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Applications of Video Game Music Theory for the Highschool/ College Theory Curriculum

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Video game sound has been around for over 50 years starting with Atari's *Pong* in 1972, which was the first game to include an electronic screen and internal speaker. No music exists in *Pong*, only sound effects. These simple sounds serve as feedback for the player when the ball is deflected from either side of the screen. Home consoles would not include on-board sound chips until 1977, with the release of the Atari 2600. [1] A sound chip is just one part of a gaming system's audio hardware that can generate sound. The 2600 was the first console to support two sound channels. Each channel can only play one sound or pitch at a time. Most 2600 games had no music outside of a title jingle, as the limited sound channels were allocated to sound effects during gameplay.[2] Later generation consoles would have more sound channels, allowing for background music to play simultaneously alongside sound effects.

Composing music for consoles before 1979 required extensive knowledge of computer programming languages. Atari published *Music Composer* in 1979 for their 400 and 800 series computers. Games such as *Mario Paint* (1992) include music composition software. Before the release of the Nintendo Famicom in 1983, most consoles used a coaxial cable to transmit audio/video to the television set. Nintendo changed the game by introducing RCA cables, which meant that video games could now support stereo sound.[3]

[1] Hopkins, C. *Video game audio, a history 1972 – 2020*, 12.
[2] Hopkins, 14.
[3] Hopkins, 23.

Currently, most large video game companies use professional ensembles to record their original soundtracks. For smaller companies, or "indie" titles, the world of audio has progressed beyond the need for limited audio channels. Many composers still utilize "chiptune" style sounds as well. Even with sound in video games being a recent development, the genre has progressed rapidly alongside technology.

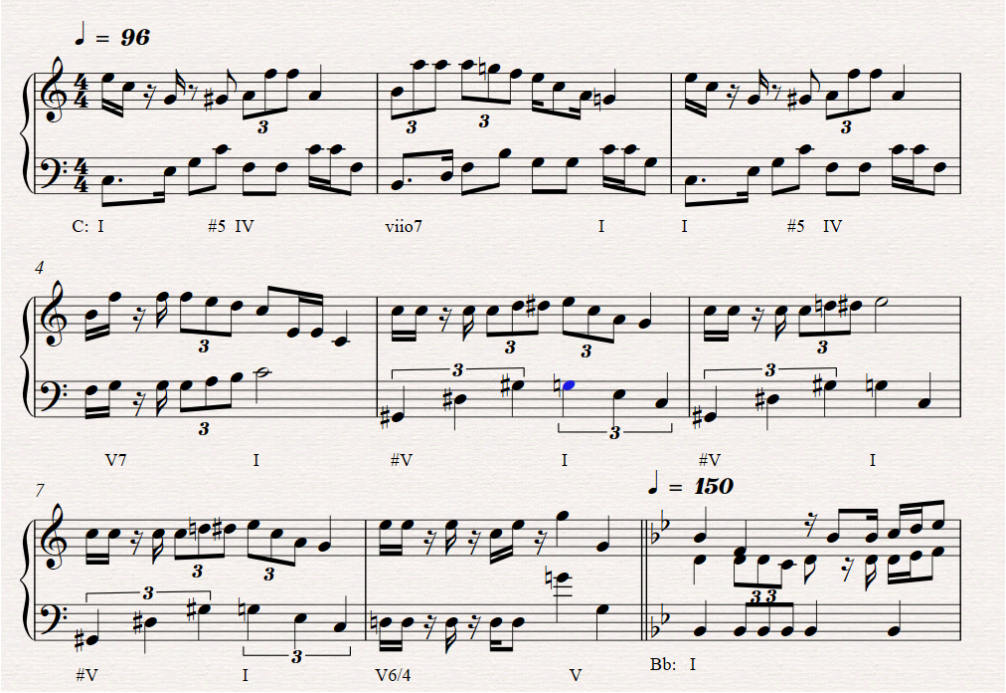
The technological constraints of older hardware limited the complexity of compositions for older video games. These early compositions are simple but contain countless examples of theory techniques that make their melodies compelling. Modern video game music may use live instruments, but the principle remains the same. The goal of my analysis was to find concrete examples of theory techniques throughout all eras of video game music. Thankfully, I found nine excerpts that display a wide variety of theory techniques. With the sheer amount of video game music, it would be possible to construct a high school or college level theory curriculum using examples only from video games. By including theory examples from relevant video games, students can learn the inner workings of their favorite tracks. For all these reasons and more, I decided on this to be my senior project. I have separated my analysis into three song sets. Each song set covers a different era of videogame music, from early to modern.

