

Music in Video Games

Dr. Richard Anatone

Professor of Music Theory

Prince George's Community College



Topics Covered this Unit

- Ludomusicology
 - Scholarly study of music and games
- Early video game sound and graphics
 - “Golden Age” of video games
- Music in early Nintendo games (the 8-bit era)
 - “Chiptunes”
 - Different types of channels and voices NES music
- Music in early SNES games (the 16-bit era)
- Music from *Super Mario World* (test piece)
 - **Thematic transformation** of a given theme
 - **Incidental music**
- Music from *Final Fantasy VI* (test piece)
 - Role-Playing games
 - Cyclic themes
 - *Leitmotifs*



Brief overview of Popular Video Game Platforms in the Pre-NES era

- First recognized video game was called “Tennis for Two” in 1958
 - Used hard-wired electronic circuitry, *not* a computer
- “Spacewar” created in 1962
 - First computer video game
- “Pong” created in 1972
- 1970s give us the first “At Home TV” video games
 - Magnavox Odyssey Home Entertainment System
 - First-ever home console, released in 1972
 - Atari 2600 (1977)
- Many other home consoles
 - Most had built-in games, only few had cartridges



Spacewar



Pong



Early Video Games thru the mid 80s

The Golden Age (thru 1987)

- Games released as Arcade games
 - Popular titles:
 - Pong (Atari, 1972)
 - Space Invaders (Taito, 1978)
 - Pac-man (Namco, 1980)
 - Originally named “Puck-Man” because of his shape
 - Developers were fearful of vandals changing the P to and F on systems, which would prevent parents from letting their kids play!
 - Donkey Kong (Nintendo, 1981)
 - First appearance of Mario (originally named ‘Jumpman’)
 - Frogger (Konami, 1981)
 - Moon Patrol (Irem, 1982)
 - Star Wars (Atari, 1983)
 - Mario Bros (Nintendo, 1983)
- Arcade games had superior graphics and sound compared to their Home-Console counterparts

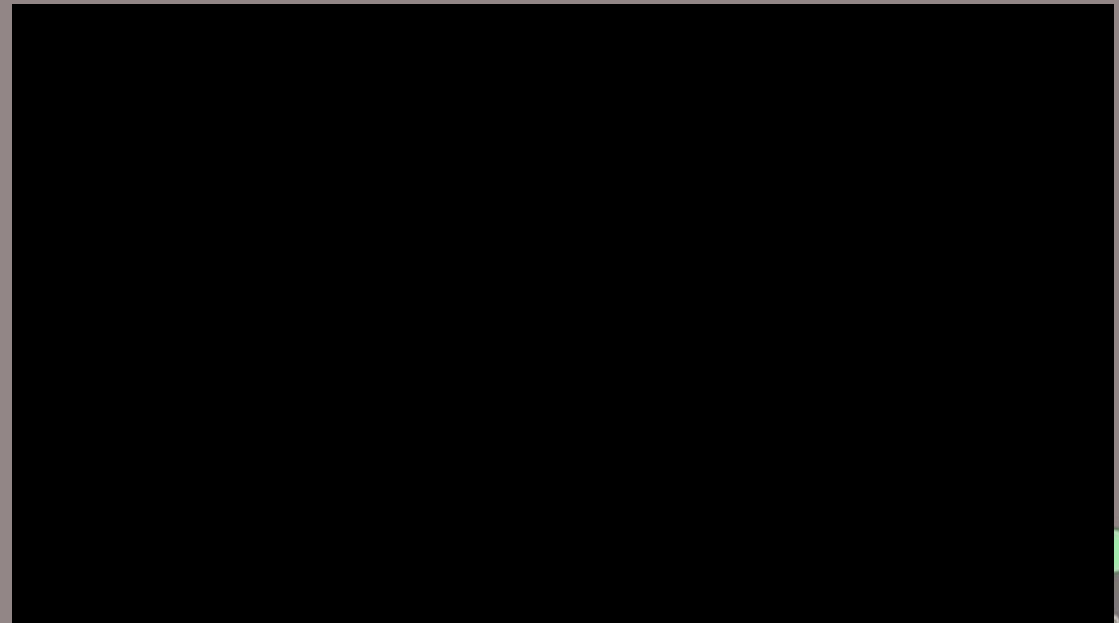


Atari 2600

- Released in 1977
- First commercially successful home console that used game cartridges
 - People can simply buy a new game cartridge instead of buying a new system all together
- Released many games that were originally arcade games
 - Because of the limited technological capabilities, graphics and sound were inferior to the arcade games



