, Z. (2007) p. 71.

sequence without any possible input from the player (beyond skipping the sequence), which belies Whalen's claim that "a game is played rather than viewed".[86]

The *Super Metroid* "Title Sequence" (see fig. 25, and full score in appendix 2) starts with a single piano note, taking advantage of the SNES' ability to pan sound and create delay / echo effects. The

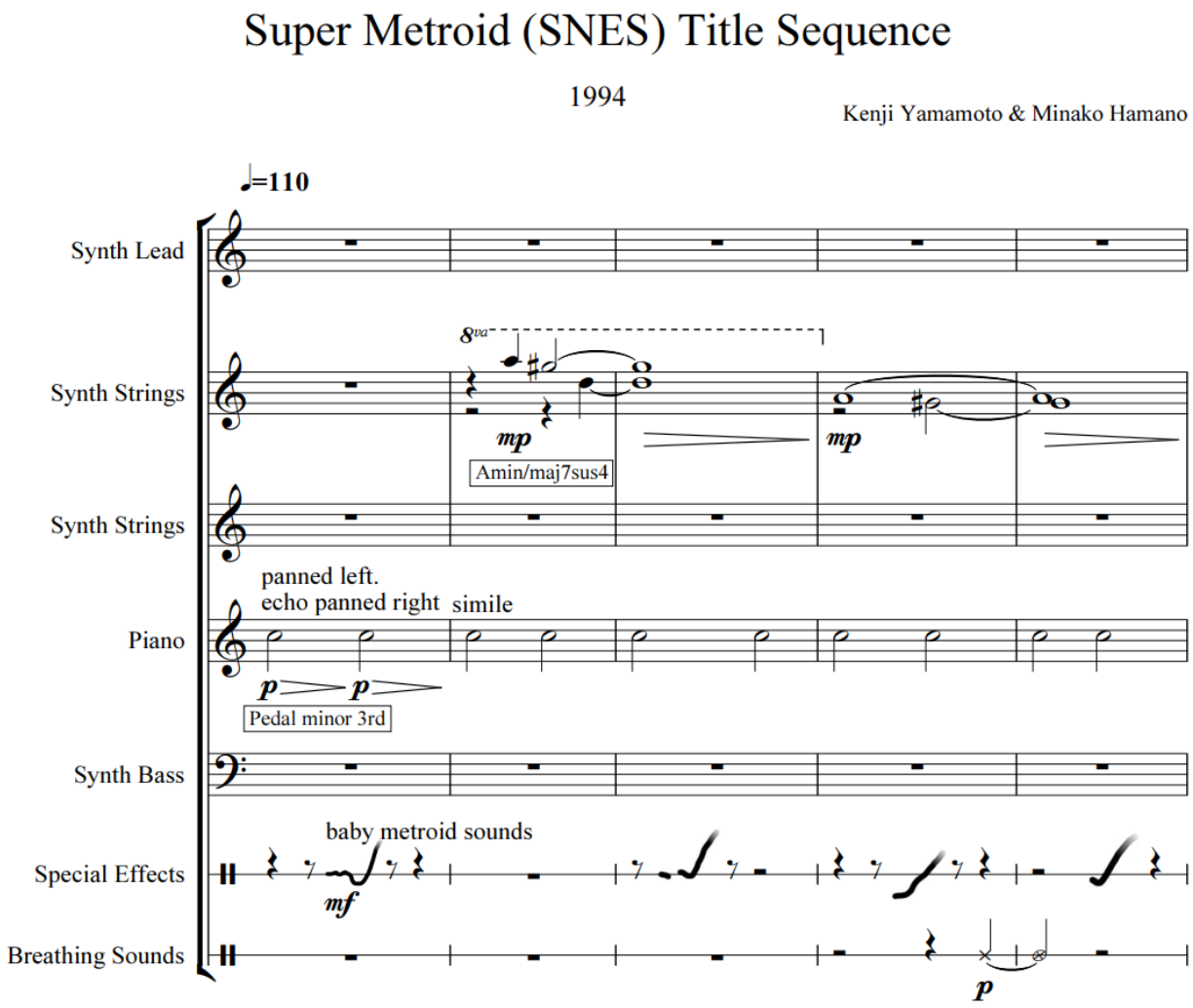


Figure 25. Bars 1-5 of the *Super Metroid* Title Sequence

piano is panned to the left, but an echo occurs on the right of the listener. This single note, repeated, outlines what turns out to be the minor third of an Amin/maj7sus4 chord. Synthesized strings fill in the rest of the harmony in a staggered descending chord, while unusual sound effects chirp in the background. These sound effects are those of the "baby Metroid" shown on screen during this sequence, which Yamamoto created himself. Yamamoto describes that he was filling three roles

86 Whalen, Z. (2007) p. 68.

Figure 26. *Super Metroid* Title Screen, with Baby Metroid in Center

working on *Super Metroid*: sound programmer, sound designer, and composer,[87] which is a similar role to Tanaka in the first *Metroid* title. While the *Super Metroid* "Title Sequence" features sound effects as well as music, I don't believe it blurs the lines between sound effects and music as the track "Silence" did in the first *Metroid* title, as we clearly see the baby Metroid on screen, and the sounds emanating from it are distinct from the music.

After the tense introduction of the *Super Metroid* "Title Sequence", the piece shifts into a re-arrangement of the original *Metroid* "Title Music" at bar 13. Tanaka's original title theme is presented in the same key of D minor, and the D – Bb – F / D – C – Bb melody (which I am calling the "Metroid Title Theme") is presented more simply, using two repeated notes for each pitch, instead of the 5 notes for each pitch in the original *Metroid* "Title Music" (see fig. 27). The pitches are also transposed down two octaves, creating a more sinister and foreboding tone.

The D drone with added fifth is present, although the sounds are upgraded from the NES version: the sampled sounds of the SNES feature synthesized strings. Sound effects such as the baby

87 Napolitano, J. (2008)

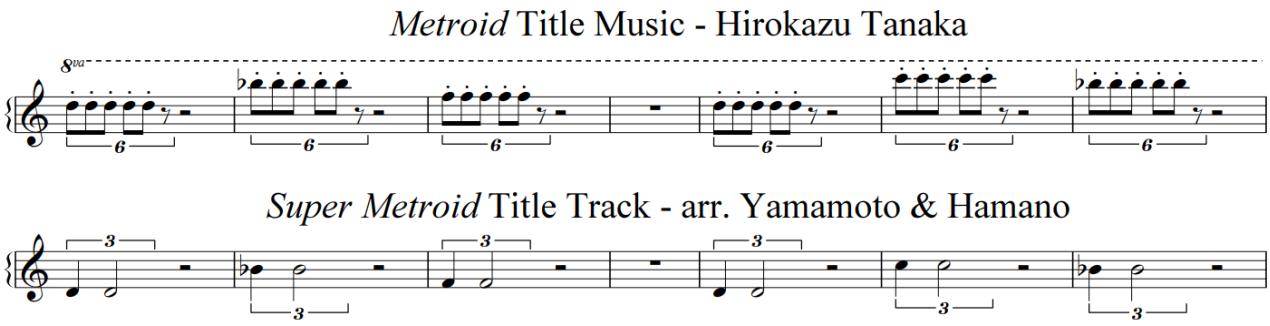


Figure 27. Comparison of Metroid and Super Metroid Title Themes

Metroid sounds, and eerie breathing sounds add to the unnerving mood of the title music, with as many as 7 channels of the S-SMP sound unit used at once. Yamamoto describes his reasons for re-using musical material from previous Metroid games, as a "present" for Metroid fans, and says that he is "always trying to include at least one musical piece from the previous title".[88] It is this incorporation and integration of material from previous games that causes game series like Metroid, Final Fantasy, Zelda and Mario have such a distinct impact on video game music, as they cultivate a legacy of music that fans relate to each series.

88 Napolitano, J. (2008)

"Samus Aran's Appearance Fanfare", which is an arrangement of the "Game Start" music from *Metroid*, is interesting in that all the notes except for two fit into a D minor (of F major) pentatonic scale. The outlying notes are shown in red in fig. 28: the Eb in the bass voice, and Bb in the tenor voice in the first beat of the first bar, which is consistent with a bii chord. The chord on the third beat of the first bar is the result of contrapuntal movement within the pentatonic scale, although

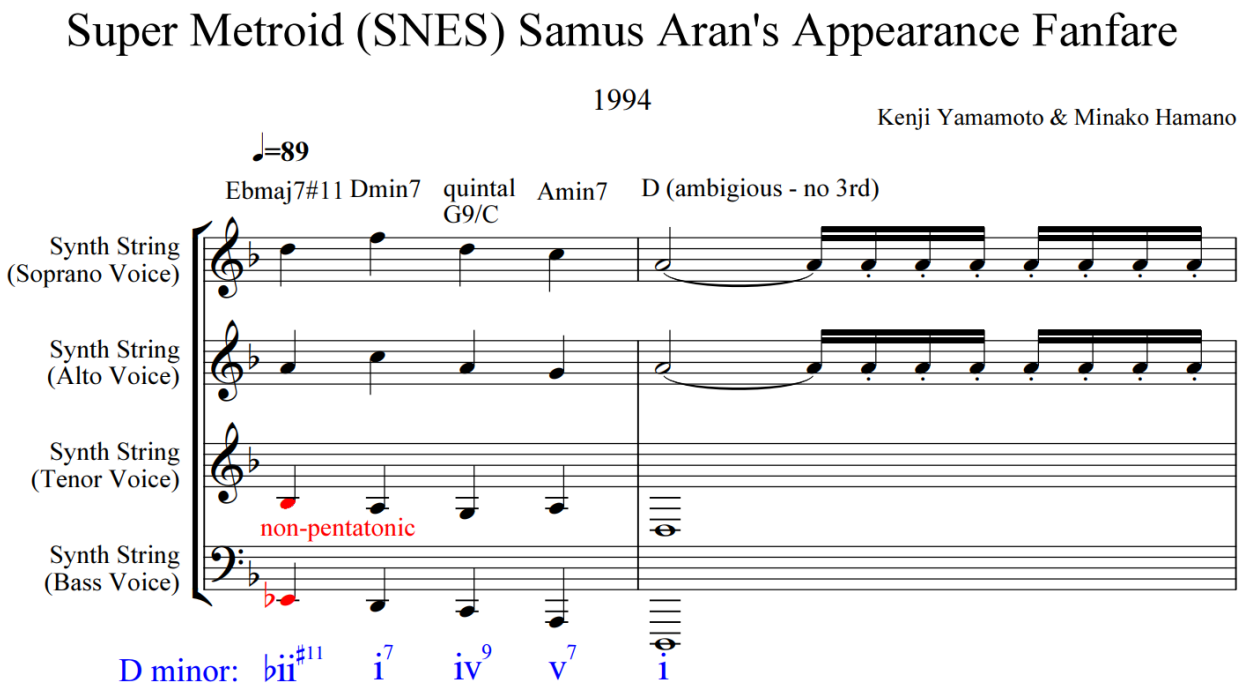


Figure 28. Samus Aran's Appearance Fanfare

could also be understood as a quintal chord functioning as chord iv. The original "Game Start" music does not fall within a pentatonic scale, although has similar harmony, starting with the bii chord, and ending with a v – i cadence (although the "Game Start" opts for ending in D major). The melodic lines in the bass and soprano voices are identical in both "Samus Aran's Appearance" and "Game Start", as these are the most identifiable element of the original piece, so it is understandable that Yamamoto and Hamano kept these the same. The function of the inner voices could be interpreted as taking these two melodic lines from "Game Start", and adding parallel fourths to the upper voice, and parallel fifths to the lower voice (with the exception of the penultimate note in the alto voice). Altering the inner voices allows the piece to be re-contextualized harmonically and made more neutral, such as omitting the third in the final chord. This ambiguity in tone reflects the

purpose of the piece within the context of the game more clearly: the player is just starting their gameplay experience, and it is unknown if they will encounter triumph or defeat, or a combination of the two.

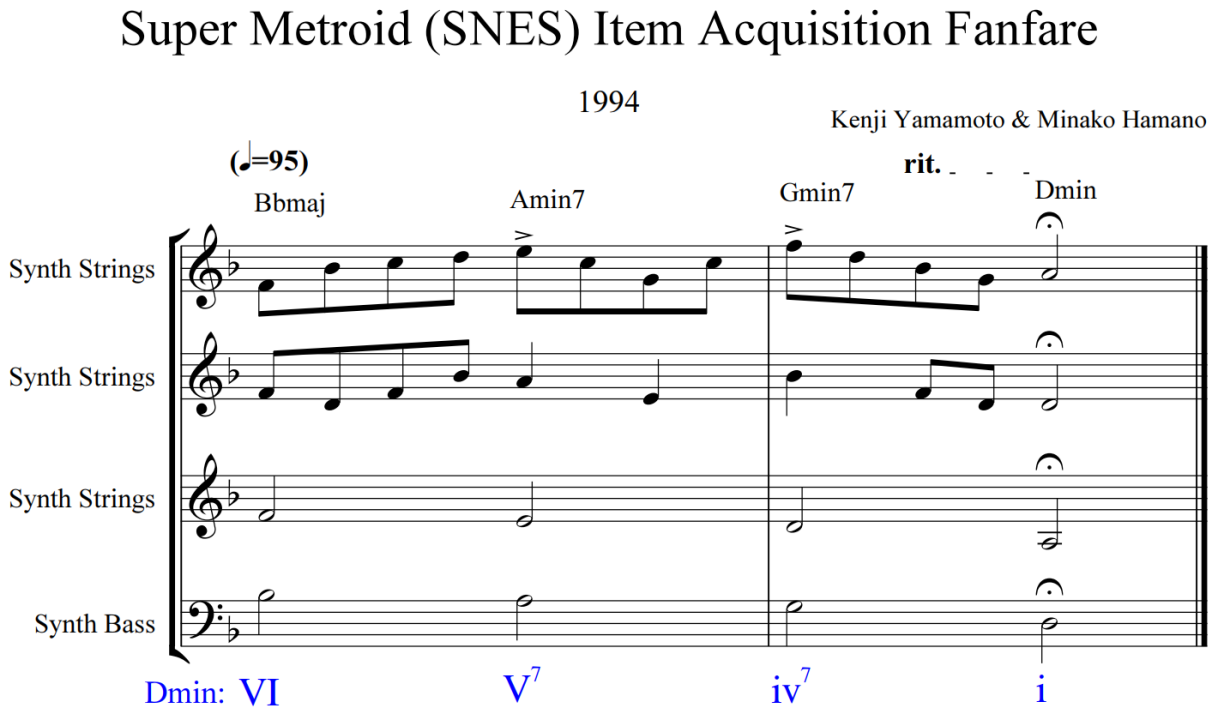


Figure 29. *Super Metroid* Item Acquisition Fanfare

The *Metroid* "Item Acquisition Fanfare" is also reinterpreted for the *Super Metroid* score, and while it starts with the same two chords as the original, the bii third chord and final picardy cadence are altered to a iv7 and minor ending respectively (see fig. 29.). The main melodic element of the original piece (in the soprano voice) is once again left unaltered, as this comprises the recognizable core of the piece. The extra voices are used to fill out the harmony, such as the tenor voice being used to create parallel fifths with the bass. This is consistent with Karen Collins' summation that extra audio channels in the 16-bit era tended to be used to "fill out the sound" of chords.[89]

The late 1980s and early 1990s saw technological advances in the number of voices and quality of sound produced by game systems, as well as the ability to incorporate panning and basic effects into musical compositions. This 16-bit era, while opening up the possibility for much richer and complex musical expression, was perhaps not fully taken advantage of, as composers tended to use

89 Collins, K. (2008) p. 47

extra channels to fatten out chords by adding overtones, rather than opting for more voices and polyphony in the music itself. When describing the 16-bit era, Collins says “the musical structures remained very similar to those of the 8-bit era”.[90] While many games were starting to incorporate short, filmic sequences of synchronized visuals and music as introductory or story exposition material, the function of game music in this period was largely unchanged from the previous 8-bit era. Music in the 16-bit era was still a combination of static background tracks during gameplay, and fanfares triggered by important game events such as collecting items or completing objectives. Perhaps the largest change in this period is the expansion of the intended audience of games, from children to teenagers, and the darker thematic tones used by game designers of the period.