Song Set One: The Early "8-Bit" Era (1983-1991)

The first set of songs I analyzed were all composed for the Nintendo Famicom/NES. The first of three is *Overworld Theme* from *Super Mario Brothers* (1985) composed by Koji Kondo (1961-). For these three excerpts, I transcribed the pieces by ear and then did a Roman numeral analysis. You can listen along to each excerpt by following the link in the Appendix.

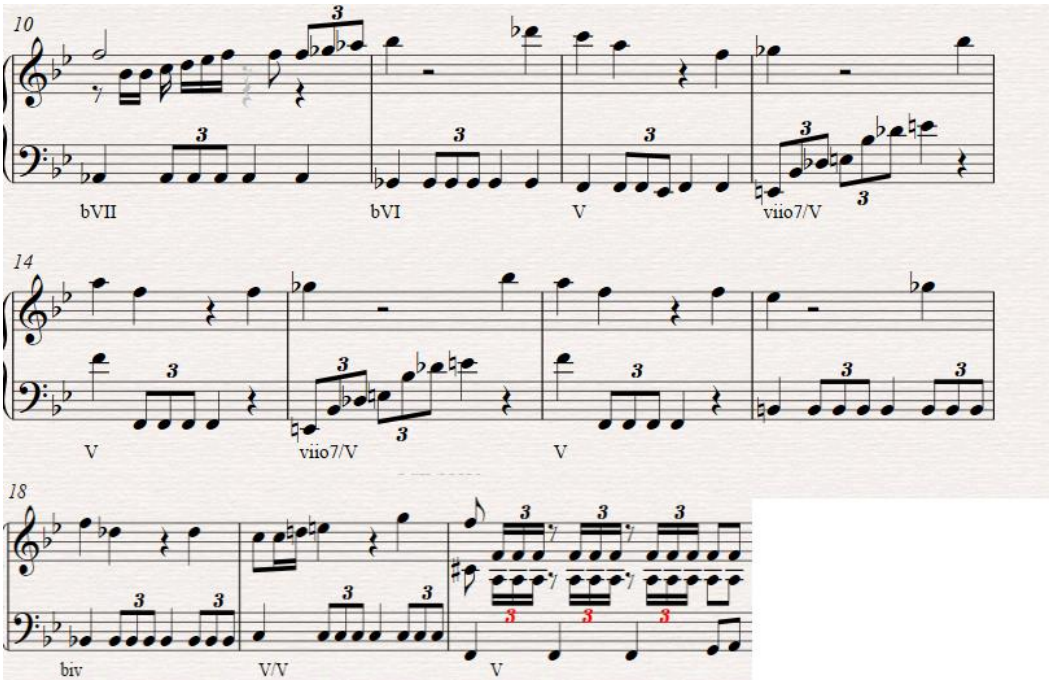
The first excerpt uses chromaticism in its progression. Video game songs often have many theory elements but do not strictly follow theory rules. An example of this would be how

the V chord is used in this excerpt. Typically, the V chord is not altered in a major key unless there is a key change, modulation, or secondary function chord that requires accidentals. In m.7 and 9, the V chord is sharped. The typical resolution of this chord would be to the new tonic, (C#). Instead, the V# chord resolves to a normal I chord. Other such instances of theory exceptions are chord progressions that do not end on a typical cadence; non-chord tones that do not resolve properly; and the use of minor v, major vii, and iii chords. The first phrase ends in an authentic cadence on m.4. The most interesting part of this excerpt is the last four measures. As mentioned before, in this section, the V is altered. The chromaticism in the bass accents the C, D, D# motif in the right hand. Finally, the phrase ends on V, creating a half cadence. This piece is a notable example of how to implement chromatic movement and swing rhythms.



The second song is *Overworld Theme* from *The Legend of Zelda* (1987) composed by Koji Kondo. What stood out to me most in this piece were the secondary function chords and the use of chromaticism. In this example, the vii and VI chords have been lowered as part of the