Pacman: Arcade vs. Atari 2600



Mario Bros: Arcade vs. Atari 2600



Moon Patrol: Arcade vs. Atari 2600

[youtube.com/MamePlayer](https://www.youtube.com/MamePlayer)

PUSH BUTTON
ONLY 1 PLAYER

CREDIT 01



Why the difference?

- The arcade systems had better graphics and sound. Why?
 - Higher ROM and RAM capabilities
 - RAM: Random Access Memory – the computer's capabilities
 - ROM: Read-Only Memory – the cartridge's space
- Atari 2600:
 - RAM: 128 bytes
 - ROM: cartridges typically contained 4-8 KB (kilobytes) of memory
- Arcade System used for Pac-Man
 - RAM: 4 KB
 - ROM: 16 KB



Bits, Bytes, KB, MB, GB, TB: Who cares?

- The higher the RAM and ROM, the better sound and video
 - 8 bits = 1 byte
 - 1000 bytes = 1 KB (kilobyte)
 - 1000 KB = 1 MB (megabyte)
 - 1000 MB = 1 GB (gigabyte)
 - 1000 GB = 1 TB (terabyte)



Bits, Bytes, KB, MB, GB, TB (cont'd)

- To put into perspective: the average 3-minute song you download as an mp3 on your computer is about 3 mb
 - Typically 1 minute = 1 megabyte
- It would be impossible to put even 10 seconds of a song on an Atari cartridge, as those only contained about 4-8KB!
- This is why composers weren't hired for early games – the space on these early games couldn't handle much space
- This is why most games used “bleeps” and “bloops” for SFX (sound effects)
- Some games used famous melodies
 - Donkey Kong: Bach's “Toccatina and Fugue in d minor”
 - Mario Bros: Mozart's “Eine Kleine Nachtmusik”



Cartridge/Game ROM Space

- Atari games: between 4-8KB
- NES games: between 128KB and 1MB
- SNES games: average 4MB
- PS1 games: max of 660MB (a full CD's worth of ROM)
- PS2 games: 4.7GB (a DVD's worth of space)
- PS4 games: range from 1GB-50 or more!
 - *Final Fantasy VII: Remake* is about 40GB on 1 disc



Nintendo and the 1980s

- NES Released in 1983
- Sophisticated technology found in systems like the NES allows for better graphics and music
- More space means *actual music* played in the background
- Composers are required write music for the games
- Console RAM: 2KB
 - Additional RAM can be included in the game cartridge!
- Cartridge ROM size: ranges from 128KB to 1MB!
 - Much more space than the Atari 2600