90 Collins, K. (2008) p. 47 – 48.

5 *Metroid Prime* and the High-Quality Audio Era (1994 – present)

5.a Technical Advancements: 1990s – early 2000s

The advancement of storage media in the late 1980s and early 1990s allowed games to store exponentially more data. The game cartridge for a SNES, which stored all the data for the game's code, art and music, could hold 6 Mega Bytes (MB) of data, while Sega Genesis / Mega Drive cartridges could hold up to 4MB of data. Meanwhile Compact Discs (CDs), which were starting to become common for games on personal computers (PCs) by the early 1990s, could hold a whopping 700MB of data. Suddenly, very high-quality audio was possible for game soundtracks. The first game to take advantage of this possibility was *Tengai Makyō: Ziria*, a role-playing game which was released in 1989 on the the TurboGrafx-CD, an add-on for the PC Engine console which allowed it to use a CD as storage (see fig. 30). By the early 1990s, several high profile games had high-quality audio, utilizing "mixed-mode" CDs, where the data for the game's code and art was separated from the audio, which could be played back as if a regular audio CD. *Myst* (1993), and *Quake* (1996) among others, had soundtracks created by regular recording methods, and re-produced using high

Figure 30. The TurboGrafx-CD/CD-ROM² add-on, Released in 1988

quality sampling close to CD quality, which was generally sampled at a frequency of 44kHz,

meaning a discrete digital value is created 44 thousand times per second (see fig. 31).[91] This higher sample rate was essentially indistinguishable from real acoustic sound. For reference, telephone and walkie-talkies are generally sampled at 8kHz, and the SNES was capable of sampling at 32kHz. While quality closer to CD audio was available for game soundtrack from the early 90s onwards,

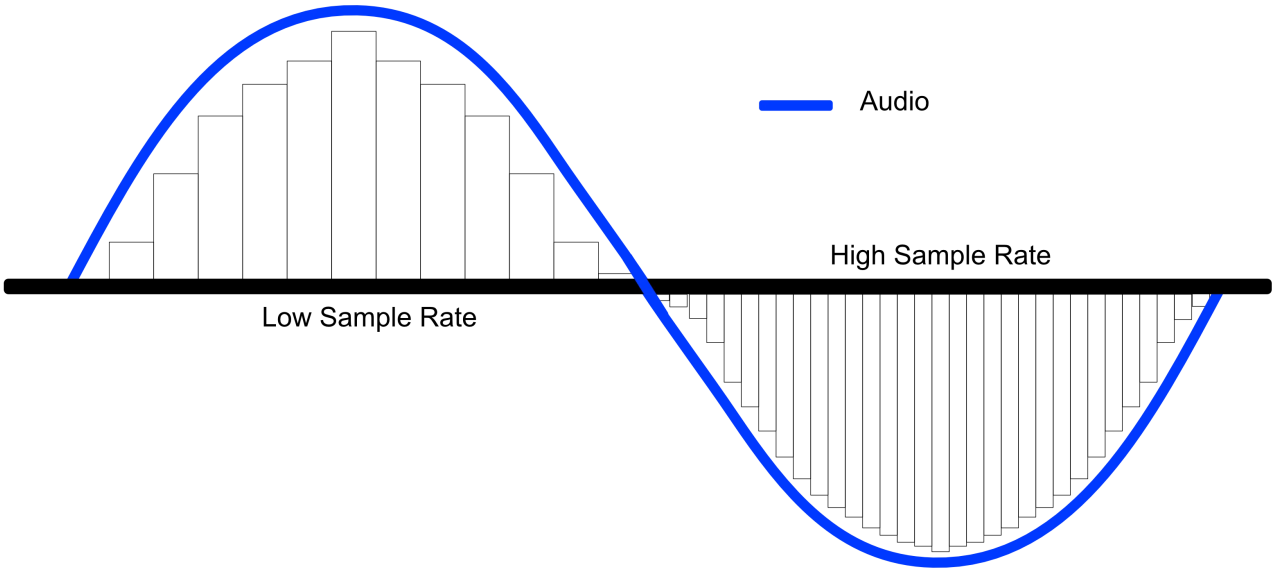


Figure 31. Example of Audio Sample Rates[92]

games did not always take advantage of this, as high-quality soundtracks were expensive to commission, and had a longer loading time (as the optical drive for the CD had to spin up and change to the correct position). There were also inherent issues with looping due to the laser reader needing to change positions from the end to the start of a track. To mitigate these issues, many games in the mid 1990s opted to use MIDI playback systems built into the console (or PC) for their soundtracks, such as those for *Final Fantasy VII* on the Sony Playstation console, or the *Legend of Zelda: Ocarina of Time* for the Nintendo 64 console.

After the 16-bit era (see fig. 32), bit rate ceased to be as much of a defining chronological categorization of game systems, as other factors such as CPU speed become more important than bit rate. Developers still used bit rate as a selling point, up until around 1996, and 32-bit and 64-bit

91 https://en.wikipedia.org/wiki/Compact_Disc_Digital_Audio#Audio_format
92 Image Source: https://www.masteringthemix.com/blogs/learn/113159685-sample-rates-and-bit-depth-in-a-nutshell

systems were advertised using their bit rate, sometimes in the title, such as in the case of the 64-bit Nintendo 64. By 1995, most consoles such as the Sega Saturn and Sony Playstation were using CDs as their storage medium, and able to produce audio very close to CD quality (although the ADPCM used encoding was not lossless).[93] Outliers such as the Nintendo 64 (released in 1996) still used cartridges, but the general trend by the end of the 1990s for game storage medium was CD. While there is no specific name for the game music produced in this era, I am proposing naming it the High-Quality Audio Era.

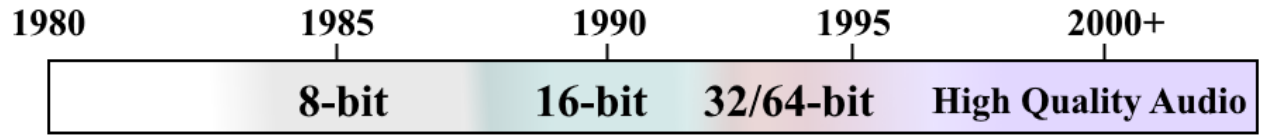


Figure 32. Summary of Eras 1980 - 2000

5.b. Soundtracks in the High-Quality Audio Era

Rod Munday, in his chapter on music in video games, from the book *Music, Sound and Multimedia* (2007), states that game music "no longer exists" in the modern day, as the music for video games "inhabits every style imaginable, from baroque to bluegrass, rockabilly to symphonic"[94]. While he was correct about the broad variety of genres being written for games in the 2000s and onwards, there were still strong stylistic connotations for the phrase "game music", even in the post 2000 era. The musical styles of the 8-bit and 16-bit era will probably be the first to come to mind for many people when they hear the term "game music", and while retro scores in the style of those eras are still employed for many games even at the time of writing (especially those with a retro or "pixel art" visual styles), many non-gamers may not be familiar with just how extensive high-quality scores are in modern games. See figure 33 for a sample of genres in video game music in 1999. With increased budgets for game audio, many options opened up to composers for video games. Full orchestras and ensembles of real players were utilized, with composers such as Michael Giacchino writing full orchestral game scores, recorded by live orchestras such as for the *Medal of*

93 https://en.wikipedia.org/wiki/Adaptive_differential_pulse-code_modulation
94 Munday, R. (2007) p.51.

Honor series, of which the first title was released in 1998.[95] While real performers were a possibility, not all studios had the luxury of using of them, so composers were often left to use sample libraries and synthesizers, as they had in the 16-bit era. The synthesizers available in the 1990s were of a higher quality than in the 1980s, and the fidelity between the source sample and the music heard in game was now much better, and at times lossless.

Video Game	Genre of Soundtrack
Tony Hawk's Pro Skater	Punk Rock, Ska
Wipeout 3	Electronic: Techno, House, Trance
Final Fantasy VIII	Varied: Latin Choral, Pop, New Wave, Orchestral, Electronic, Rock
Medal of Honour	Orchestral, Late Romantic
Silent Hill	Ambient, Lo-Fi, Horror
Command and Conquer: Tiberian Sun	Futuristic Ambient

Figure 33. Video Game Soundtrack Genres, 1999

5.c *Metroid Prime*

Retro Studios, a game company based in America, were by early 2000 working on four different games simultaneously for the GameCube: Nintendo's latest console, which had a 32-bit CPU and used specialized miniDVD discs to store game data on.[96]

Nintendo had a large ownership share of *Retro Studios*, and when Shigeru Miyamoto (one of the head game designers and producers at Nintendo) visited Retro Studios from Japan, he deemed only one of the four games worthy of continuation. The chosen game, a “First Person Shooter”,[97] was suggested by Miyamoto to be re-designed as a Metroid game.[98] Titled *Metroid Prime*, It would be the first Metroid game to be experienced from a 3D “First Person” perspective, where the game is presented as if viewing it from the eyes of the main character. All previous Metroid games had been 2D, in a style known as “Side Scrolling”, where the characters move vertically and/or horizontally across a flat background (see fig. 34). The difference between the two perspectives was significant,

95 https://en.wikipedia.org/wiki/Medal_of_Honor_(1999_video_game)#Development
96 https://en.wikipedia.org/wiki/GameCube#Storage
97 FPS: A popular genre of game where the player experiences the game from the eyes of the main character, usually seeing a weapon or hands protruding from the lower section of the screen. Popularized by games like *Doom* and *Quake.*
98 https://en.wikipedia.org/wiki/Metroid_Prime#Development

as players no longer saw their character on screen, but were instead fully immersed in the environment, able to look around in any desired direction. Only the player character's weapon or

Super Metroid: 2D "Side Scrolling"

Metroid Prime: 3D "First Person"

Figure 34. 2D Side Scrolling vs. 3D First Person Perspectives

hands would be displayed on screen. There were times when *Metroid Prime* did switch to a third person perspective, showing the full player character on screen, but these were generally for cut scenes or introductory material, rather than the main section of gameplay.[99] Immersion was a key factor of the game's presentation, and special graphical effects helped the player feel as if they were really in the game's world. For example, a player walking under a waterfall would experience water droplets on the visor of their character's helmet, while walking through steam would create condensation instead. The transition from 2D environments to more immersive 3D environments had an important impact on game audio, as music was no longer one of the primary elements keeping the player immersed. Instead, more realistic diegetic sound effects were to become the focus, with increased volume compared to previous eras. Responding to the switch to first-person perspective, *Metroid Prime* composer Kenji Yamamoto stated "we needed to have more realistic sound effects and environmental sounds"[100]. Background music was generally reduced in volume compared to previous eras, where it was usually on par with the sound effects. By the year 2000,

99 With the exception of the "Morph Ball" gameplay sections, where the player is presented with a third person perspective of the action.

100 Napolitano, J. (2008)

game music could be as low as 50% of the volume of diegetic sound effects[101] (see figure 35), with options to disable music altogether. A brief loudness comparison analysis of three games showed the 8-bit era *Metroid* having music at -25 LUFS (Loudness Units Full Scale – an audio industry standard measure of perceived loudness), and sound effects at -18, while the 16-bit era *Final Fantasy VI* had music at -24 LUFS, and sound effects at -22. *Metroid Prime*, from the post 2000 High-Quality era, had music at -24 LUFS and sound effects at -11.[102]

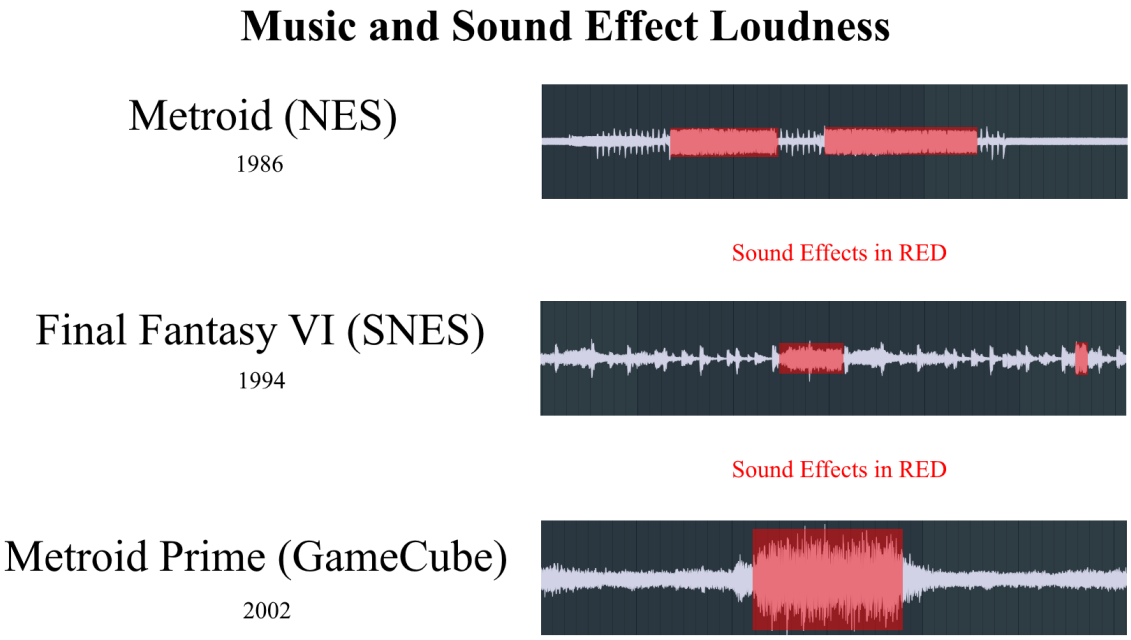


Figure 35. Sound Effect vs. Music Loudness, 1980s – 2000s

5.d The Music of *Metroid Prime*

While Retro Studios handled the art and coding for *Metroid Prime,* Nintendo would handle the audio, including the music. Retro Studios had originally approached English electronic music group Autechre[103] to create the music for *Metroid Prime*,[104] but Nintendo vetoed this decision in favor of the musical continuity of employing *Super Metroid* composer Kenji Yamamoto, who was assisted by Kouichi Kyuma to create the score.[105] The impact of Autechre's music on Yamamoto and

101 Based on the authors audio analysis of games from the NES, SNES and GameCube
102 Note that these examples were all normalized to the loudness of the *Metroid Prime* example, so the exact LUFFs values are not correct. The important detail is the difference in loudness between sound effects and music.
103 A two-piece electronic act, with a varied oevre, known for experimental techno, and "Intelligent Dance Music" (IDM)
104 https://www.musicradar.com/news/autechre-metroid-prime-soundtrack
105 https://en.wikipedia.org/wiki/Metroid_Prime#Audio

Kyuma's score is not fully known, but some similarities can certainly be ascertained. Autechre's music is generally synthesized, and contains inspiration from early 1980s hip-hop, especially with relation to their use of electronic percussion. Autechre's music can be complex and feature irregular meters and rhythms, and their work encompasses a variety of styles over their 30+ year career. Distinctive features of Autechre's music such as harsh electronic noise and early hip-hop style percussion can be heard in the *Metroid Prime* score. However, the scores of the Metroid series are no stranger to unusual electronic noises and sampled or fully electronic percussion, so any similarities may be coincidental. The effect of Autechre on the music of *Metroid Prime*, in my opinion, can be heard in the percussion and harsher electronic background textures.

According to Nintendo Wiki, the first Nintendo game to feature live players was *Super Smash Bros. Melee*, released in 2001, which featured a full orchestra. The next game to do so would be *Kirby Air Ride*, in 2003[106], and so while live performers and ensembles were a possibility for composers working at Nintendo during this period, the score for *Metroid Prime* would not feature live players. This would likely be an aesthetic choice by the composers, but audio budgets and time may have also had an effect on the options available to Yamamoto and Kyuma. By the time of 2007's *Metroid Prime 3: Corruption*, Yamamoto had the option to use live orchestra, but said that “if we used orchestral music for all of the sound, then we would lose the distinct musical atmosphere of the original *Metroid*".[107] Clearly this distinct atmosphere precluded an entirely orchestral score.

When matching music to a video game, composers carefully consider the subject material, and choose instrumentation that reflect the setting and story of the game. The setting of *Metroid Prime* was strongly science fiction, but in a clean, stylized visual presentation. The main character, Samus Aran, was presented in a flawless polished space suit, and while the environments could feature destroyed or overgrown areas, the presentation of the menu screens and heads up display[108] was

106 https://nintendo.fandom.com/wiki/List_of_games_with_live-performed_soundtracks
107 Napolitano, J. (2008)
108 This is the visual information presented to the player on screen, usually around the corners of the screen, displaying information such as ammunition remaining, health, objectives and the map.

clean and minimal. Scott Petersen, Retro Studio's sound supervisor, described that all the sound in *Metroid Prime* "should be highly stylized and/or synthetic",[109] which I feel is also reflected in the choice of instruments and production of the music.