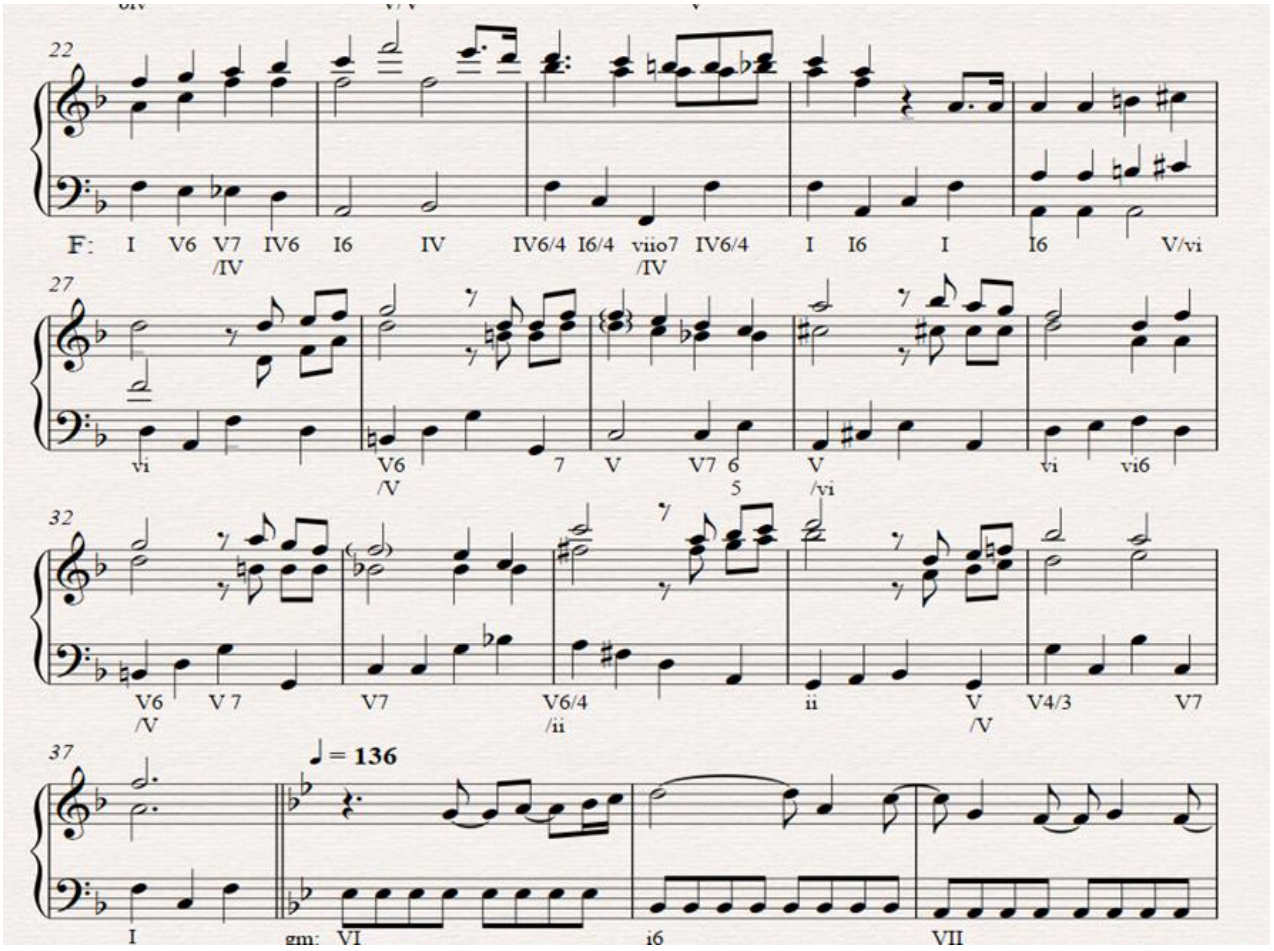
chord progression. In addition to this, a viio7/V is present in m.13 and 15. This secondary chord functions as expected, prolonging the phrase by increasing tension. The final three measures outline a biv-V/V-V progression. As with many video game songs, these compositions are designed to loop during gameplay[4]. This can be seen in this and the previous example, as both phrases end on a half cadence. When the phrase starts again on the tonic, the transition is natural and the loop is established. This piece serves as a great example of secondary dominant and seven chords, flat vi and vii chords, and half cadences.



The third song of this set is *Overture* from *Dragon Quest III* (1988) composed by Koichi Sugiyama (1931-2021). Sugiyama's style is much closer to classical theory conventions than seen in previous excerpts. Due to sound channel constraints, most NES compositions only have two or three instruments playing at any given time.[5] In the case of *Overture*, the three sound

[4] Whalen Z. *Case Study: Film Music Vs. Videogame Music: The Case of Silent Hill*, 77.
[5] Collins K. *Game Sound: An introduction to the History Theory, and Practice of Video game music*, 9.

channels are turned into three voices. The voice-leading in this piece is textbook theory: cadences and dissonances resolve like they would in any Bach chorale. In mm.29 – 35, secondary dominants are used to create a sequence starting in D minor (vi). By starting the sequence in the relative minor, the tension is heightened by prolonging the inevitable resolution to the tonic. As this is the entire composition, the piece ends on a perfect authentic cadence preceded by a V7 chord. This piece is an excellent example of 3-part writing, voice leading, secondary dominants, and modulation.