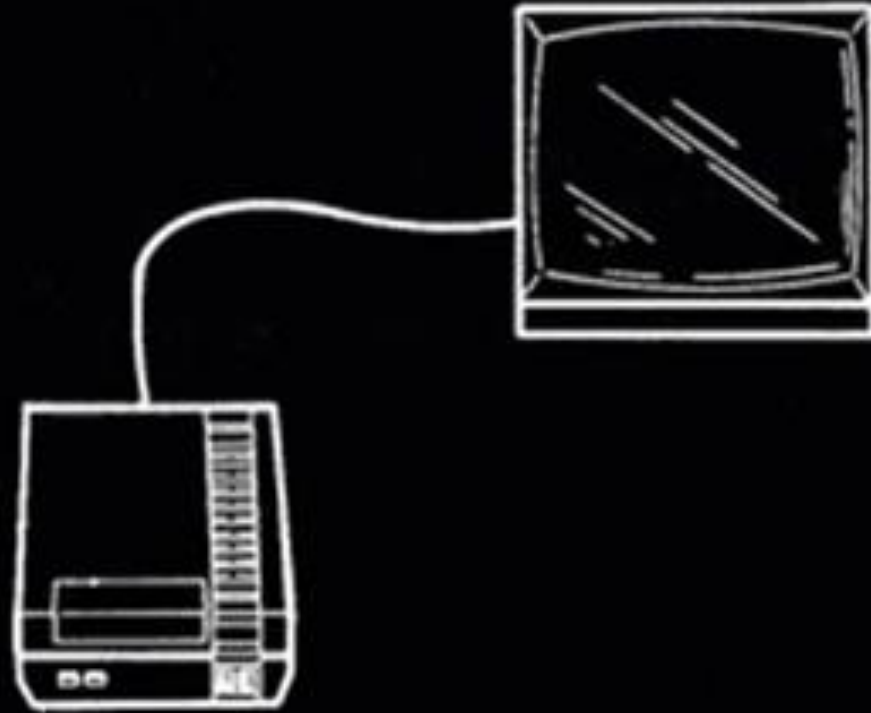


Sound in the Nintendo Entertainment System

- The sound card allowed for 5 channels
- Mostly comprised of **pulse waves**
 - Channel 1: melody
 - Channel 2: melody
 - Channel 3: bass
 - Channel 4: noise for drum sounds
 - Channel 5: actual samples of real sounds
 - Used *rarely* because this required more space on the game cartridge
- Music for NES games called **chiptunes**
 - No real instrument sounds – all electronic sounds