In order to match a clean visual style and science fiction setting, composers generally chose synthesizers as their main instruments, and emphasized clear, polished production values. Although there are exceptions to this rule, in the case of *Metroid Prime*, synthesizers would be the main instruments used to create the score, supplemented by sample libraries and various audio CD's of musical loops.

Figure 36. E-mu Proteus 2000, Orbit-3 and Xtreme Lead-1 Synthesizers

The three main synthesizers used in the *Metroid Prime* soundtrack were the Proteus 2000, Orbit-3 and Xtreme Lead-1, all produced by E-mu Systems[110] (see fig. 36). These were once again rack-mounted synthesizers controlled by MIDI input, similar to those used for the *Super Metroid* score, but more up-to-date, being released in 1999 or later. Supplemental synthesizers included the Korg MS2000, Korg Electribe ER 1 / EA 1 and Roland SC88 Pro. Although not all sound sources are known for the *Metroid Prime* score, the East West Quantum Leap Symphonic Orchestra seems to be the main sample library used, which was only used for a number of supplemental sounds.

109 Napolitano, J. (2008)
110 Petrosky, M. (2022)

Compilations of loops and sound effects made up the core of the *Metroid Prime* percussion, and often these were used as stand-in percussion while the track was being composed, and then later replaced with similar rhythms and sounds.[111] "Chemical Beats" by Zero-G, self-described as "Loops with masses of attitude, huge drum sounds and FX crunched through advanced signal processors",[112] Uncivilised G'rooves by ZTime Audio, described as a "Totally unique collection of futuristic drum beats",[113] and the Sony Methods of Mayhem II Industrial Toolkit, were the main Compilations CDs used. These collections of loops and samples would all be utilized by Yamamoto and Kyuma for their unusual and processed[114] percussion samples, and to provide rhythmic interest in the *Metroid Prime* score. Unusual and processed sounds have always been desirable in science fiction scores, and the industrial nature[115] of many of these collections helped to add a unique timbre to the music of *Metroid Prime.* The use of these collections in my opinion shows the influence of Autechre, whose (at times highly processed) music has roots in industrial electronic music, among others.

As with *Super Metroid*, *Metroid Prime* contained re-arrangements of musical themes from previous Metroid titles, with some material going as far back as the original *Metroid*. The "Metroid Prime Theme", which is the title / menu track for *Metroid Prime*, would utilize the same main melodic theme (The "Metroid title theme") as *Metroid* and *Super Metroid*, however presented in different ways, and developed further melodically. This them is first presented in bars 1 – 4, of the "Metroid Prime Title Theme" (see fig. 37 and appendix 3) and with regards to pitch, is presented in its original form, however transposed to C minor. The title theme is presented as a background element, barely noticeable, and played by a synth pad. In the foreground a chaotic electronic sound (the "Invaders" patch from a Korg MS2000 synthesizer) oscillates to many different pitches,

111 Petrosky, M. (2022)
112 https://zero-g.co.uk/products/chemical-beats
113 https://www.beatstars.com/finspire/sound-kits/93220
https://discuss.cakewalk.com/index.php?/topic/38411-uncivilized-groove-re-release/
114 "Processed" in this context refers to signal processing – the application of effects such as distortion, reverb, granularization, equalization and suchlike to sound.
115 https://en.wikipedia.org/wiki/Industrial_music Industrial genre of electronic music, defined as the "most abrasive and aggressive fusion of rock and electronic music"

seemingly at random. The Metroid title theme is offset by one quaver, so that when the percussion enters on the beat in bar 4, we briefly experience a metrical reinterpretation, where the downbeat of the music is not where we expected it to be.

The Metroid title theme is then exposed in bar 6 (see fig. 38), once again in its original melodic form and in C minor, however the "Past Mind" patch from the Korg MS2000 allows the melody to

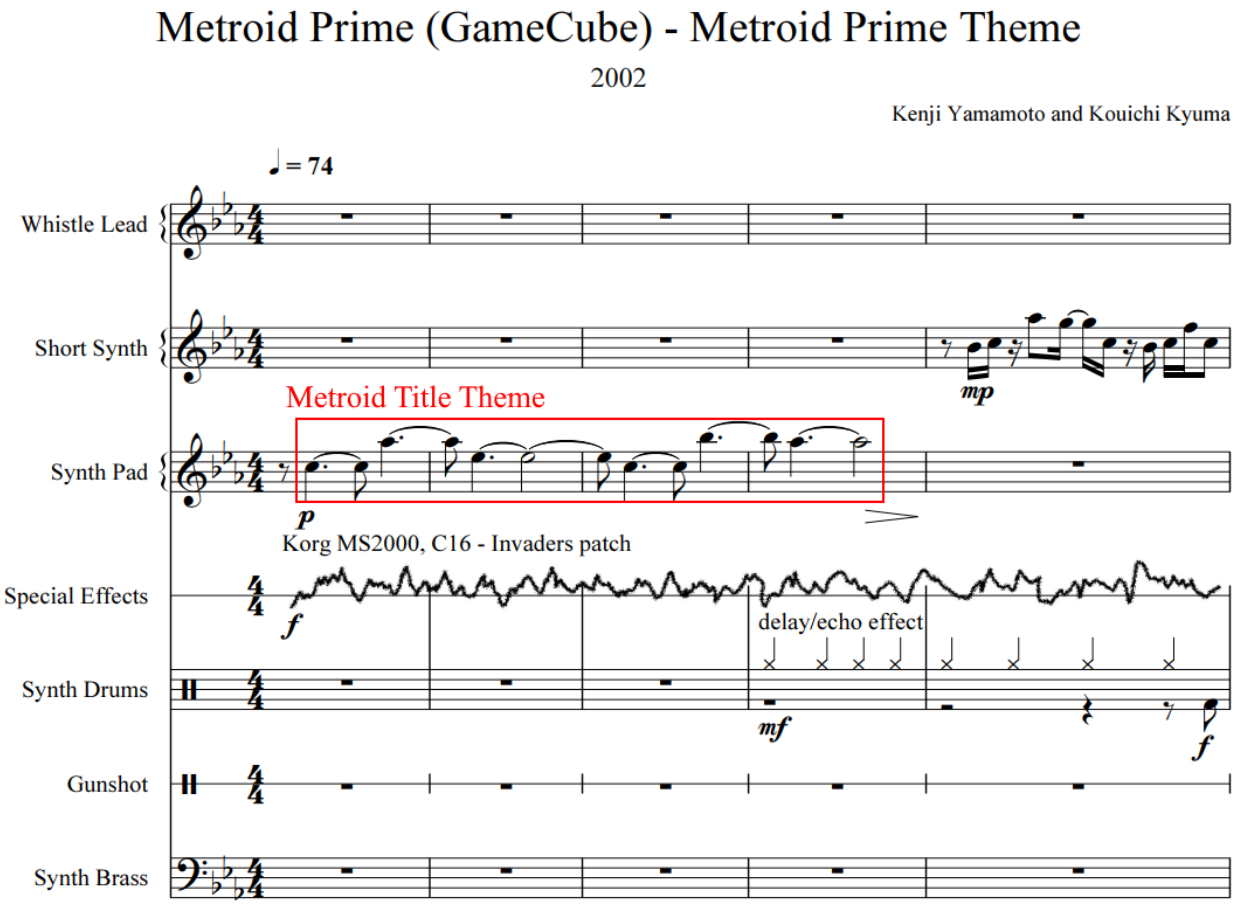


Figure 37. *Metroid Prime* Title Theme

glissando smoothly from note to note. This glissando effect was not yet possible in NES music at the time of the *Metroid* score in 1986, but by the time of titles such as *Silver Surfer* in 1990, advanced composers were able to program convincing glissandi for the NES audio hardware. On the SNES glissandi were easier to create, and were commonly used. The smooth sound of the "Past Mind" patch has a timbre similar to a whistle, and this is accentuated by the long held-notes chosen for the presentation of the Metroid title theme in this piece of music. These held notes are in stark contrast to the quick staccato notes of the original *Metroid*, and the evenly paced two-note rhythmic

motif of the *Super Metroid* Title Sequence (see fig. 39). I believe the held notes and glissando are a reflection of the clean visual aesthetic and science fiction setting of the game, and this is supported by Yamamoto in his interview with Jason Napolitano in 2008. In this interview, discussing the music of *Metroid Prime,* Yamamoto said: "When creating the theme song for Metroid, I used the inspiration I felt when I saw the title screen of this game", he continues: "I didn't use the sound

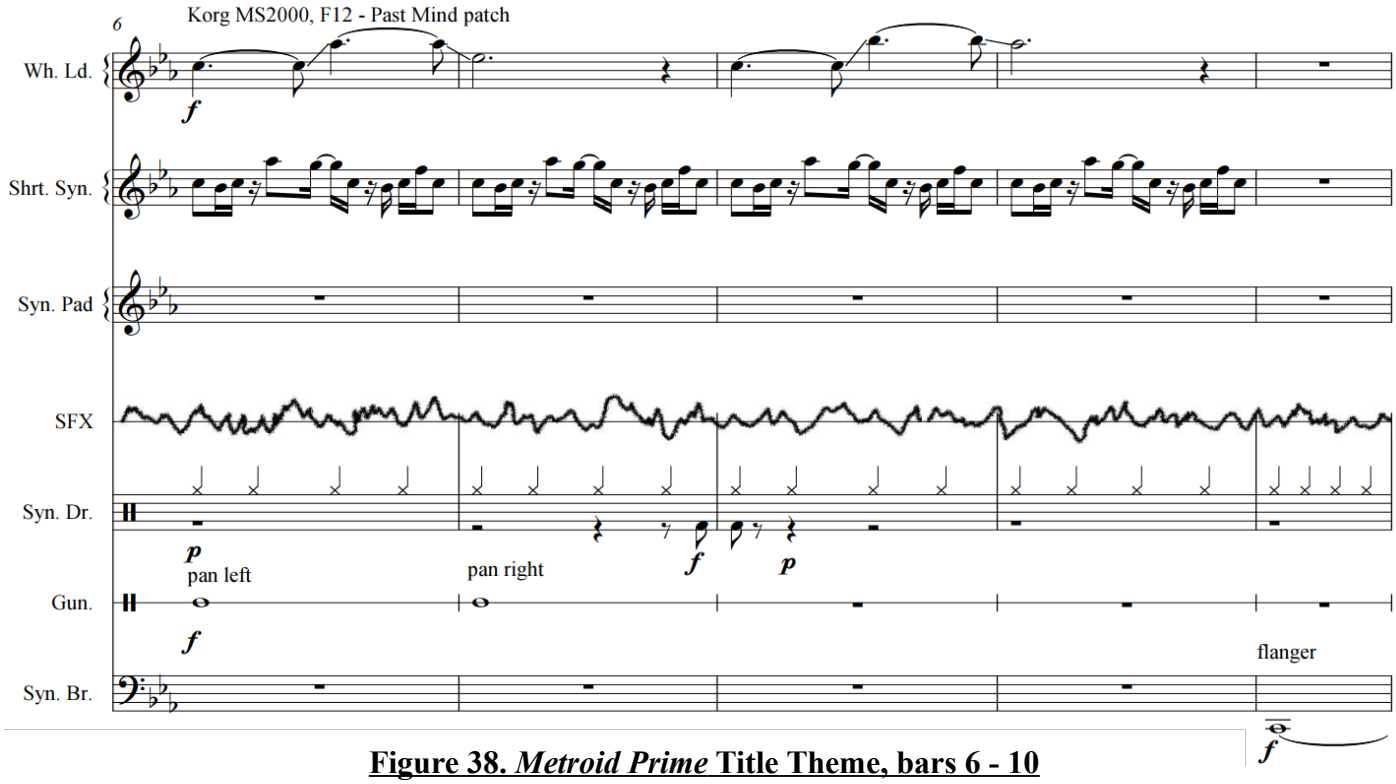


Figure 38. *Metroid Prime* Title Theme, bars 6 - 10

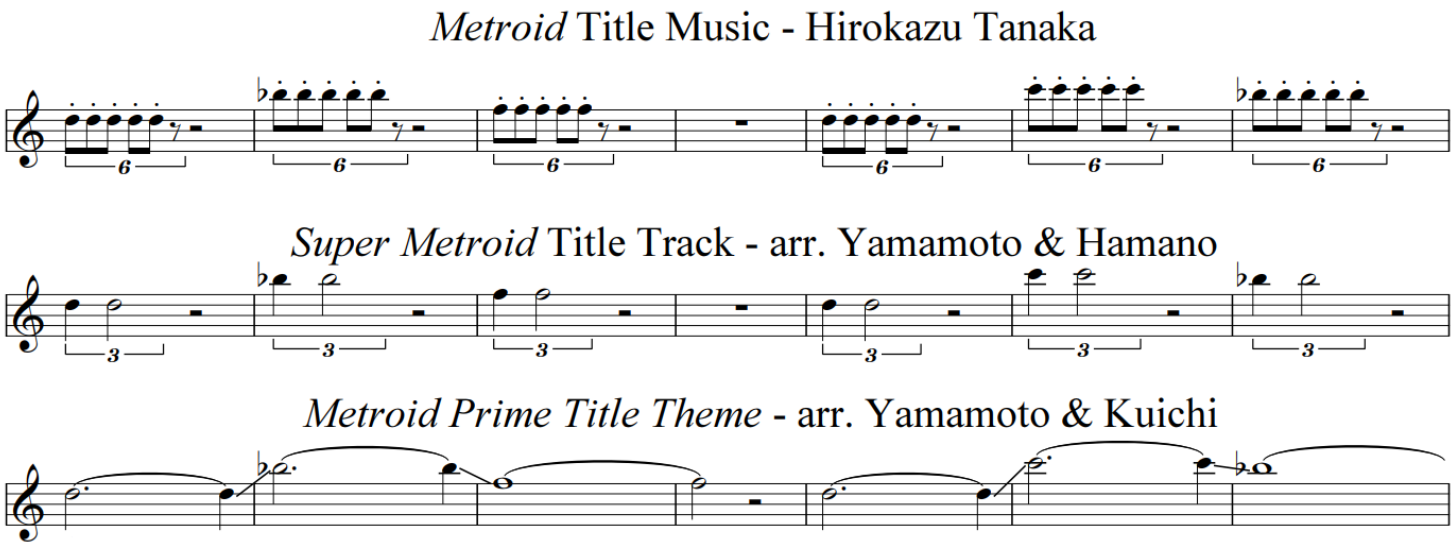


Figure 39. Evolution of Metroid Title Theme

(*Metroid* transposed down 2 octaves, *Metriod Prime* transposed to D minor and with note values doubled)

bank to get inspiration. I didn't have any specific influences for composing Metroid music. I watched the footage first, and used the inspirations I got by playing the guitar and piano to organize

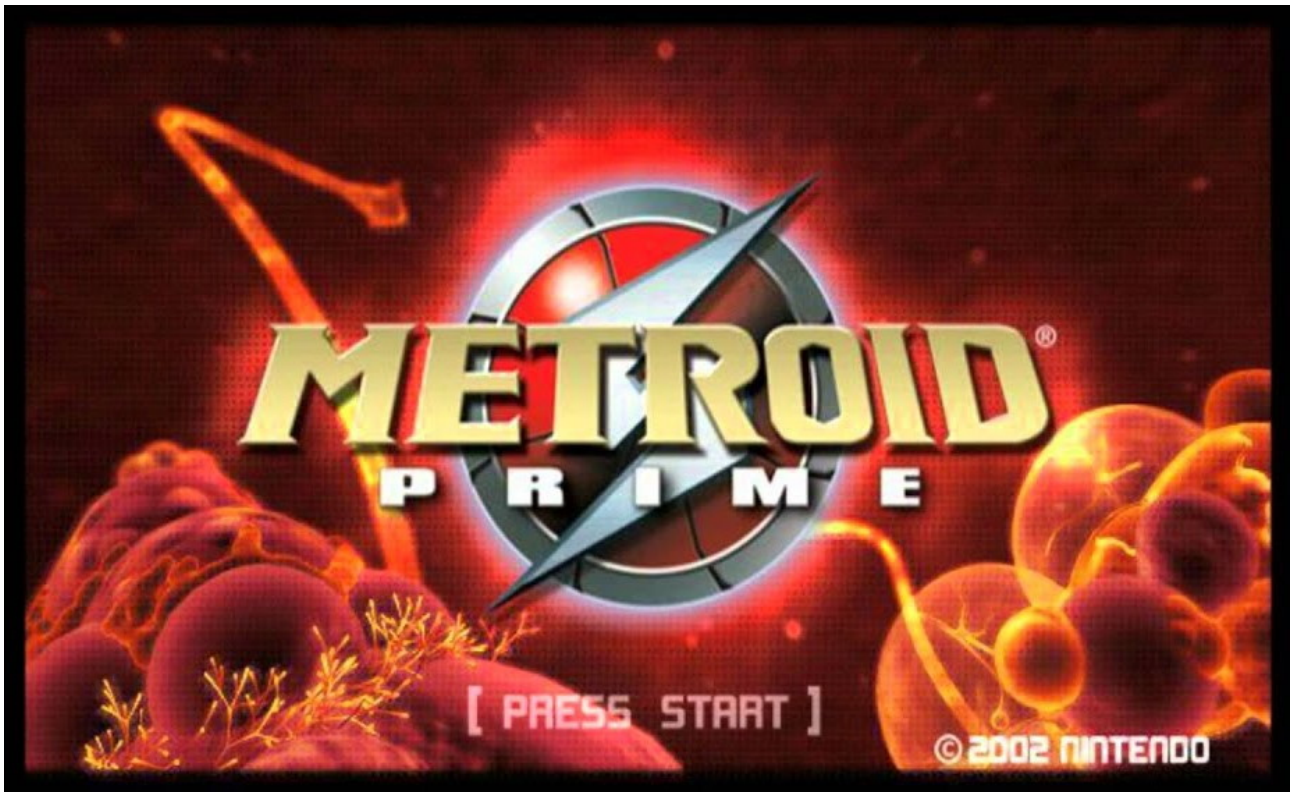


Figure 40. Metroid Prime Title Screen

the music".[116]

Visually, the title sequence which the "Metroid Prime Title Theme" music accompanies has two distinct features, which are reflected in the music. The logo and *Metroid Prime* title text are displayed in the usual clean science fiction aesthetic, but the background of the sequence displays a gritty, at times unfocused view of microscopic organisms (see fig. 40).