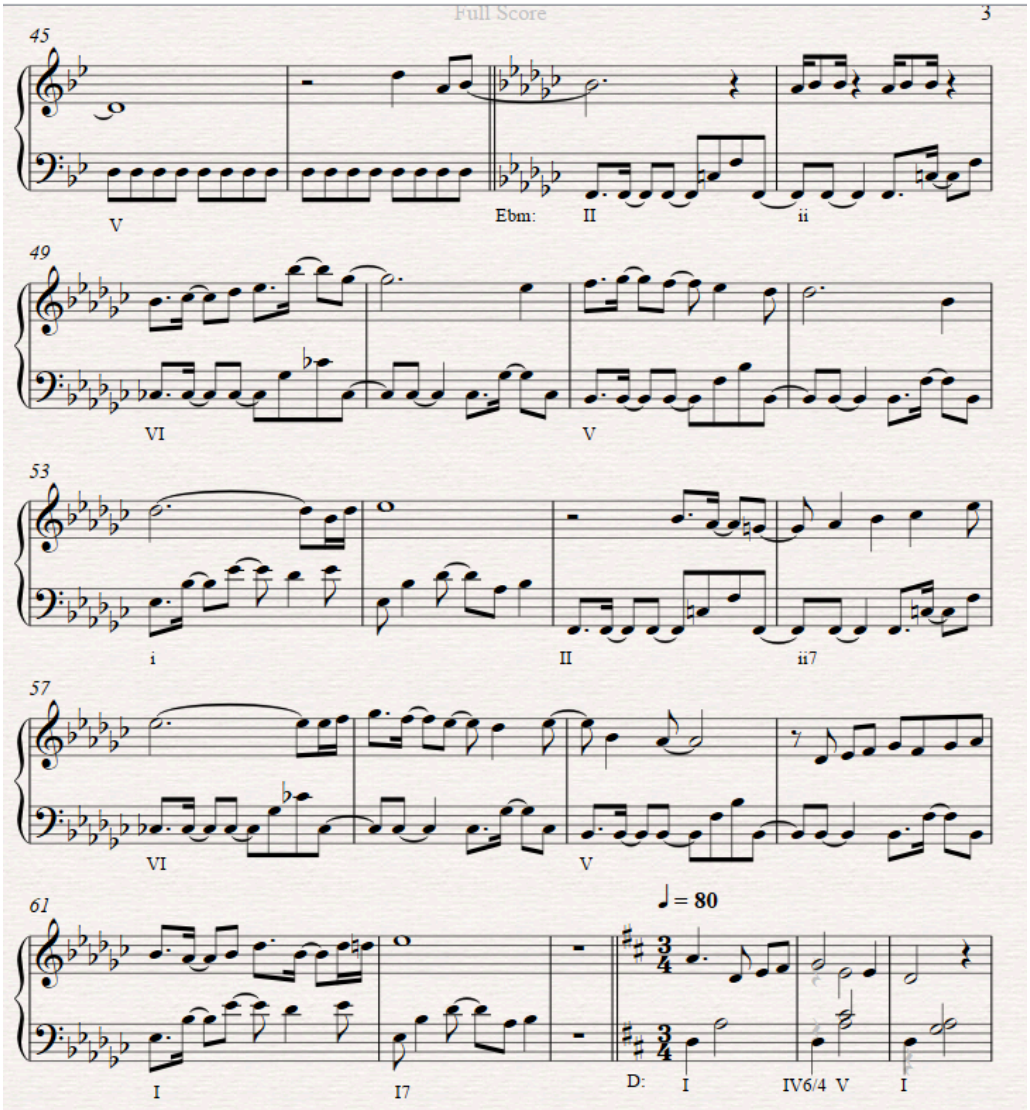


Song Set Two: The Middle "16-Bit" Era (1991 – 1996)