NES Sounds Explained

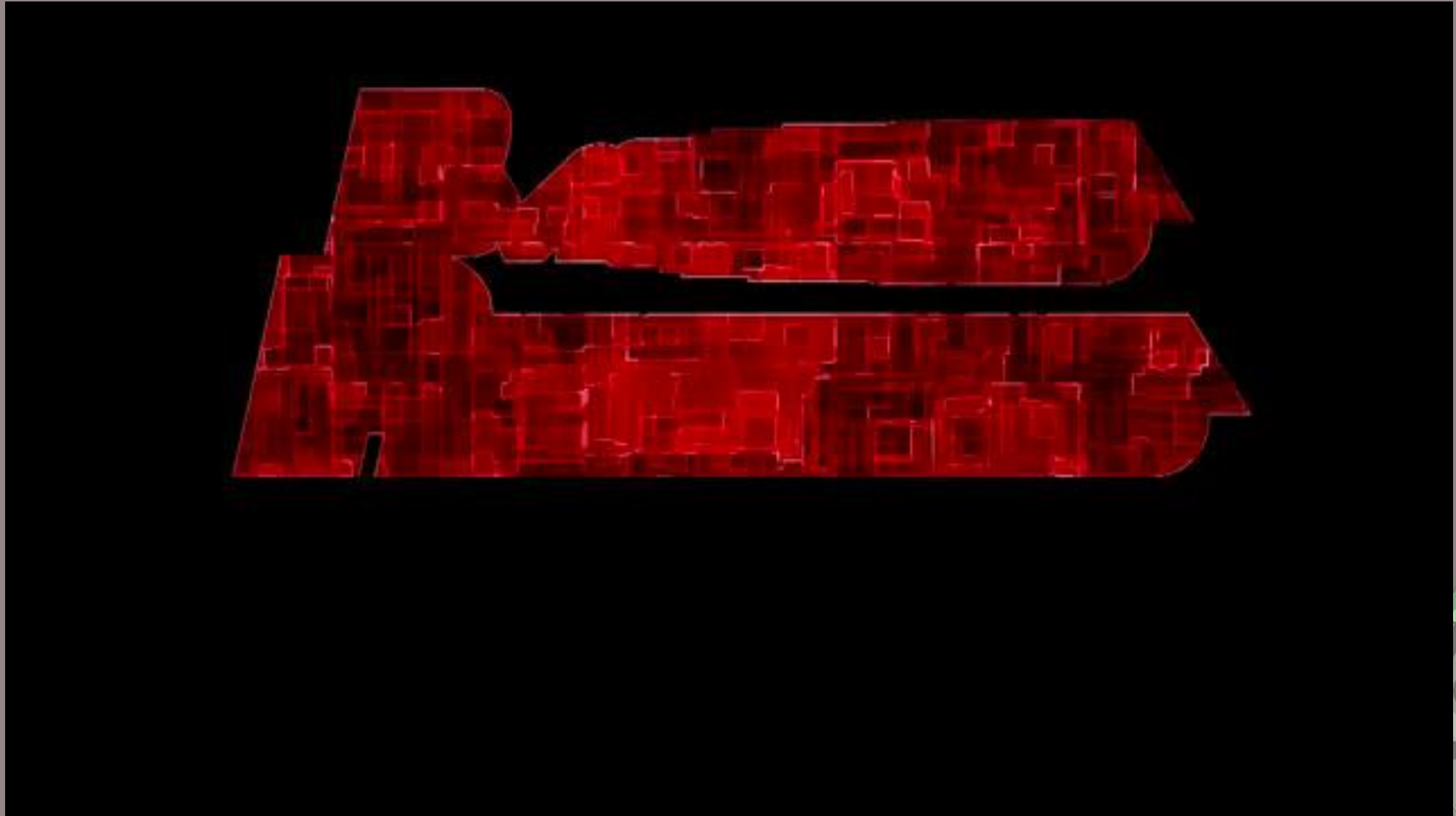


NES Audio:

A brief review of the 5 sound channels



Mario (1985, NES)



Mario (cont'd)

- Music composed by Japanese composer Koji Kondo
- Listening to this music, we see more **song-like structure and sound**
 - Form:
 - Introduction, ||:A B B C A D D C D:||
 - Not very predictable in its structure. Very uncommon for such an early game!
 - “Instruments”
 - 2 voices playing 1 melody in harmony
 - Square waves
 - 1 voice playing the bass
 - Triangle wave
 - 1 voice playing the drum kit
 - Noise channel

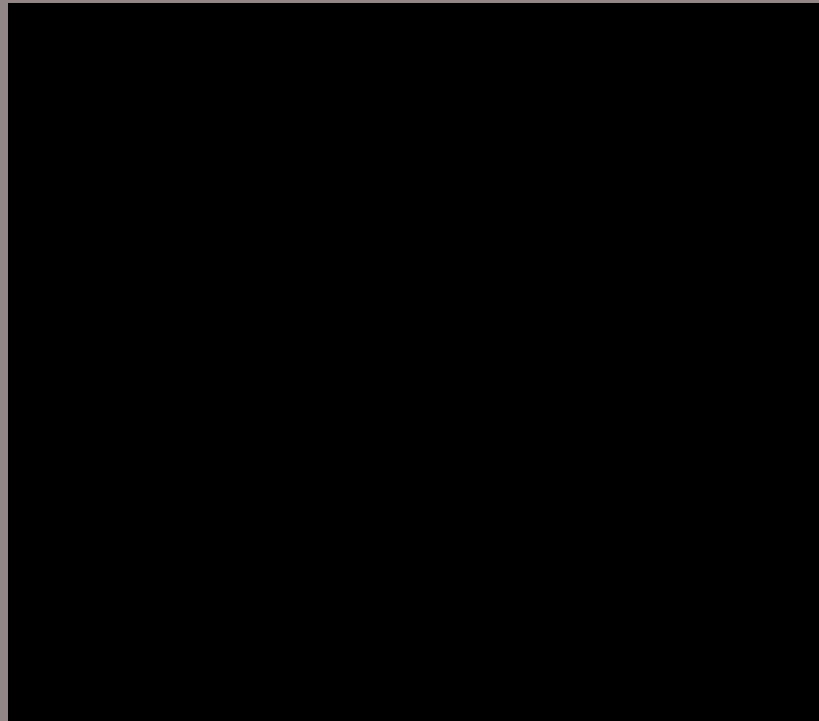


The 5th Channel: Real Sampling

- 5th channel allowed for real sampling
 - Actual human voice or recordings of live instruments
 - Had to be **severely compressed** in order to fit the sound on a game
- Famous example: *Three Stooges* (Cinemaware, 1987)

Larry's "Hey, this looks like a kid's game!" is taken from their short *Three Little Beers* from 1935!