The melodic aspects of the "Metroid Prime Title Theme", utilizing smooth synthesizers with timbres close to a pure sine wave, are a good match for the clean visual presentation of the logo and title text. The chaotic aspect of the "Invaders" patch, on the other hand, matches the visual presentation of the more organic background material, filtered through effects to represent the look of a scanning electron microscopic image.

116 Napolitano, J. (2008)

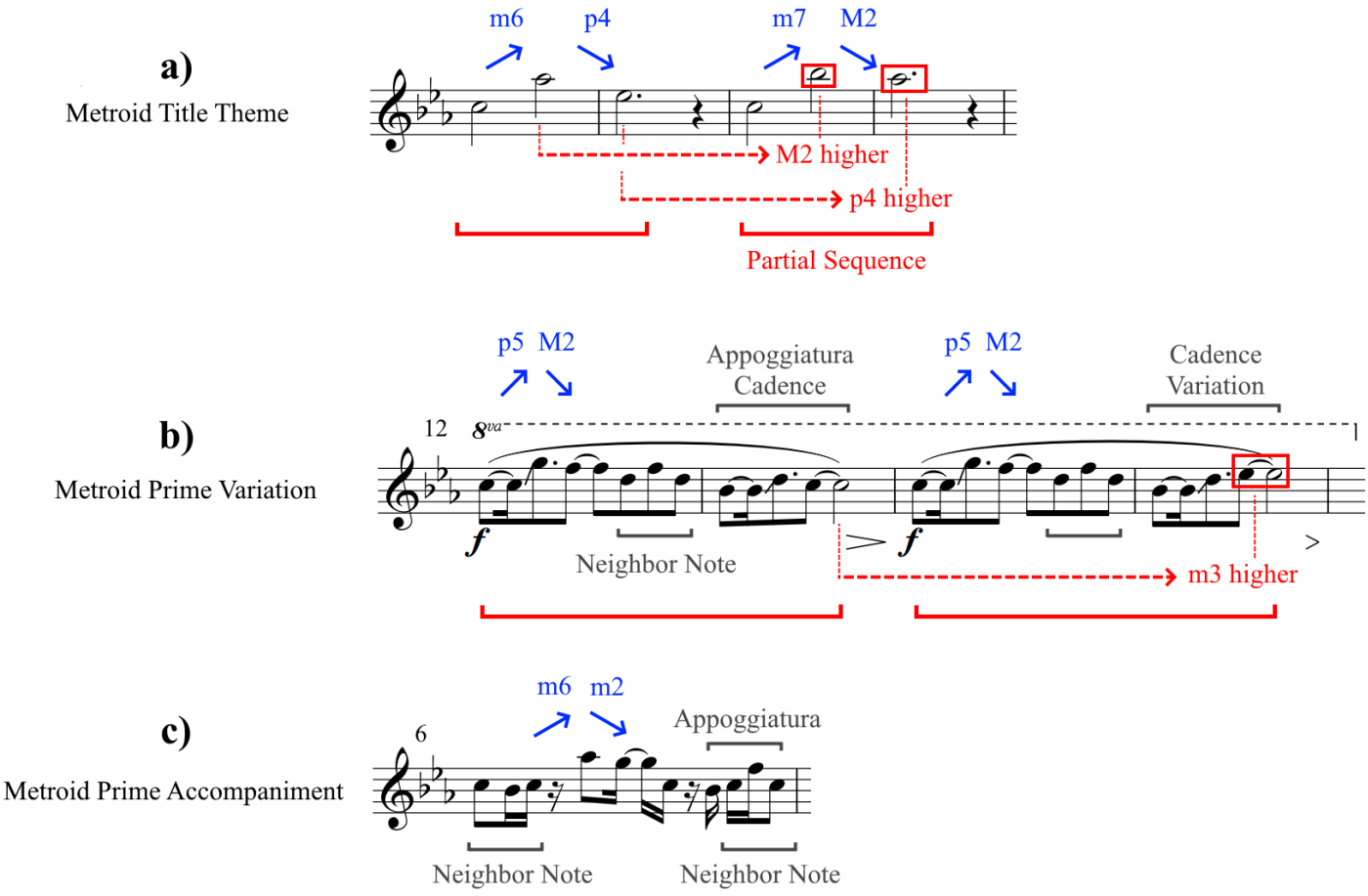


Figure 41. Variations of the Metroid Title Theme in Metroid Prime

The Metroid title theme (fig. 41 **a**) is taken through two major variations in the menu music for *Metroid Prime*. This theme has two phrases, one a partial sequence of the other, and overall three distinct characteristics. The first distinct characteristic is a rising-falling directional motif, comprising of the rising leap of a minor sixth followed by the fall of a perfect fourth. The second characteristic is the partial sequence of the motif, with an expanded first interval (to a minor seventh), and a contracted second interval (to a major second). The third distinct characteristic is a raised end tone: the second phrase ending on a higher note than the first. In this case, higher by a perfect fourth.

In bars 12 – 15 of the "Metroid Prime Title Theme", the Metroid theme is presented in the foreground, in a clear synthesized whistle. This Metroid Prime variation is contracted intervallically from the original, and a neighbor note motif is inserted after the initial leap up and fall, followed by an appoggiatura cadence back to the C. (fig. 41 **b**). The second phrase, which is usually a partial

sequence in the Metroid title theme, is unaltered in this case, except for the raised final note, this time raised by a minor third. The appoggiatura cadence in the second phrase is modified to fit with this distinctive characteristic. This variation is designed to give the listener clear analogues to the original Metroid theme, while still exploring a new melodic direction. Using the rough melodic shape and characteristic raised end tone of the original Metroid title theme but breaking it up with new material was a clever move by Yamamoto and Kyuma, creating a subtle variation that is still connected to the original material.

The second major variation of the Metroid title theme is presented in the accompaniment throughout the piece, starting on bar 5 (fig. 41 **c**). It is played by a short synth sound, at a lower dynamic to the foreground elements of the piece. The accompaniment makes use of the rising minor sixth interval, and rising-falling directional motif (although falling by a minor second instead of perfect sixth or major second). The accompaniment makes use of the neighbor notes utilized in the *Metroid Prime* variation in the last three notes of the phrase, although with expanded intervals (a perfect fourth instead of a minor third). The first three notes also make use of a neighbor note, although a lower neighbor note, and only a major second interval. The last four notes of the accompaniment phrase also act as a kind of appoggiatura, mirroring those in the *Metroid Prime* variation. The raised end tone of the original Metroid title theme is absent in this accompaniment, as is the more unstable interval of the minor seventh from the original title theme. These two elements are likely omitted due to the accompanying figure needing to fit well with a variety of pitch and harmonic material. The shorter note values of the accompaniment, when layered with the longer notes of the other melodic material in the piece, create increased complexity and interest.

The music for acquiring an important item in *Metroid Prime* was a re-arrangement of the *Metroid* and *Super Metroid* "Item Acquisition Fanfare" music, as this was a distinctive piece of music from the series. In the "*Metroid Prime* Item Acquisition Fanfare" (fig. 42), the harmony was once again altered from the previous versions, although not significantly. The instruments chosen are synthesized choirs, strings and a solo violin.

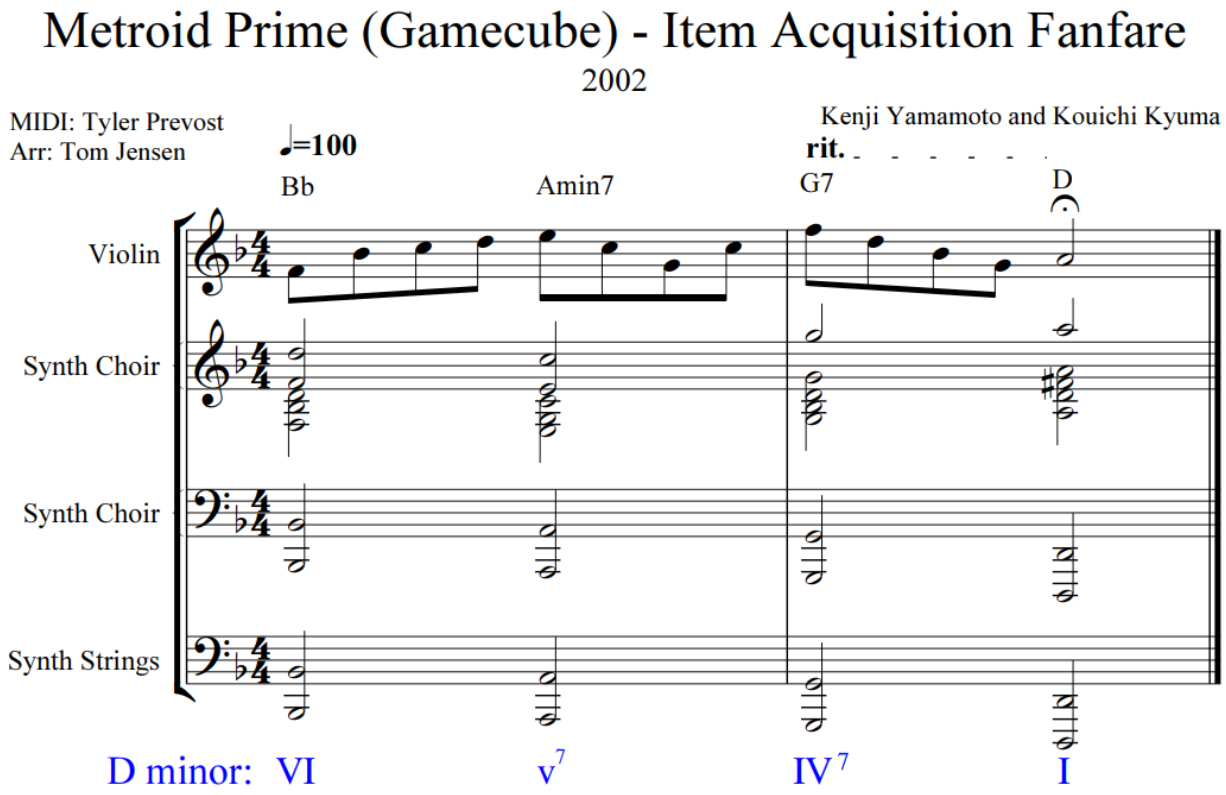


Figure 42. *Metroid Prime* Item Acquisition Fanfare

Metroid	D Minor:	VI	v7	bII	I (picardy)
Super Metroid	D Minor:	VI	V7	iv7	i
Metroid Prime	D Minor:	VI	v7	IV7	I (picardy)

Figure 43. Harmonic Evolution of Metroid Item Acquisition Fanfares

If we look at the evolution of harmony from the original *Metroid* through *Super Metroid* to *Metroid Prime*, we can see the change in overall tone throughout the series (fig. 43). The original *Metroid* has a quirky bII leading to a picardy cadence, while *Super Metroid* has a more conventional iv7 leading to a minor i chord, perhaps emphasizing the darker tone of the game. *Metroid Prime* on the other hand returns to elements of the original fanfare, namely the minor v7 second chord, and most notably, the picardy cadence. This may reflect the brighter, more stylized tone of *Metroid Prime* compared to the previous games.

The "Game Start" music from the original *Metroid* and *Super Metroid* is also re-arranged for *Metroid Prime*, and partially re-harmonized as "Samus Aran's Appearance Fanfare" (fig. 44). The re-harmonization is once again not extensive, in order to maintain the familiarity of the original.

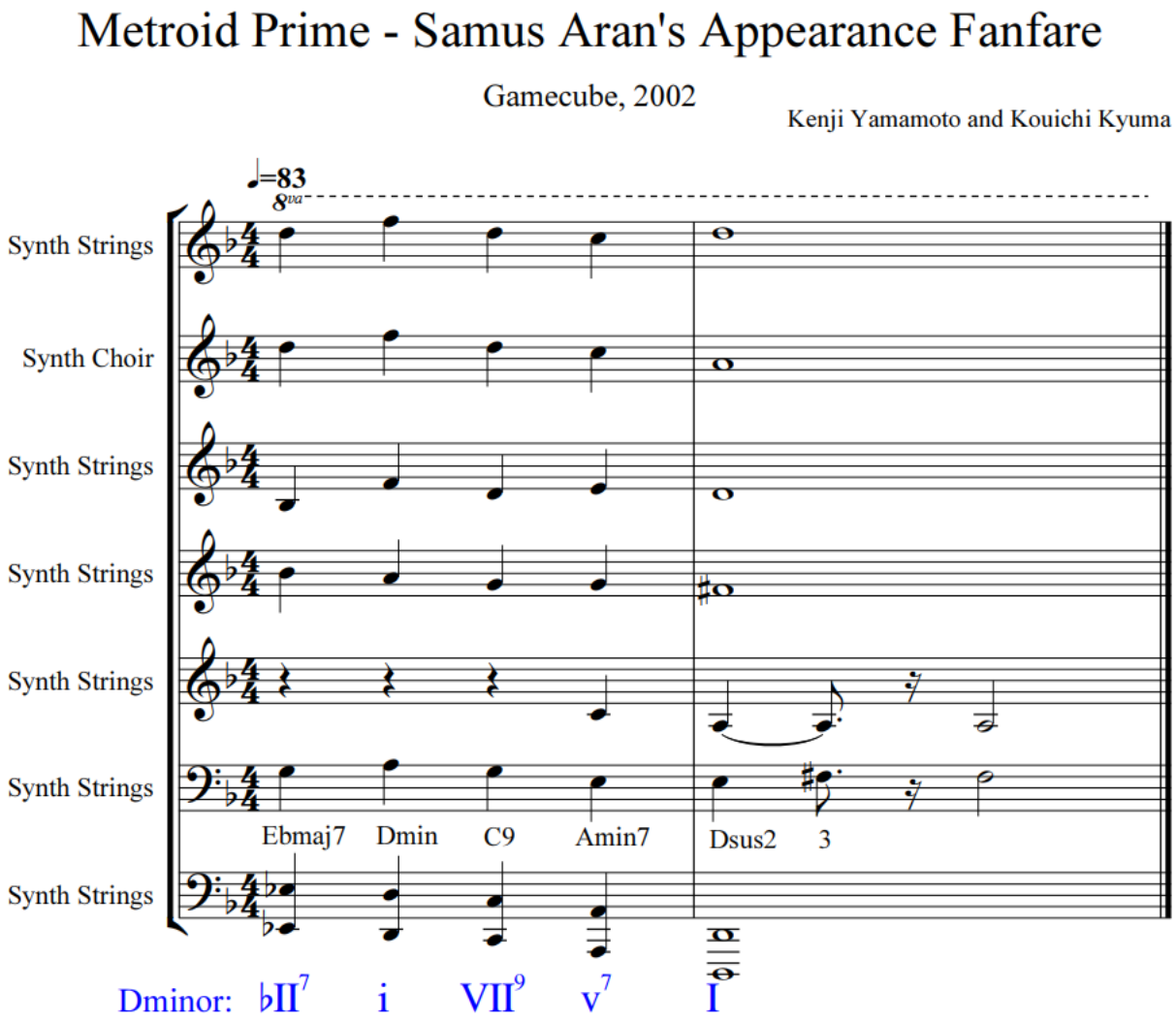


Figure 44. Samus Aran's Appearance Fanfare, *Metroid Prime*

If we compare the harmonies of all three "Game Start" / "Samus Aran's Appearance" tracks, we can chart the evolution of tone over the course of the Metroid series (fig. 45).