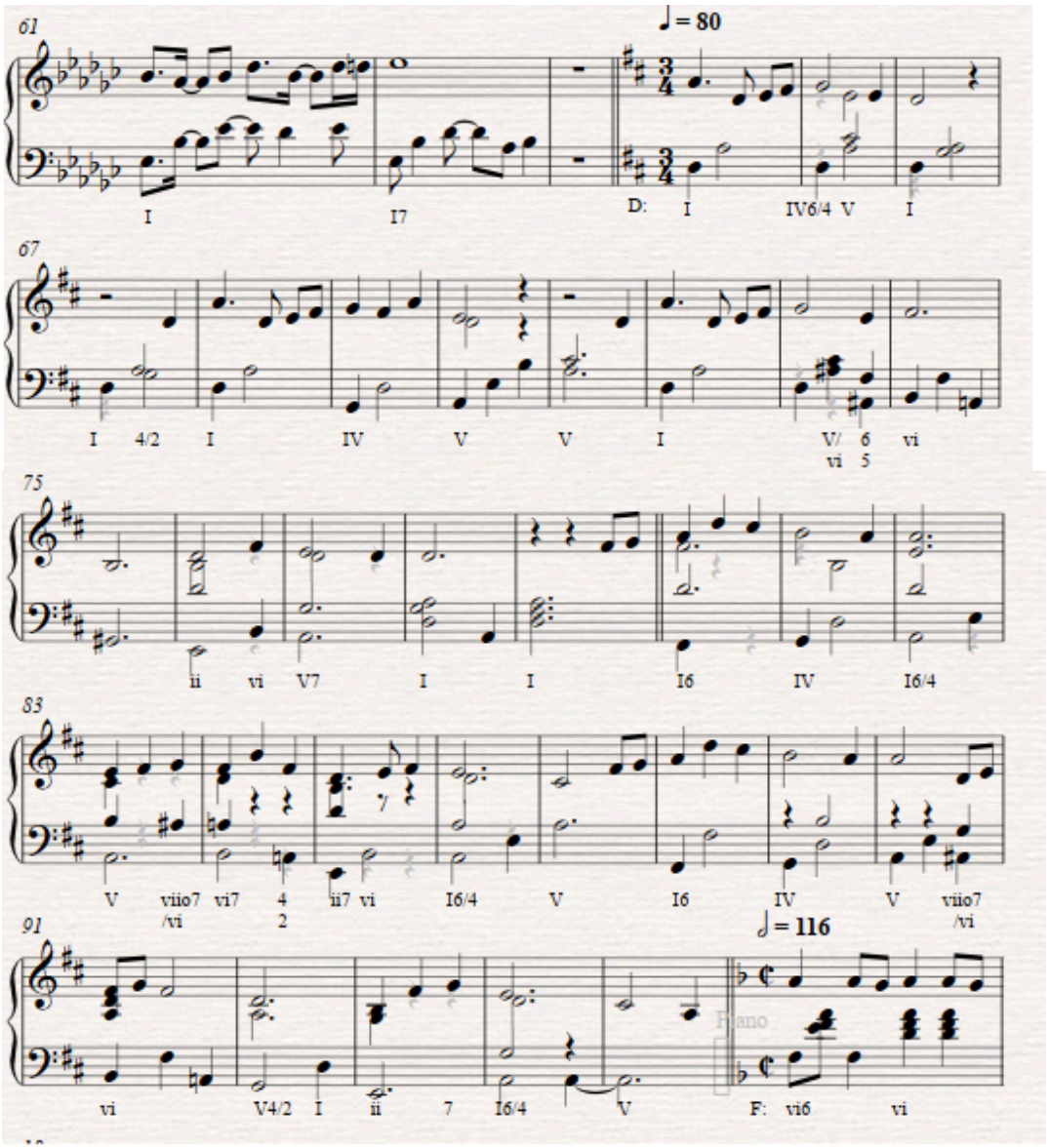
The next set of songs was composed for the Super Famicom/SNES and Sony PlayStation. The 16-bit processor and improved sound chip of the SNES allowed composers to utilize more sound channels. The result of this upgrade was higher quality midis and increased clarity of sound. Composers could also utilize higher-quality audio samples. Much of the music of this 16-bit generation is closer to real ensembles than the electronic blips and bloops of previous console generations. The Sony PlayStation is a disc-based system, meaning that composers had access to CD-quality midis and higher audio fidelity. Once disc-based systems became the norm, video game composers could sample live recordings during gameplay. Additionally, it was now possible for video game composers to utilize any instrument. Live recordings can be heard as early as the PlayStation. However, the CDs could only store so much data.[6] It was not until CD technology progressed that a fully orchestrated videogame soundtrack was feasible.

The first song of this set is *Wings that Cross Time* from *Chrono Trigger* (1995, Super Famicom) composed by Yasunori Mitsuda (1972-). Once the piece modulates to the parallel minor in m.47, the phrasing changes. The ii-VI-V-i progression outlined in this section utilizes the ii7 and VI chord to prolong the phrase as dominant preparation chords. The power of syncopated versus normal rhythms is displayed in mm.60-61. This piece is a wonderful example of minor key chord structure, dominant preparation, and syncopation.