<https://www.youtube.com/watch?v=K-jyLtty9cg> go to 5:15 mark



Early Chiptunes and their song form

- A rock/pop band at all composer's disposal:
 - 2 melodies, bass, drum kit
- Depending on the concept of the game, composers would write music that matches the character of the game:
 - *Mappy Land* (Tose/Namco, 1986)
 - Composer: unknown, but Nobuyuki Ohnogi wrote the main theme for the arcade version released in 1983)
 - Genre: 'bubblegum' pop
 - *Castlevania* (Konami, 1986)
 - Composer: Kinuyo Yamashita
 - Genre: Heavy metal
 - *Silver Surfer* (Software Creations, 1990)
 - Composers: Tim and Geoff Follin
 - Genre: Progressive rock
 - *Megaman* series
 - Composer: Takashi Tateishi
 - Genre: Rock 'n Roll



Mappy Land



The 'bubblegum pop' style

- Games that are more kid-friendly in topic
 - Mouse avoids cats to collect cheese and presents for his girlfriend mouse
- Melodies in the major mode
- Lack of drum kit's 'back beat'
 - Back beats are used in blues and rock
 - 1-2-3-4- 1-2-3-4
- Prominent use of Square Waves
 - "brighter" timbre
- Song Form
 - Intro + Verse + Chorus