Metroid	D minor:	bII7	i	VI	v7	I (picardy) sus2-3
Super Metroid	D minor:	bii#11	i7	iv9	v7	i (no third)
Metroid Prime	D minor:	bII7	i	VII9	v7	I (picardy) sus2-3

Figure 45. Harmonic Evolution of Metroid Samus Appearance Fanfares

The original Metroid "Game Start" sets the tone with its altered chords, sevenths and picardy cadence. It also provides the distinctive bass and soprano parts which are unaltered throughout the series. In *Super Metroid*, the harmony is altered significantly, through a process of adding fifths and fourths respectively to the original bass and soprano parts, and possibly through a desire by

Yamamoto and Hamano to have the piece fit into a pentatonic scale. The ending is also much more ambiguous, with the third being omitted. This may reflect the desire to do away with brighter picardy endings in the 16-bit period, as game designers and composers tried to make games more serious. *Metroid Prime* however, returns to the brighter tone of the original "Game Start" music, and sticks to much more conventional, if still jazz-inspired chords like the VII9 in the third beat of bar 1. The picardy cadence is re-established, and a lush 8-voice harmony in synthesized strings and choir helps to emphasize the heroic nature of the fanfare.

It is interesting to see Yamamoto handle this material differently in the *Super Metroid* and *Metroid Prime* scores. This may reflect the changing attitudes to game design, from the focus on music and 2D art to set the scene and provide immersion in the 16-bit era, to the focus on 3D environments and sound effects to provide immersion and mood in the post-2000s era.

In summary, many video games made in the mid 1990s and later started to emphasize much more realistic 3D environments. The popularity of the first-person shooter genre allowed players to experience a game as if they were viewing it from the eyes of the main character. With this change in viewpoint, many games started to favor much more realistic sound effects over music in order to fully immerse players in the game world. Music was still important for communicating tone and specific game events, but it was no longer one of the vital tools for immersion. Technologically, anything was possible in the post-1990s high-quality audio era, and lossless recordings of orchestras, live players and popular music acts started to become more widespread in video game music. The wide variety of genres and styles of games meant that composers for video games had to think carefully about the setting, visual aesthetics and story of a game in order to begin making choices about instrumentation and tone.

6. Conclusions

The evolution of music in video games from 1980 to the early 2000s encapsulates a period of drastic change technologically. Hardware limitations combined with family-friendly marketing decisions in the early 1980s drove musical trends in a stylistic direction that had a lasting effect on game music. While game audio technology quickly progressed in the late 1980s and early 1990s, and higher fidelity audio became more widely available, composition for video games did not show such meteoric advancement, and instead integrated more genres as time progressed. Variety in genres within video game music increased until by the late 1990s, game music covered so many different genres that some claimed it no longer existed.[117] While music in video games currently covers almost every known genre, the styles of the 8-bit era still permeate our collective consciousness on what constitutes game music, which still houses a variety of distinct musical styles specific to video games.

As a gamer since the early 1990s, and a composer since the early 2000s, it has been fascinating to follow the development of music in video games. I think the main unifying factor of stylistic directions in video game music over the past forty years has been the visual aesthetics of games themselves, which is strongly tied to the intended audience of games. As composers worked very hard to match the look of a game, the visual storytelling hugely influenced the stylistic choices in the music. I think if games in the 8-bit era had been designed primarily for adults, dark in tone, and abstract in visual style, the music would have been drastically different, even with the technical limitations imposed on composers. Instead of the bright, major tonality tunes that became common in game music historically, we may have been presented with more sophisticated styles of melody including atonality, experimental sound effects and suchlike, which could have completely changed the course of music in video games.

The evolution of tone and visual aesthetic choices in video games, as well as a move towards a more mature audience has, in my opinion, informed the evolution of video game music itself. When

117 Munday, R. (2007). p. 51.

darker, more filmic scenes started to be presented in the early 1990s, game music responded, as it did when more realistic 3D environments became more common in the early 2000s. While this dissertation has focused on the evolution of just the Metroid series, I think this evolution in musical aesthetics is well represented by the games chosen. Although *Metroid Prime* provides a limited view of post 2000s soundracks (being largely synthesizer-based), it still illustrates the way modern composers strive for clean production values, and their dedicated to matching the visual aesthetics and tone of a game. This commitment also extends to respecting the musical history of a series, such as largely eschewing live orchestra in leiu of synthesizers on *Metroid Prime 3: Corruption*.

Immersion is another factor that has strongly impacted game music over the past forty years. In the 8 and 16-bit eras, music was critical to player immersion, and was generally "wall-to-wall" and its volume level on par with the sound effects. By the mid – late 1990s, this would all change.

The highly detailed and realistic 3D environments, in combination with realistic sound effects (often recorded using real weapons, vehicles or voice actors),[118] in games post-2000 created a deep immersion for players, and music was no longer required to be one of the prime immersive factors. Rod Munday sums this up as follows: “wall-to-wall music is no longer a prominent feature of many contemporary video games, and consequently it can be argued that sound effects have begun to supplant the environmental function hitherto assigned to music”.[119] In this era, the audio mix of a game generally favored sound effects over music, and many games removed music entirely from gameplay, especially online multiplayer games such as the *Counter Strike*, *Battlefield* and *Call of Duty* games. In these games, an intense focus on action and split-second reflexes tended to prevent players from taking in more information in the form of music.

This project has benefited from the growing pool of research on games from the 8-bit era, but large holes exist in the academic literature on games from the 16-bit era and later. I think games post-1990 warrant more study, especially with regards to how composers dealt with issues of musical

118 Insider (2022). *How the Sounds in “Halo” are Made | Movies Insider | Insider* https://www.youtube.com/watch?v=AjpZEzP-I2Q

119 Munday, R. (2007). p. 53.

direction and audio quality, and the shift to sample libraries and live recordings in the 2000s.

The role of the composer has changed drastically since the 1980s, from primarily being a programmer in the 8-bit era, covering sound effects and audio software creation, to specializing in music in the post-2000s era. While this specialization in latter eras allows composers to spend much more time finessing the music and matching the tone of a game, composers like Yamamoto, who were programmers and approached music “with a sound effect creator's ear”[120] took the music in directions that conventional composers may not have. These composers from the 8-bit and 16-bit eras were, in my opinion, one of the game industry's great assets, forging an enduring legacy which permeates game audio to this day.

120 Napolitano, J. (2008)

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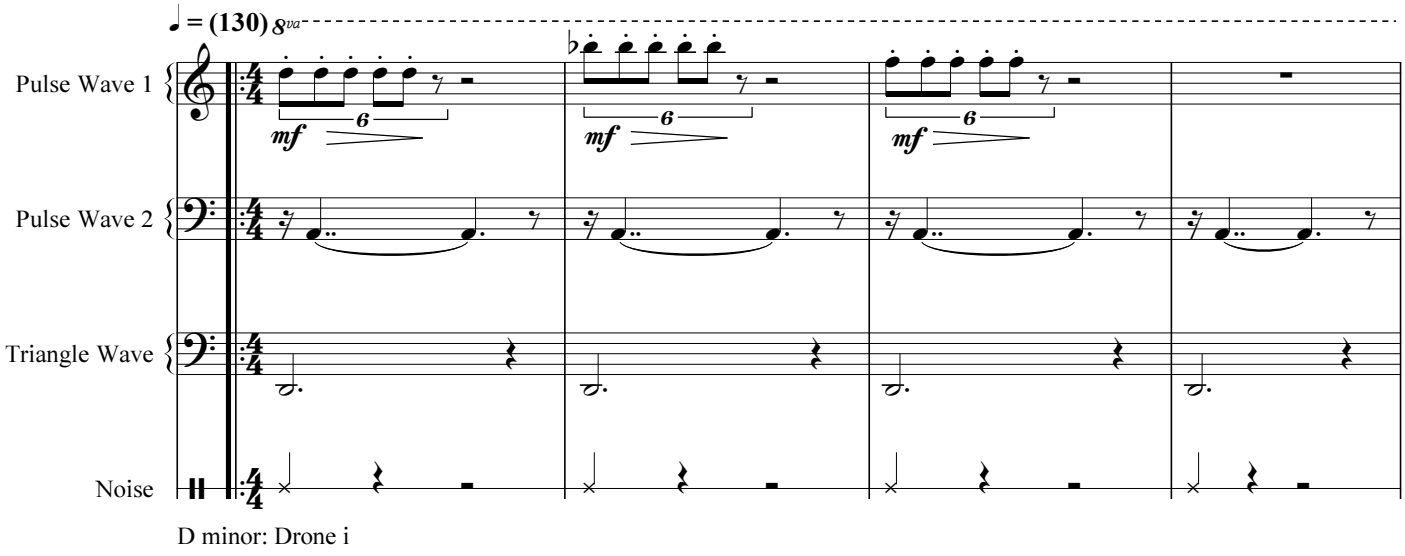
Appendix 1 – Full score of *Metroid* Title Music