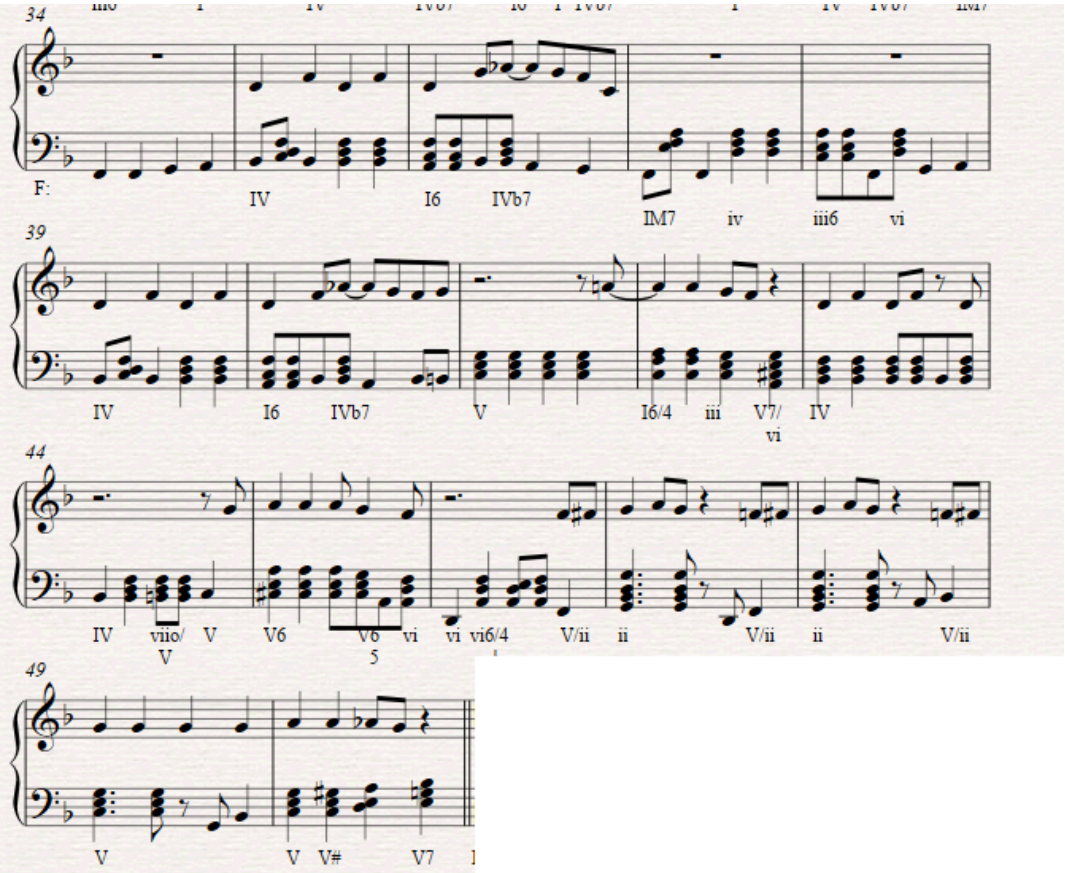
[6] Hopkins, 14.



The second song of this set is *The Bend of Time* from *Chrono Cross* (1999, PlayStation) composed by Yasunori Mitsuda. With the CD-quality audio, one might assume that the guitar is a live instrument. This is still MIDI, even down to the guitar slide sound effects. By this point, video game sounds and instruments were slowly catching up to their real-life counterparts. This piece is another example of typical voice leading in video game music. This piece has the occasional secondary dominant, but the progression is very simple otherwise. Note the half cadence at the end of the piece, indicating the loop point. This piece illustrates secondary function chords, suspensions, and the use of ii7 and vi7 chords.



The last song of the set is *Snakey Shanty* from *Donkey Kong Country 2: Diddy's Kong Quest* (1995, Super Famicom) composed by David Wise (1967-). This piece has a bop/swing influence. The instruments present mimic a jazz combo with upright bass, piano, trumpet, and saxophone. This piece also takes influence from the blues scale, as seen in m.40 with the flat fourth scale degree. Chromaticism is also used with secondary dominants and seven chords in mm.83 - 95. This is a great introduction to jazz theory. This could serve as a framework for a composition project or as an example of jazz/blues chord structure.