Castlevania

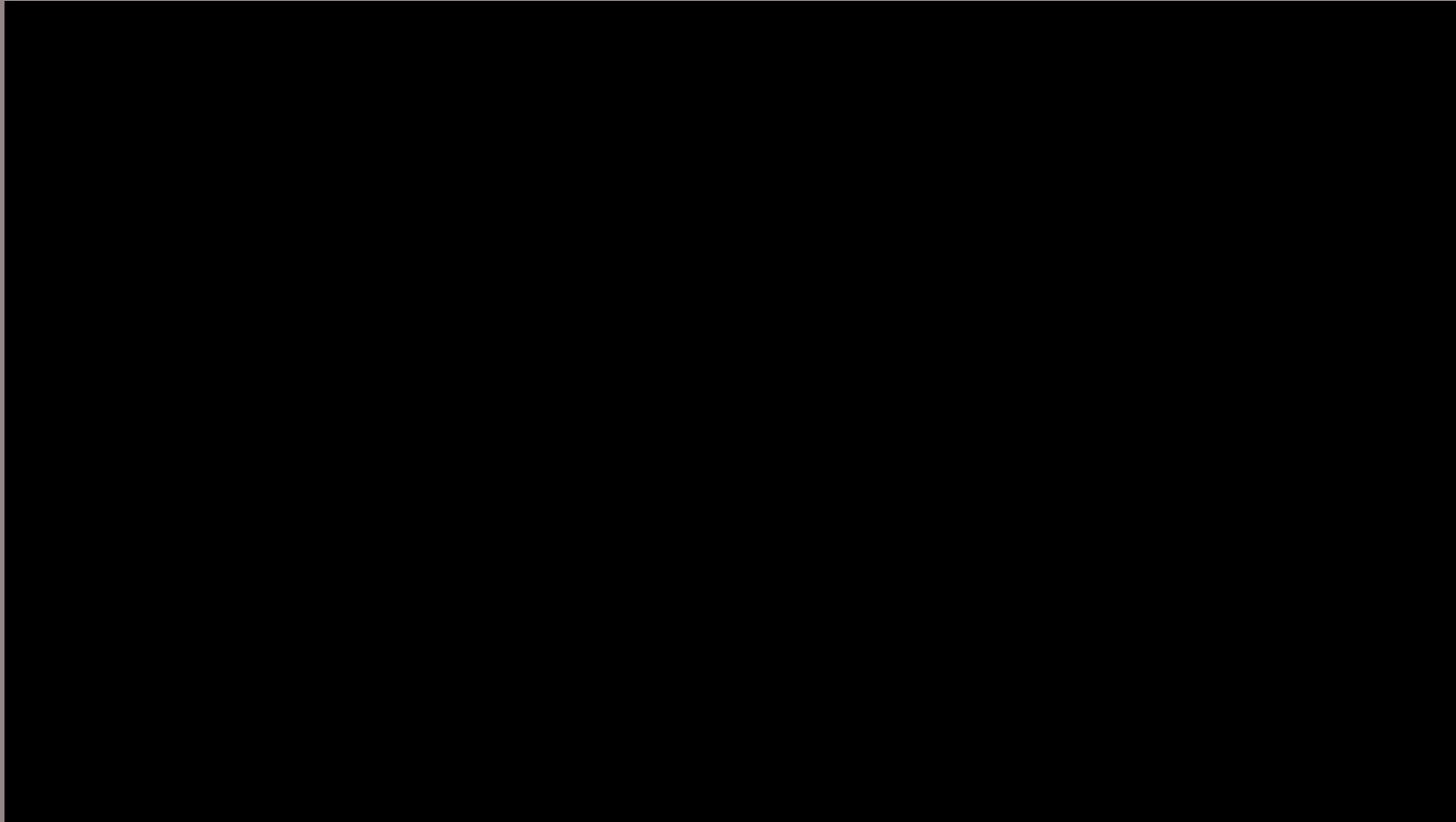


The heavy-metal style

- Games with a darker narrative
 - ‘Castlevania’ is a Dracula story
- Melodies in the minor mode
- Heavy use of drum kit
 - Lots of back beats
- Heavy use of drone notes in the triangle wave as bass line
- Song Form
 - Intro + Verse + Pre-chorus + Chorus



<https://www.youtube.com/watch?v=xOe92DMDOP0>



Silver Surfer



The heavy-metal style

- Games with a darker narrative
 - ‘Silver Surfer’ is a Marvel super-hero
- Melodies in the minor mode
- Long lines that sound like guitar solos
- Heavy use of drum kit
 - Lots of back beats and different types of drum sounds
- Heavy use of drone notes in the triangle wave as bass line
- Key changes! (modulation)
- Psychedelic sounds (think the 60s hippie movement)
- More complex Song Form
 - Intro 1 + Intro 2+ A + B + C



Megaman 2



The rock style

- Games with a darker narrative
 - Megaman – destroy all robots
- Melodies in the minor mode
- Heavy use of drum kit
 - Lots of back beats
- Heavy use of drone notes in the triangle wave as bass line
- Simple Song Form
 - Verse 1 + Verse 2 + Bridge + Verse 3



Super Nintendo and MIDI Capabilities

- Released in 1990
 - 16-bit system
 - Higher quality graphics
 - Higher quality sound
 - 8 channels of 16-bit audio samples
 - Real samples of instruments, compressed
- This means you can hear actual instruments!
 - Some instruments sound decent
 - Ex. Flute, clarinet, tuba, bass, piano
 - Some instruments are awful sounding
 - Ex. Strings, human voice



Super Mario World

- Released in 1990
- Contains improved graphics and music
- Composed by Koji Kondo (composer of the Mario series as well as the Zelda series)
- Game uses the same melody throughout each level
 - depending on the scenario, the music is a different style
 - Process known as **thematic transformation**
 - Melody doesn't change, but the **elements surrounding the music** changes



By Cyclops



Different transformations of Mario's Theme



- Overworld
 - Instruments: ukulele, tuba/bass, steel drum



- Underground
 - Instruments: marimba, other drums



- Underwater
 - Instruments: Glockenspiel, bass



- Haunted House
 - Instruments: ?????, bells, tuba



- “Athlete’s Rag” (test piece!)
 - Instruments: Piano



- Bowser’s Castle
 - Instruments: tuba



Composer: Koji Kondo
Name of Piece: The Athlete's Rag from *Super Mario World*
Video Game System: SNES (Super Nintendo)
Sounds Created by: MIDI
Genre: Ragtime
Additional Info: Kondo is paying homage to **Scott Joplin**, the king of Ragtime. More specifically, this piece pays tribute to **The Maple Leaf Rag**.



Left: Scene from *Super Mario Bros.* (NES). **Right:** Scene from *Super Mario World* (SNES). Notice the drastic change in visual scenery. The average NES cartridge contained a maximum of about 1megabyte of data, while the SNES cartridges could hold up to 6mb of data, allowing for better visual graphics and better (and longer) music.

Koji Kondo was born in 1961 and is most famous for composing the scores to the Super Mario along with the Legend of Zelda franchise for Nintendo Entertainment System (NES). *Super Mario World* was composed for the Super Nintendo system (SNES). Due to the limited space on the game cartridges, composers needed to use archaic electronic sounds using MIDI. MIDI is an acronym that stands for **Musical Instrument Digital Interface**. As time progressed and video game cartridges were able to store more and more space, composers were able to use better sounding MIDI effects on the video games.