Metroid (NES) Title Music

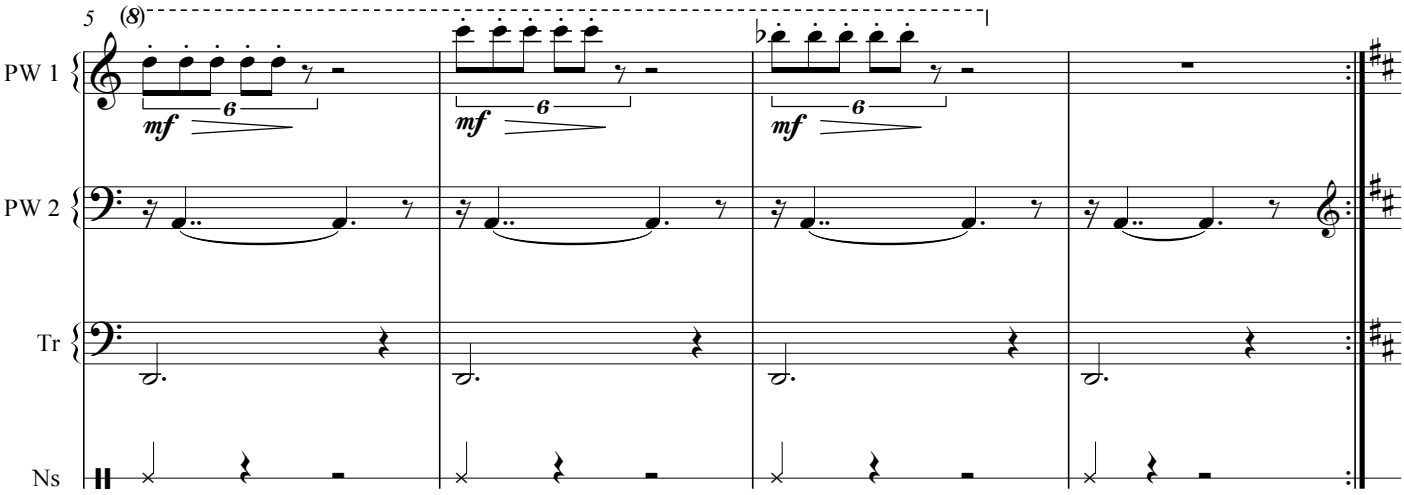
1986

Hirokazu Tanaka

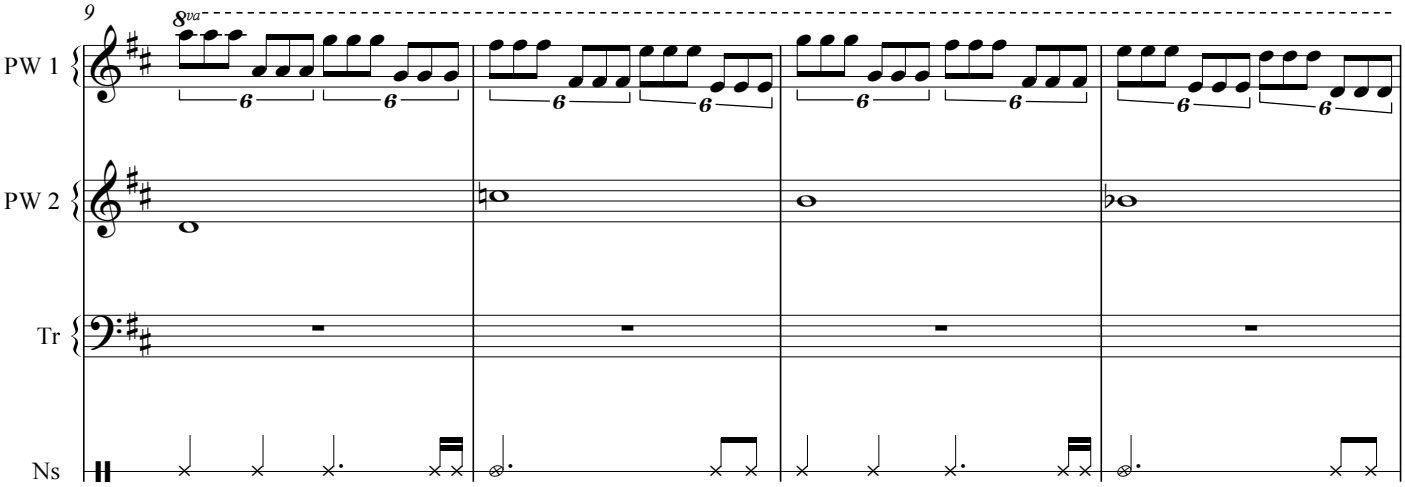
Section: A

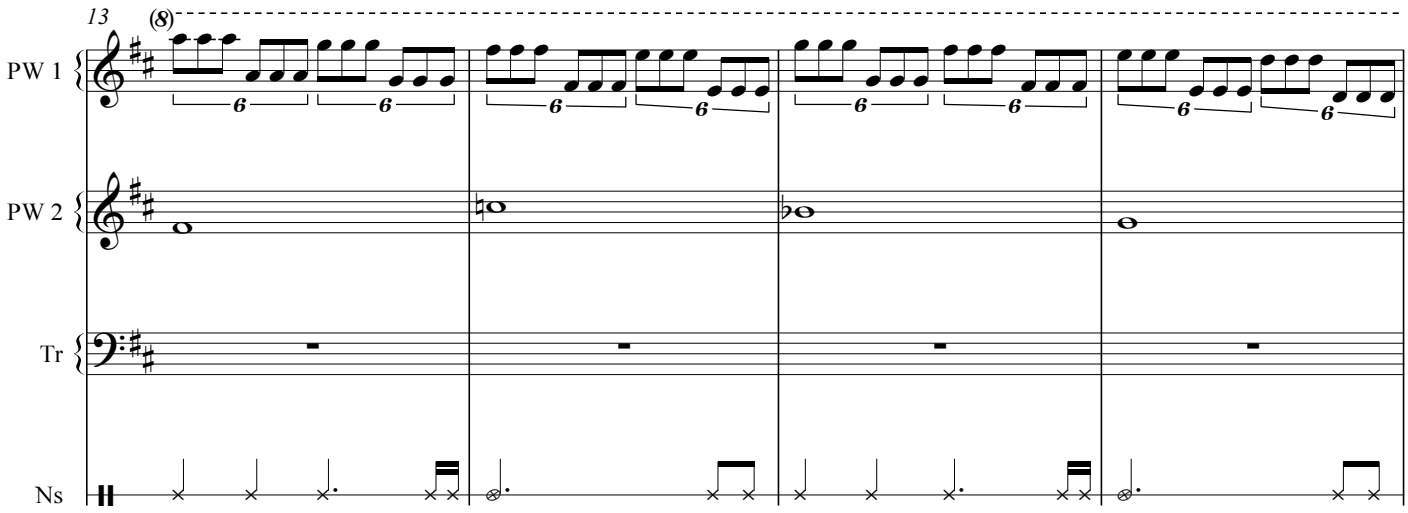


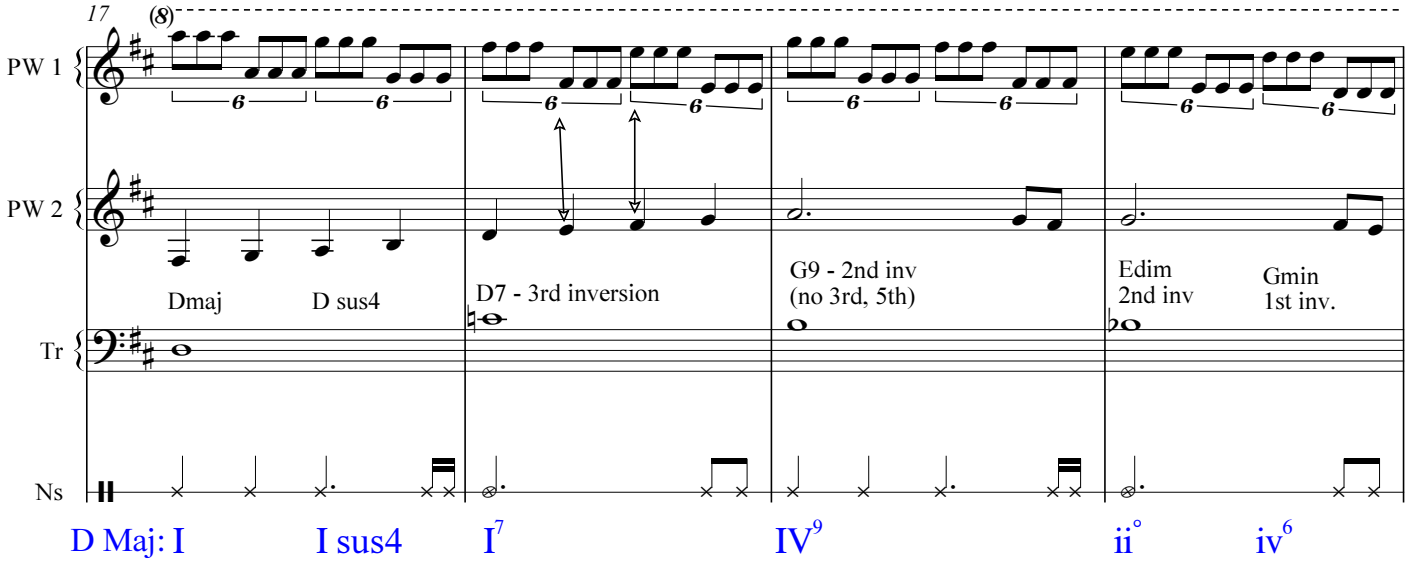
D minor: Drone i



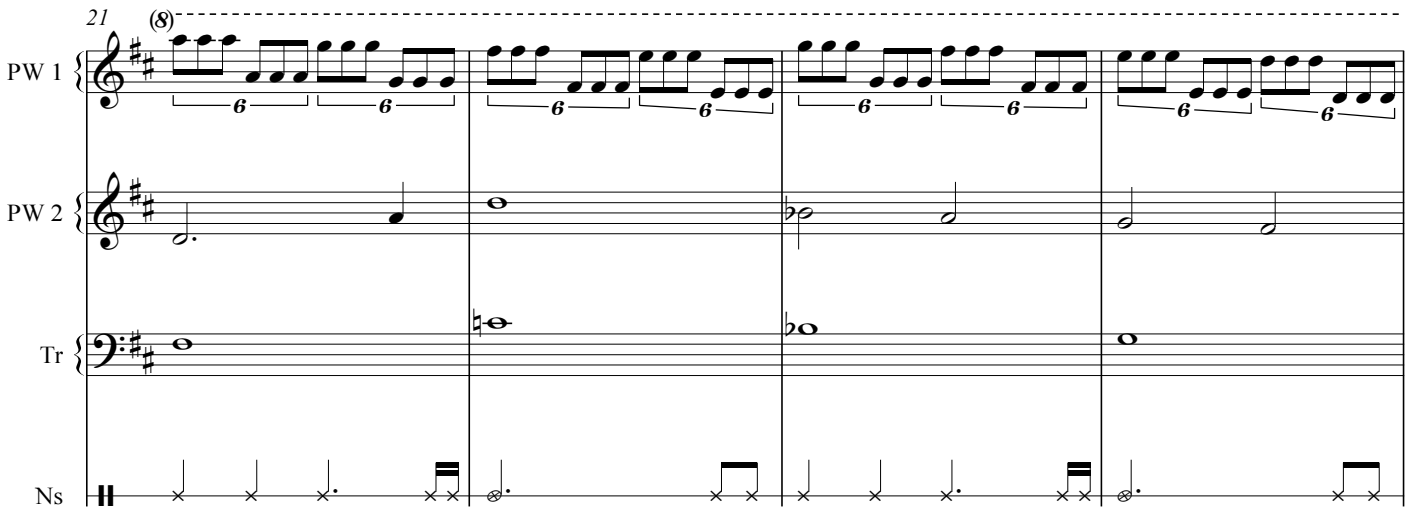
B



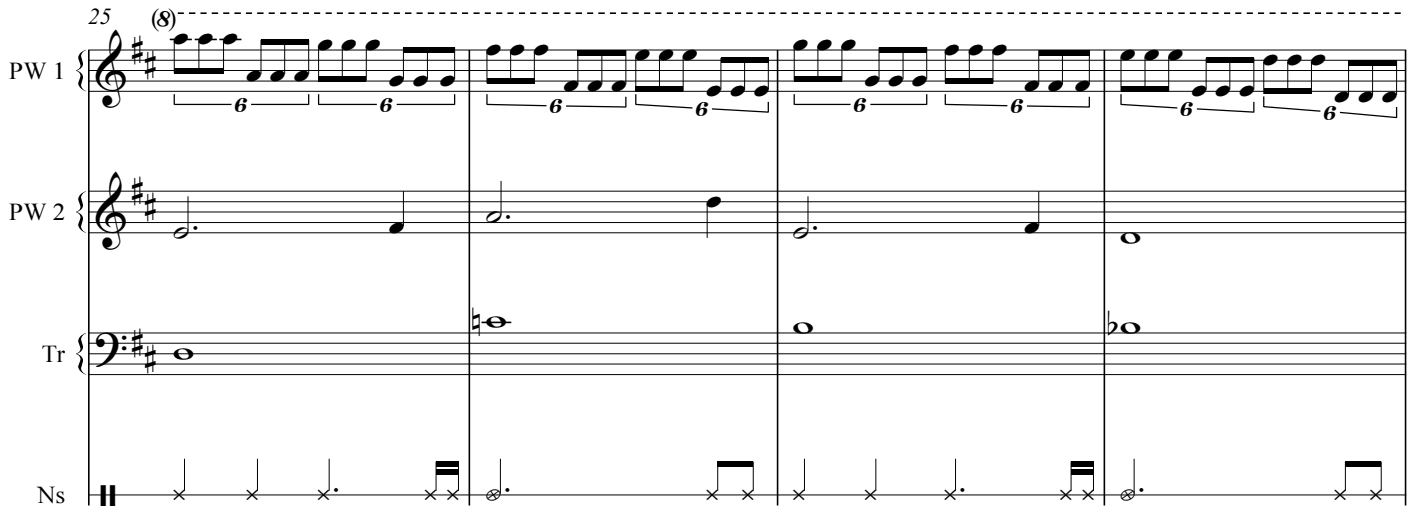


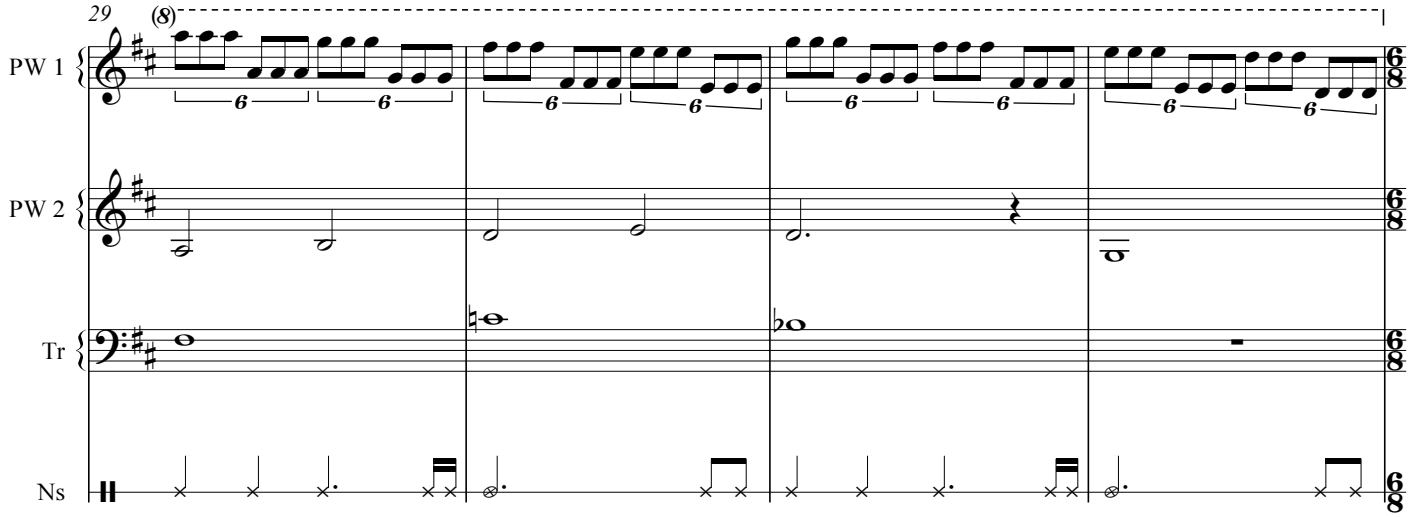


D Maj: I I sus4 I^7 IV^9 ii° iv^6

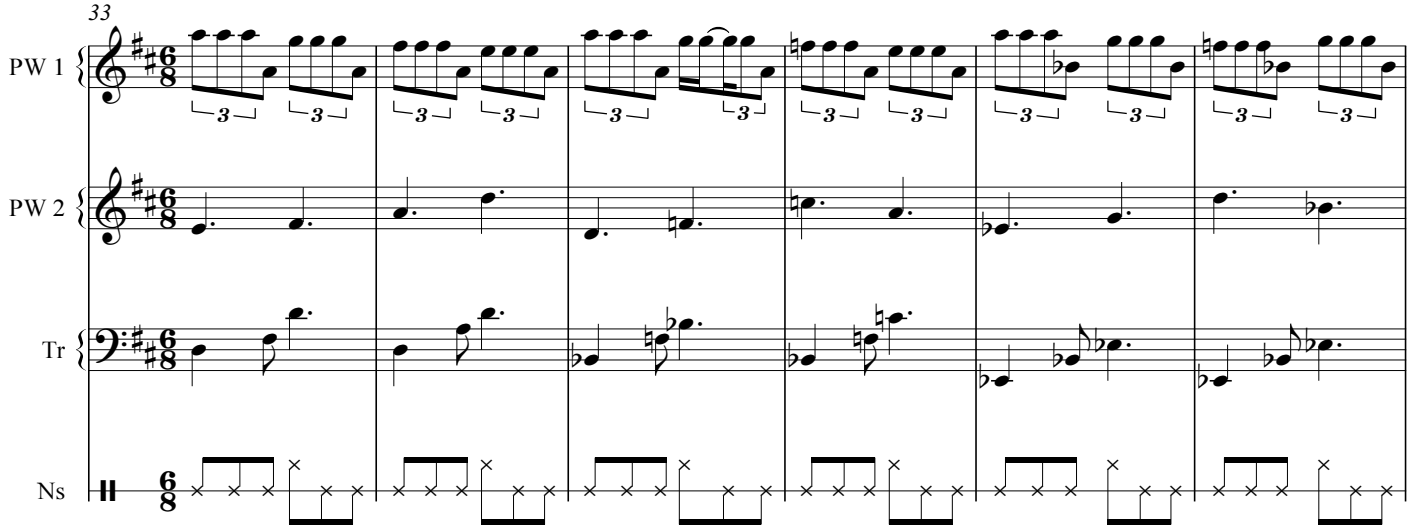


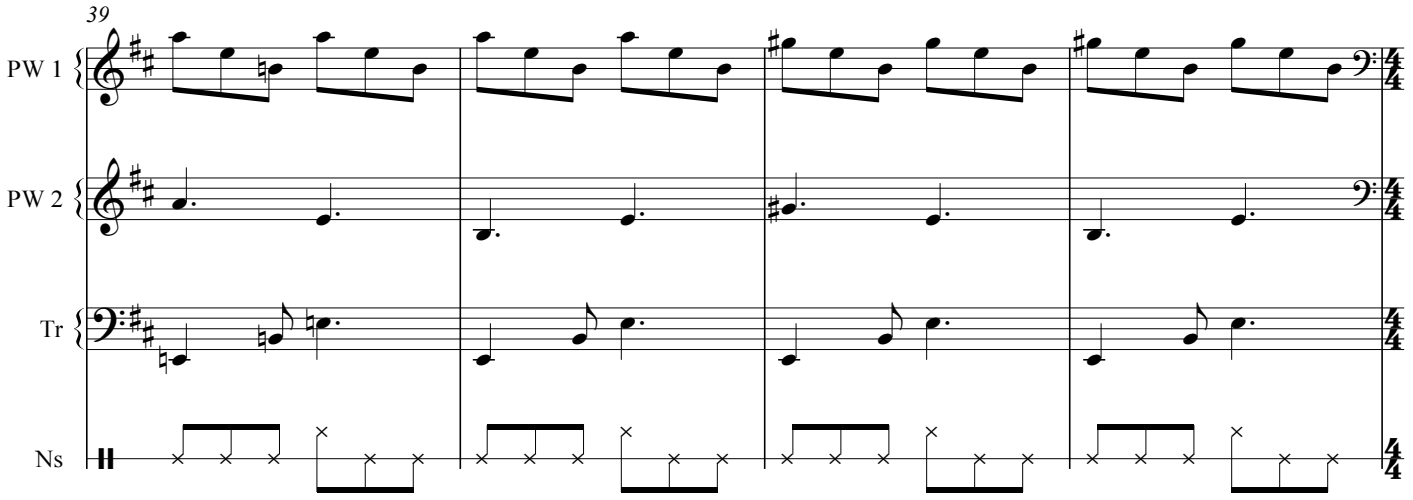
B additional voices, variation