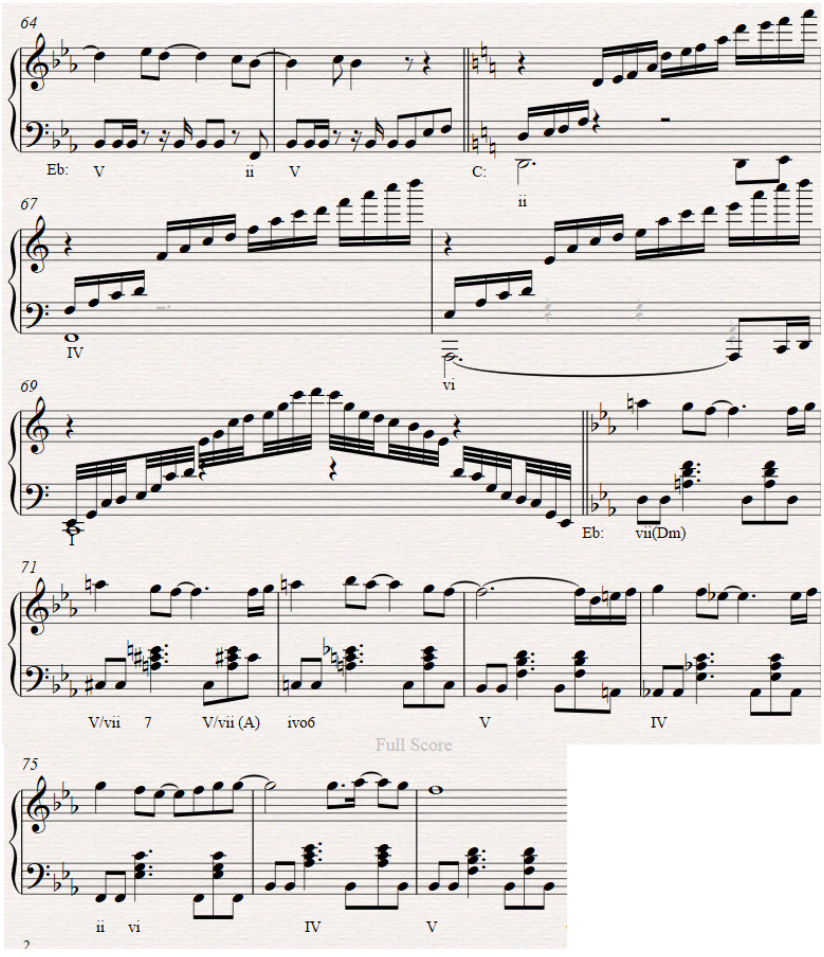
Song Set Three: The Modern "64-bit" Era (1996-)

The last set of songs consists of pieces composed for the SNES, N64 (1996), and WiiU (2011). The N64 is a cartridge based 64-bit system. The N64 does not have a sound chip. Instead, N64 programmers created audio routines in software that the CPU understands.[7] The signals are then sent from the CPU through the AV cables to whatever speaker lies on the other side. Finally, the WiiU was Nintendo's follow-up to the highly successful Wii (2006). The WiiU is capable of high-fidelity playback.

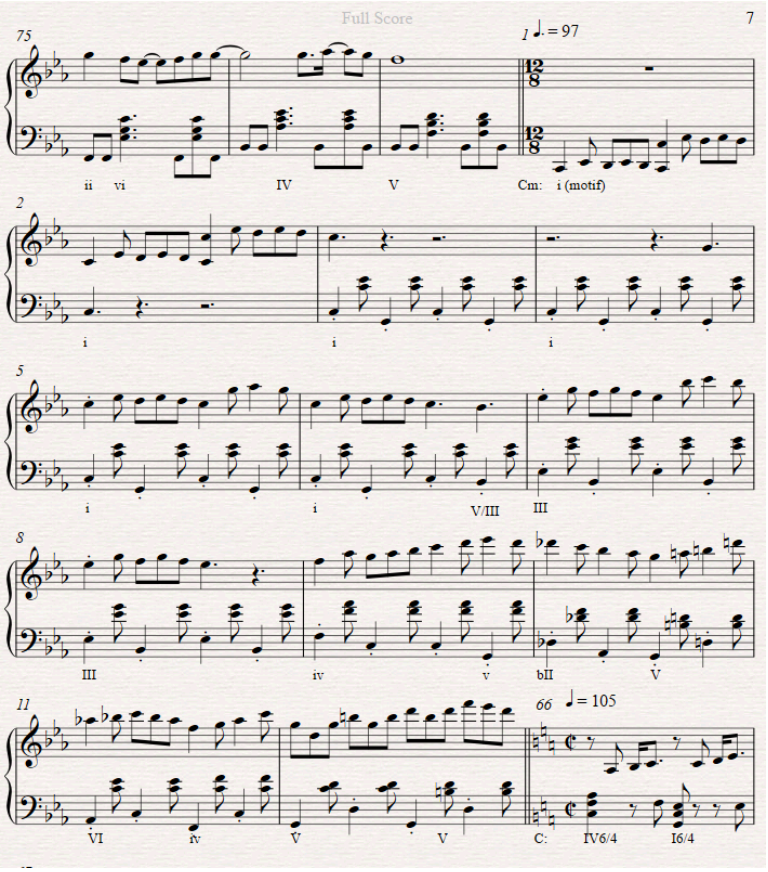
The first track of this set is *Forest Interlude* from *Donkey Kong Country 2: Diddy's Kong Quest* (1996) composed by David Wise. This song demonstrates the capabilities of the SNES