Super Mario World contains many different levels, each with their own theme song in the background. The word we use for background music is **Incidental Music**. Kondo uses the same melody for every level, but he changes certain aspects of the *presentation of the melody*—but *not the melody itself*. He may change the instruments, the tempo, the meter, or even the key, but the notes of the melody remain intact. This is a process called **Thematic Transformation**—similar to Berlioz's *Symphonie Fantastique*.

The *Athlete's Rag* is the version of the main melody we hear when Mario is running in a dangerous platform level. The composer turns the melody into the style of ragtime. Ragtime is a style of piano that was popularized by Scott Joplin in the 1890s. It consists of the left hand playing a stride bass pattern while the right hand has a syncopated melody.

The piece that Kondo is specifically quoting is the *Maple Leaf Rag*, written by Scott Joplin. The opening rhythm of *Athlete's Rag* is the same rhythm that begins the *Maple Leaf Rag*.



Final Fantasy and the RPG

- Role-Playing Games (RPGs) modeled after *Dungeons and Dragons*
 - Games where the player takes on the role of characters in a movie-like setting
 - Traditionally in the ‘high-fantasy’ or Medieval setting
 - Ex. *Dragon Quest*
- Games typically modeled after movies
 - Full storylines
 - Lots of dialogue
 - Full soundtracks



Final Fantasy (cont'd)

- Originally released in 1987 created by **Hironobu Sakaguchi**
- Hired **Nobuo Uematsu** as the composer
 - No formal compositional training
 - Wrote music for the first 9 *Final Fantasy* games as well as many others!
- FF1-3 released for Nintendo
- FF4-6 released for Super Nintendo
- FF7-9 released for Playstation
 - 32-bit graphics, much better quality than the SNES
 - Capable of *live music* instead of the distorted quality in the SNES
- Games have nothing to do with each other story-wise
 - Games aren't sequels to each other



Final Fantasy: Prologue Music



Final Fantasy IV: Prologue Music

SNES Longplay [053] Final Fantasy IV (Part 1 of 9)



▶ ▶ 🔊 19:59 / 2:00:12

Scroll for details



Final Fantasy Prologue Music (live)



Final Fantasy VI

- Considered one of the greatest RPGs of all time
- Takes an average of 40 hours to complete
- Contains 14 playable characters
 - Each with a very lengthy and complicated backstory
- Composer Nobuo Uematsu wrote primary and secondary **leitmotifs** for each character
 - **Leitmotif:** for lack of a better term, these are “character themes” for individuals within the story (think “Darth Vader” theme from *Star Wars*)
 - A compositional device created by German opera composer Richard Wagner



Final Fantasy VI: backstory

- Evil empire tries to take over the world using Magic
 - Emperor Gestahl and his 2nd in command Kefka
 - Kefka is a psychotic clown
- Resistance movement called the “Returners” who oppose them
- Kefka eventually kills the emperor and assumes all magical power for himself
 - Nearly destroys the world
- Heroes have to regroup and stop him from destroying the world for real



Locke's Theme

- One of the main protagonists in the story
- A “Treasure hunter”
- His **leitmotif** contains 2 main sections (A [transition] B)
- Section A contains musical **topics** associated with heroism
 - Key: major
 - March (hear the drums in the background)
 - The triplet rhythm within the melody
 - Melodic skips in the opening melody are often used in fanfares
- Transition brings the music to a new section
- Section B moves to a more somber/dark key
 - Subtly hinting that the character has a tragic history



Locke's Intro in the Game



Locke's Theme (cont'd)

- Locke *does* have a tragic history
 - Failed to protect his fiancé, Rachel, when he was younger
 - Off adventuring with her, she fell off a bridge and slipped into a coma
 - Her father kicked him out, blaming him for ruining her life
 - Locke went off to try and find a magical herb to bring her out of her coma
 - While he was gone, the Imperial Army torched her village
 - When he came back, he learned that she came out of her coma before perishing in the fire
 - The last thing she said was his name
- Locke blames himself for failing to protect her, so he feels the need to protect everyone he meets



‘Forever Rachel’