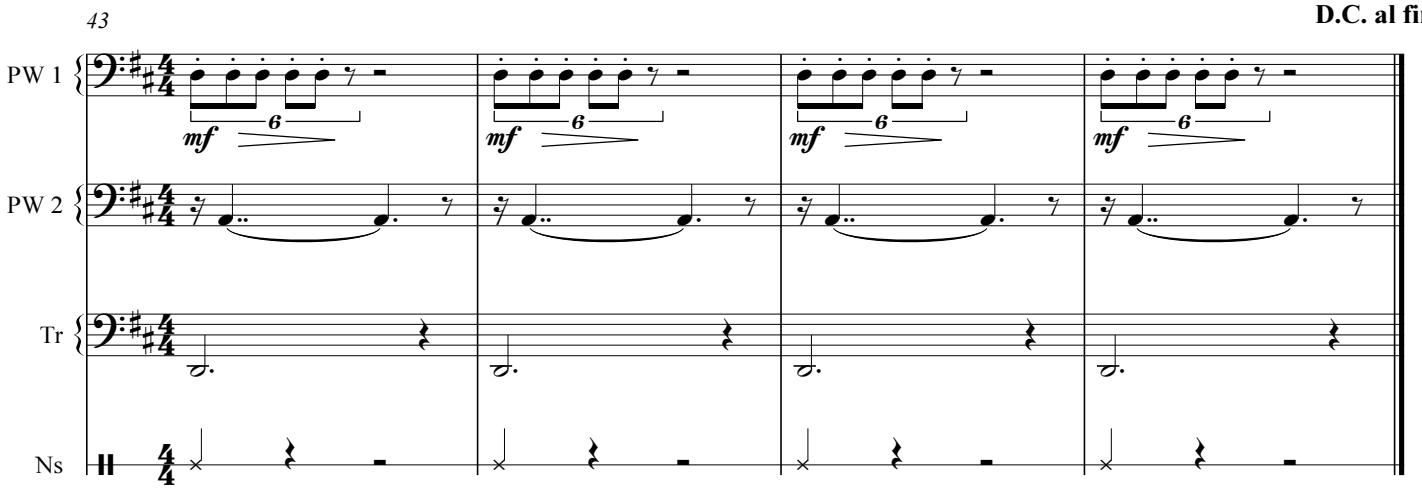
C





A fragment

D.C. al fine

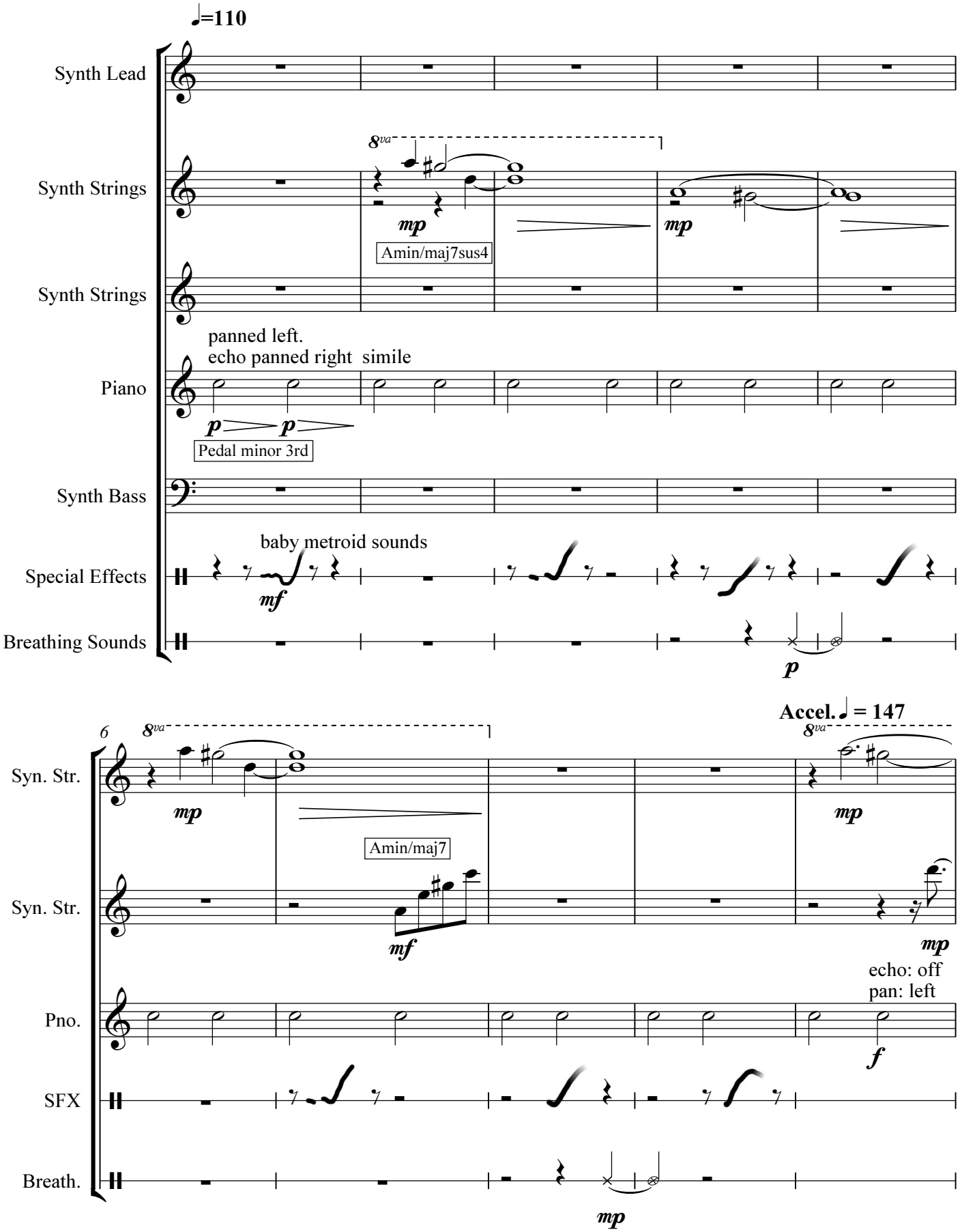


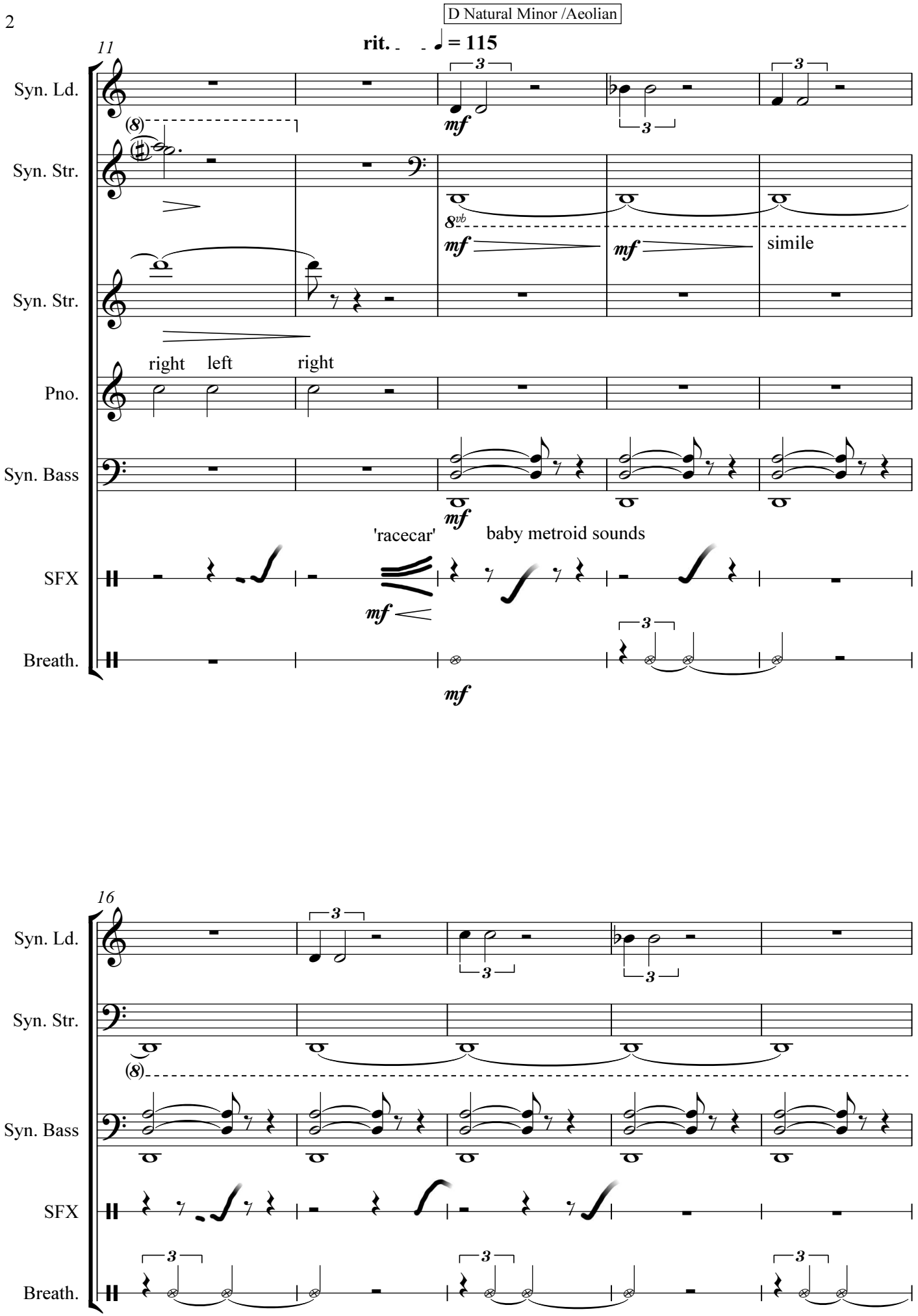
Appendix 2 – Full score of *Super Metroid* Title Sequence

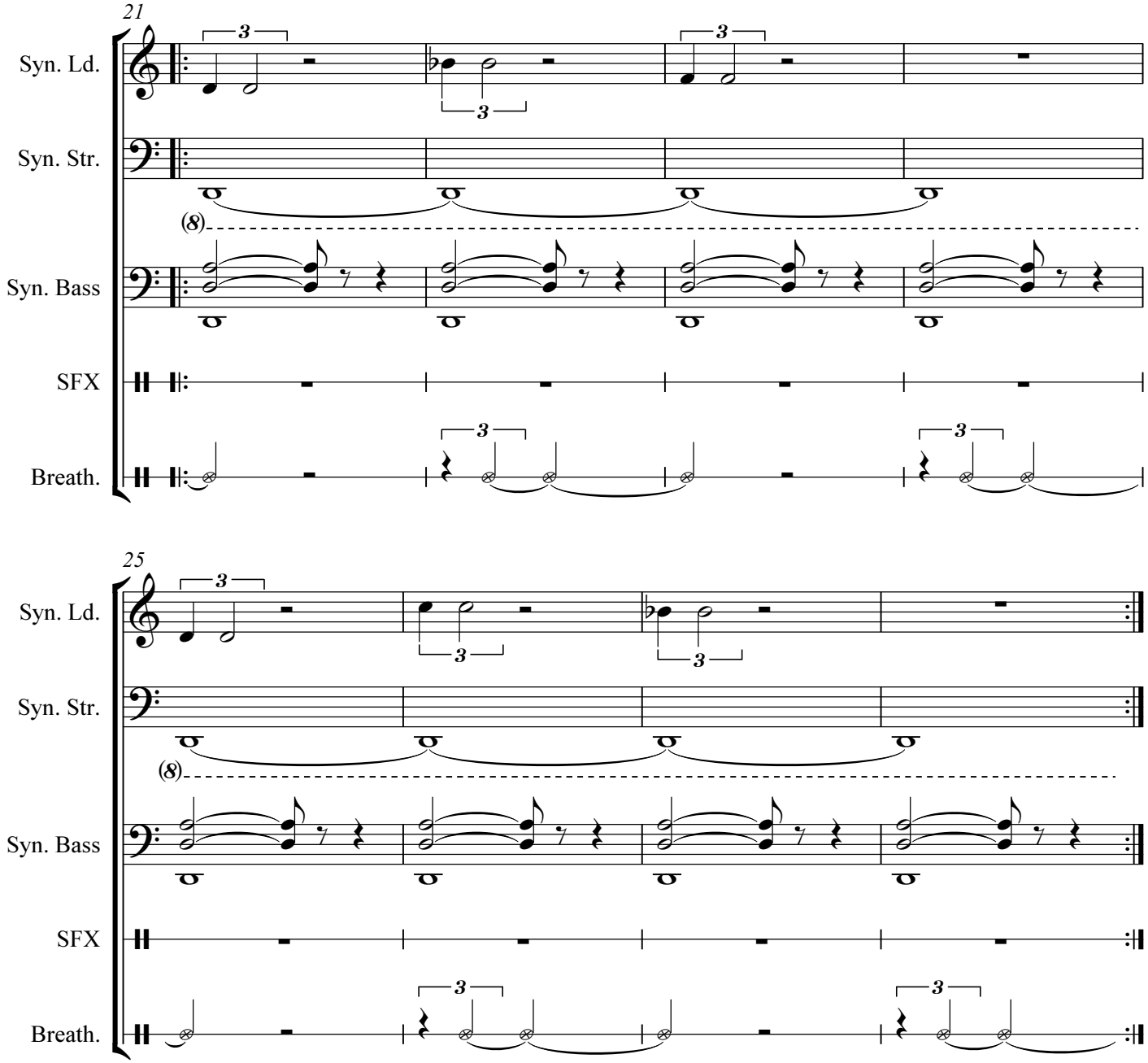
Super Metroid (SNES) Title Sequence

1994

Kenji Yamamoto & Minako Hamano




D Natural Minor /Aeolian
11
rit.
♩ = 115
Syn. Ld.
Syn. Str.
Syn. Str.
Pno.
Syn. Bass
SFX
Breath.
mf
simile
right
left
right
'racecar'
baby metroid sounds
16
Syn. Ld.
Syn. Str.
Syn. Bass
SFX
Breath.