- Locke’s secondary **leitmotif**
 - A **transformation** of the heroic leitmotif (the theme has undergone **thematic transformation**)
 - Reflects his tragic history
- Begins with the transition from Locke’s theme, then goes directly into a ‘sad’ version of Locke’s Theme
 - The transition in his primary **leitmotif** brought the music to a “sad” section of the theme, as if to tell us there was more to his backstory.
 - Here, the music begins with the transition, and brings us to the “sad” version of his theme!
- All of the Heroic Topic traits are gone:
 - Tempo: slow
 - Melody: lyrical and somber
 - Harmonies: all in the minor mode



‘Forever Rachel’ in the game



The Villain: Kefka

- Kefka: the right-hand man to the emperor
- A psychotic clown (think “The Joker” from *Batman*)
- Experimented on when he was child
 - Something snapped in his mind, turning him into a psychotic killer
- Halfway through the game, he nearly destroys the world
- Characters have to regroup and stop him from finishing his task
- The final fight against Kefka is accompanied with music called “Dancing Mad”



Kefka's introduction

EDGAR: Well?
How do you like my castle?





Final Fantasy VI: Final Battle

- 4 different stages
- From bottom to top:
 - Tier 1: Scary demon
 - Tier 2: Humans and monsters. The one in red looks like a crucifixion
 - Tier 3: Very religious: Mary and Jesus?
 - Tier 4: Kefka, now taking the role of god
- As a composer, Uematsu wrote a 4-staged piece of music that accompanies this fight
 - Tier 1: Music based on his theme 'Catastrophe,' which was heard the first time Kefka destroyed the world
 - Instruments: electric organ and choir
 - **Rock Topic** blended with the **Religious Topic**
 - Tier 2: A silly-sounding march, based off of Kefka's **leitmotif (4:33)**
 - Instruments: church organ and choir
 - It sounds like the choir is laughing at us!
 - Tier 3: An organ solo (8:12)
 - Modeled after the music of JS Bach
 - Kefka's theme is played very subtly in the lower pedals of the organ during this theme
 - Tier 4: Kefka's *leitmotif* (12:04)
 - Instruments: lots of different instruments



Sectional Form in Nobuo Uematsu's *Dancing Mad* (orch. arr)



Intro

0:00-4:40
Based on "Catastrophe"
Contains 3 smaller sections
Organized in ABA form:
A: 0:00-0:54 (Catastrophe melody)
B: 0:55-1:51 (Latin lyrics)
A: 1:52-2:31 (Lyrics with Catastrophe melody)

A

2:32-3:59
Organ and choir
Organ has a playful accompaniment
(Based on 2nd part of Kefka's theme)
Choir sings "ha" (laughing because Kefka
is an evil clown)
4:00-4:40
Organ closes this section out

B

4:41-6:40
Organ solo
Played in the style of Prelude and Fugue
(homage to JS Bach)
5:13 has Kefka's theme played in organ
pedals (bass) in the Major Mode!
5:25 has Kefka's theme played in the
organ pedals in minor mode!
6:35 ends the whole section with a Major
chord the way Bach would have

C

6:40-8:22
Kefka's theme
Played by rock organ
(rock music is 'of the devil!')
7:22 has heavy distortion in
rock instruments

Outro

8:23-end
Choir and orchestra and
rock band all play
together

Latin Text

Obita vices oblivio
Die caelutis
O sedae e temporii
Damnus ex dies domnis es te
Tabes...
Die terrore
Die tyranno
Die tibites
Die ab e mortuos
Di-diem fla-flammeus
No-nova Cae-caelum
Dies magnifica dies
Irae tabi notaba
Ex habeo non ex for etiam
Incidit fama
Torrus etiam
In terra lux

English Translation

(Death and oblivion)
(Heavenly day)
(O, calmed out of transitory)
(Forget from those days, I am your master...)
(Disappear...)
(Day of Terror)
(Day of the Tyrant)
(This Day is for you..)
(The Day of counting the dead)
(Day of Flames)
(Star of the Heavens)
(Magnificent days, days...)
(...erased by rage, marked...)
(...From no valiance, not even speech?)
(Cut the short talk...)
(...is rushing forth, even still!)
(Dawn of a new world)