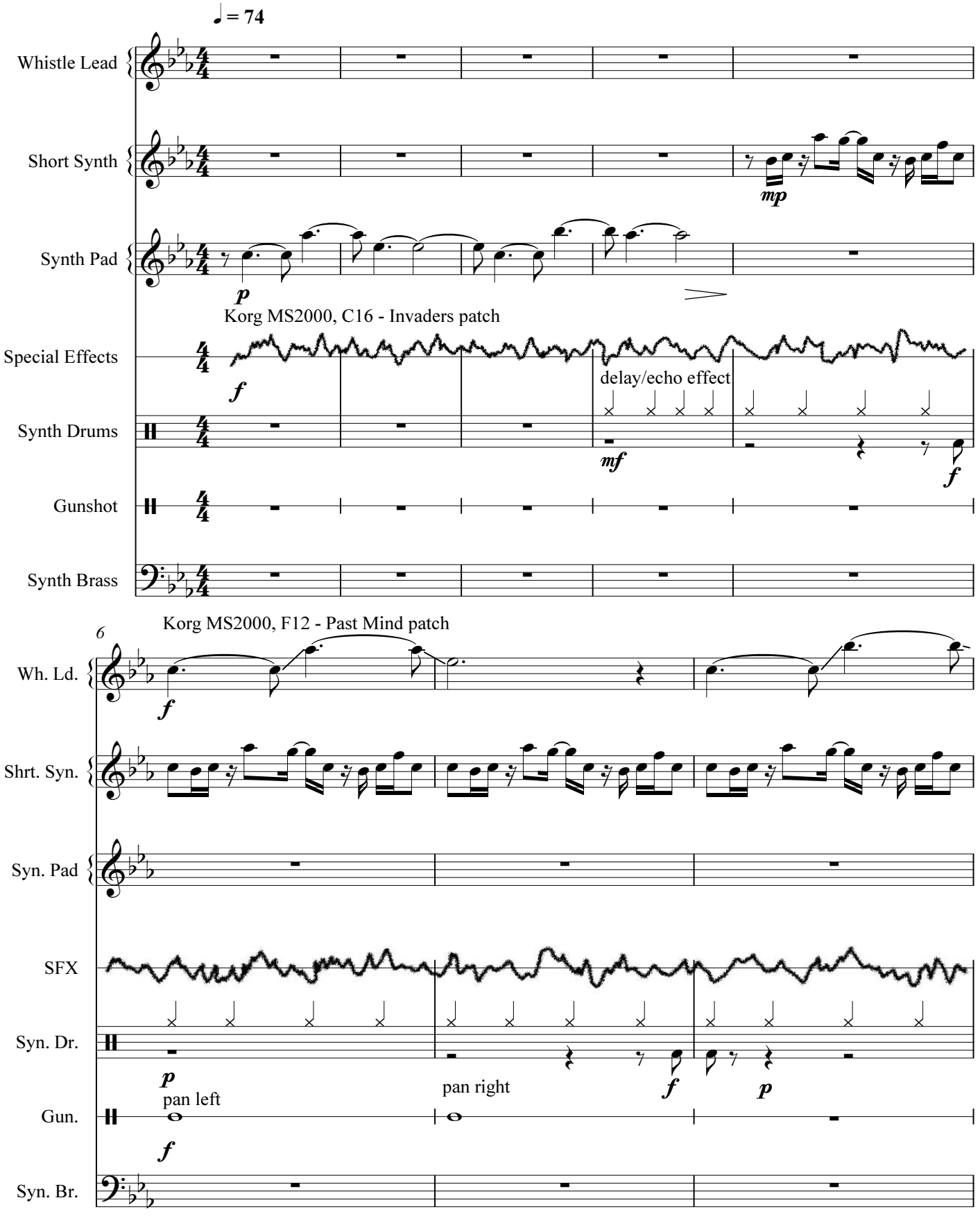

21
Syn. Ld.
Syn. Str.
(8)
Syn. Bass
SFX
Breath.
25
Syn. Ld.
Syn. Str.
(8)
Syn. Bass
SFX
Breath.

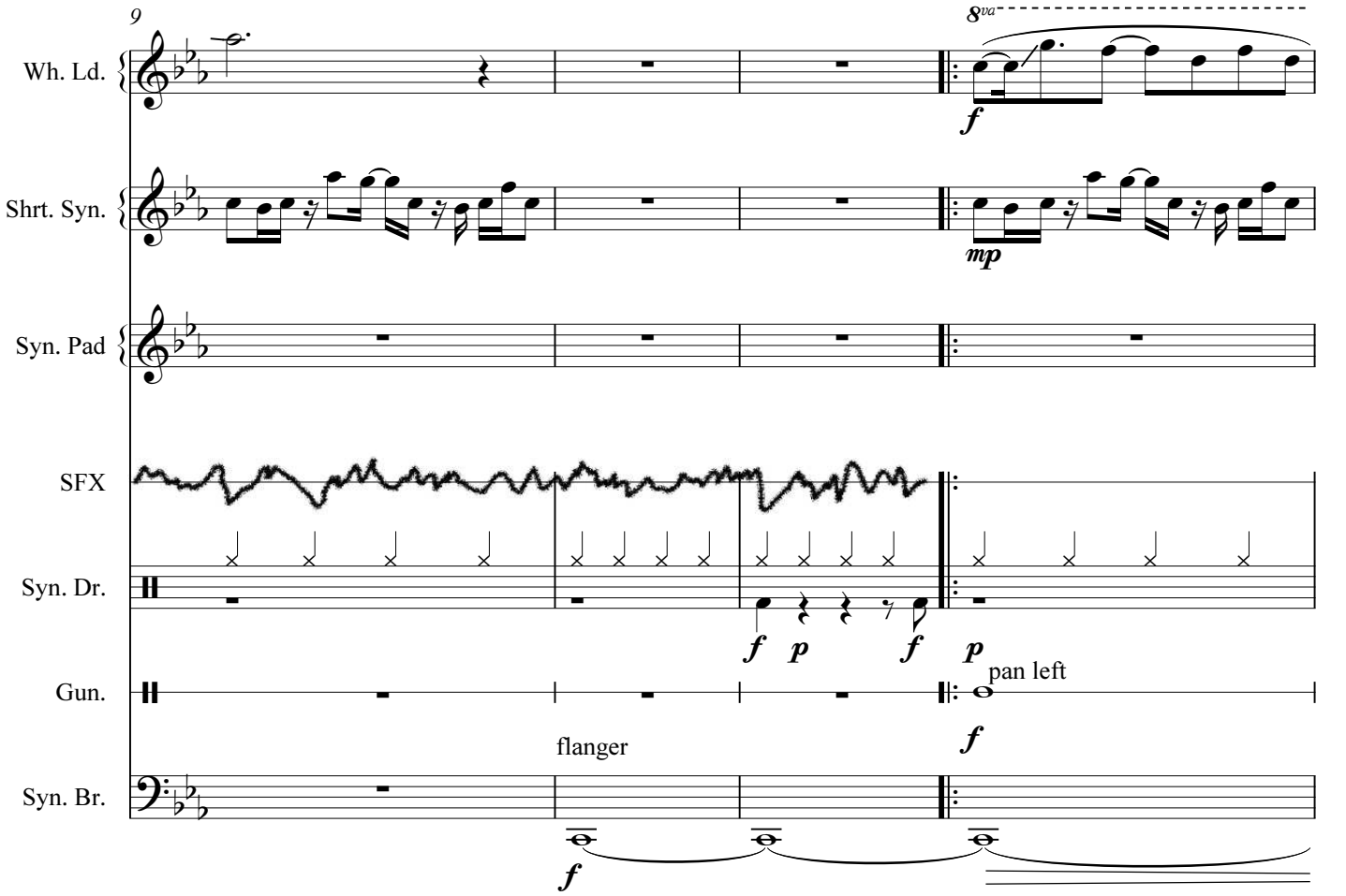
Appendix 3 – Full score of *Metroid Prime* Title Theme

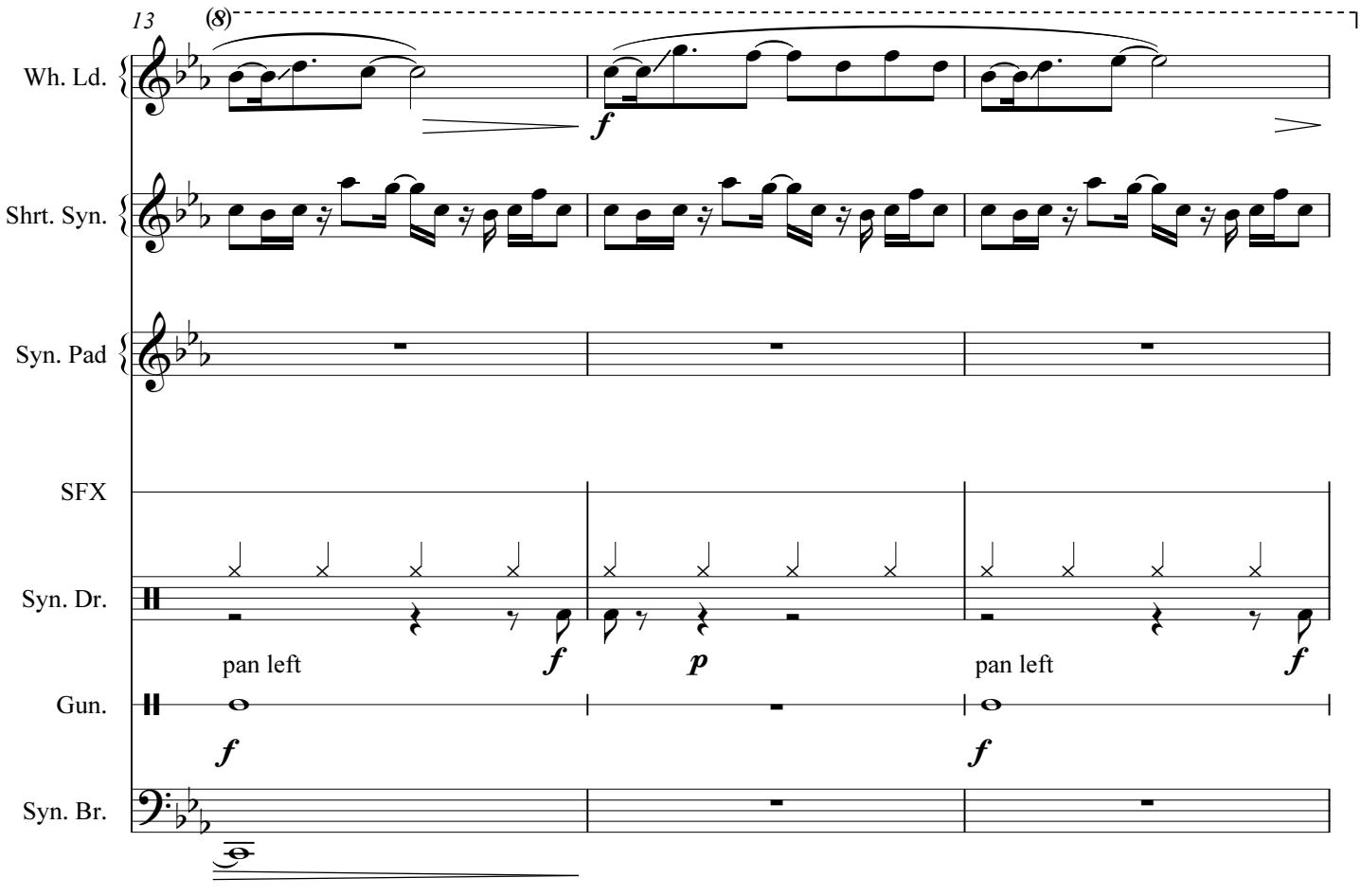
Metroid Prime (GameCube) - Metroid Prime Theme

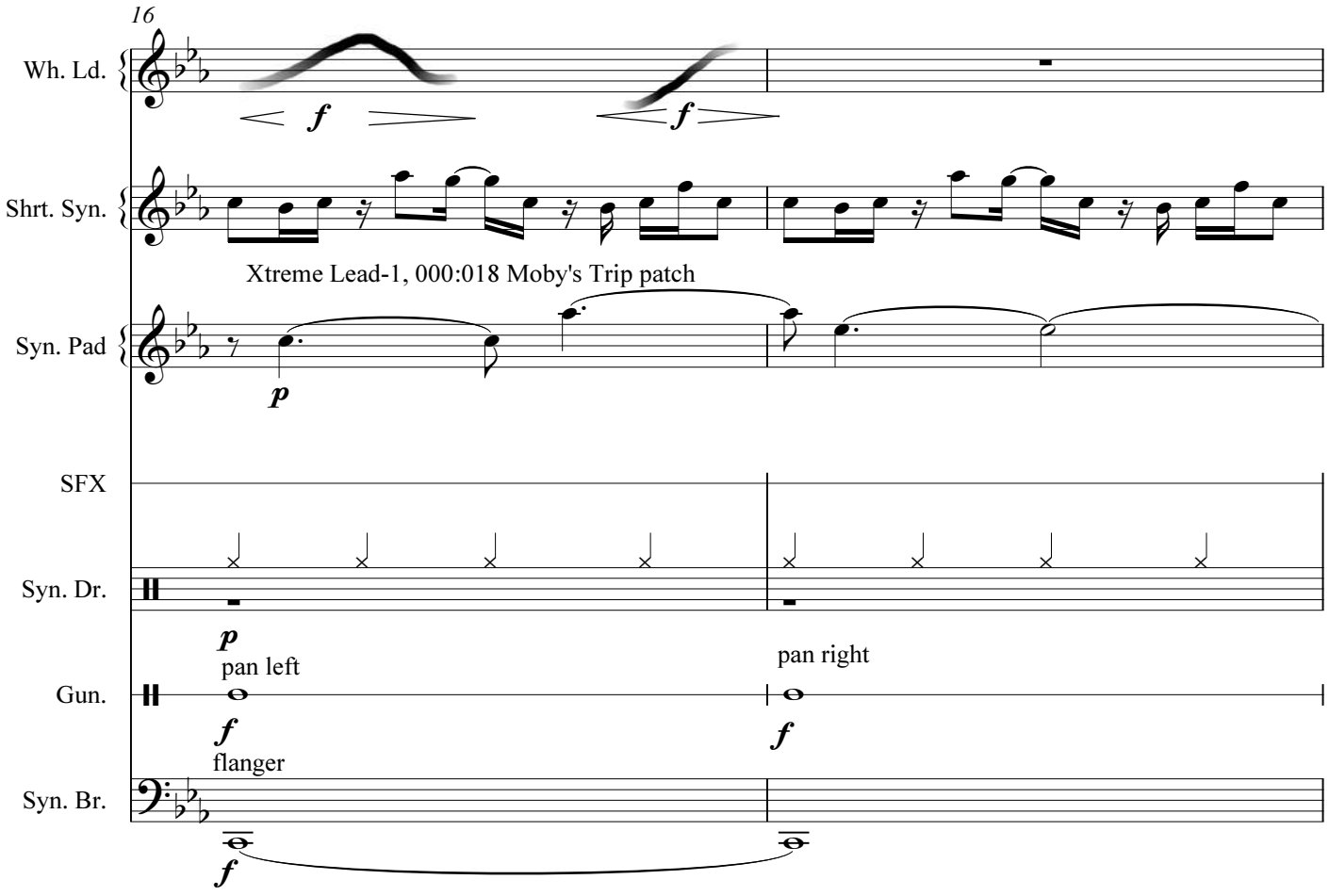
2002

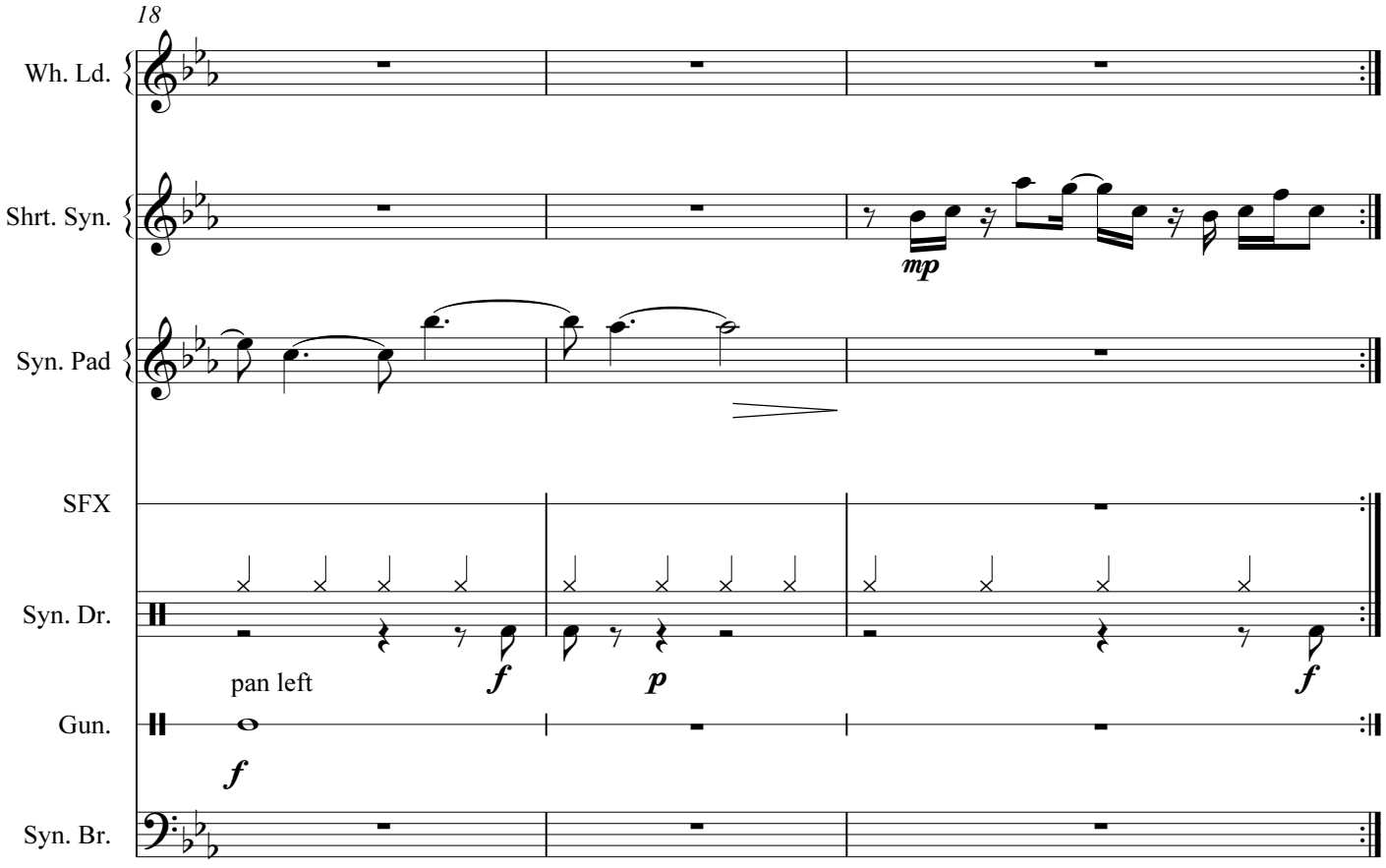
Kenji Yamamoto and Kouichi Kyuma




9
8va
Wh. Ld.
Shrt. Syn.
Syn. Pad
SFX
Syn. Dr.
Gun.
Syn. Br.
f
mp
f p f p
pan left
flanger


13
(8)
Wh. Ld.
Shrt. Syn.
Syn. Pad
SFX
Syn. Dr.
Gun.
Syn. Br.
f
pan left
p
pan left


16
Wh. Ld.
f
f
Shrt. Syn.
Xtreme Lead-1, 000:018 Moby's Trip patch
Syn. Pad
p
SFX
Syn. Dr.
p
pan left
pan right
Gun.
f
f
flanger
Syn. Br.
f


18
Wh. Ld.
Shrt. Syn.
mp
Syn. Pad
SFX
Syn. Dr.
pan left
f
p
f
Gun.
f
Syn. Br.