[7] Hopkins, 12.

sound chip. The synths and samples heard in this song are very unique for the time it was composed. In m.67 the texture of the piece changes dramatically. The 16th notes on the first beat of m.67 are repeated four times, with each repetition up the octave. This sequence continues until it is altered in m.69. In m.69 a descending pattern is implemented, compacting the sequence into 32nd notes. Another sequence begins in m.70. This time, the bass moves down a half-step each measure through m.73. Like with most of the excerpts, the half cadence in m.77 serves as the loop point for the song. This piece could be used as an example of sequences and how they function within a composition. Additionally, secondary chords are used in the sequence as part of dominant preparation. Overall, this piece can serve as practice for a wide variety of compositional and theory techniques.

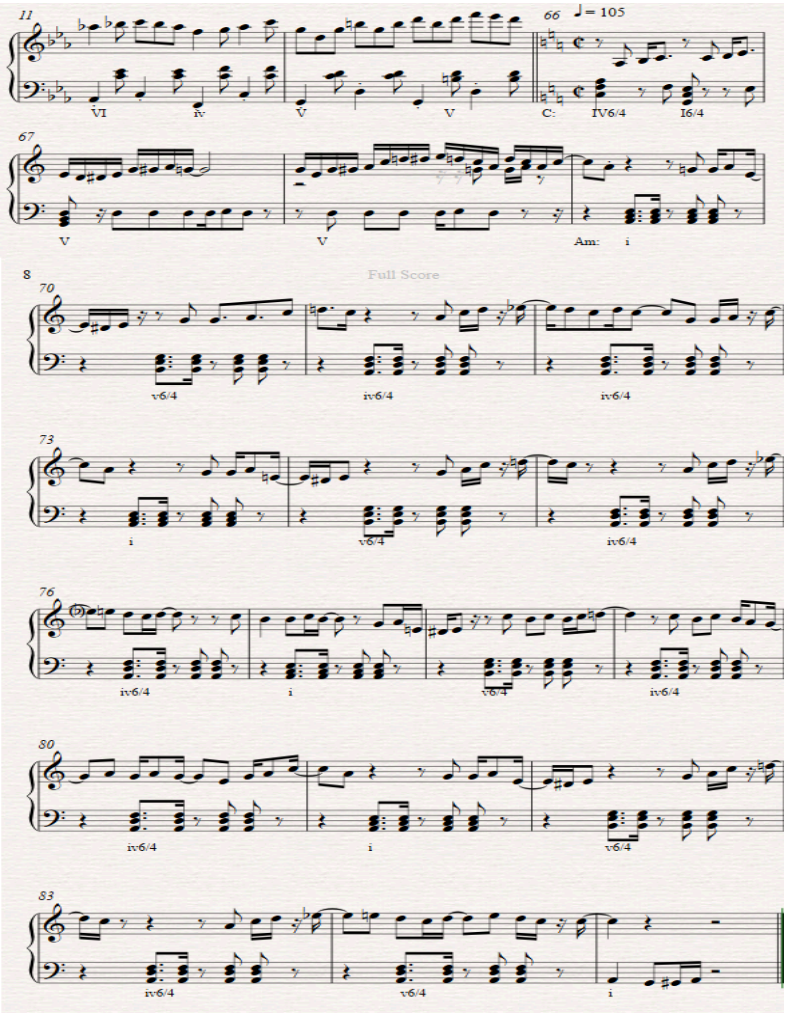


The second song of this set is *Gruntilda's Lair* from *Banjo-Kazooie* (1998) by Grant Kirkhope (1962-). For context, this song is the background track for the main hub area between levels. There is a unique arrangement of this theme for each level in *Banjo Kazooie*, but the general motif stays the same throughout. The sequence for this piece begins at the pickup to m.5 and ends on m.8. The key of Eb, or III is tonicized briefly on the pickup to m.7 through m.8. A new sequence begins on the downbeat of m.9 on the iv chord. Interestingly the bII, or Neopolitan chord is utilized in m.10. The phrase ends on a V chord, which leads into the next instance of the theme at mm.5 – 12. This piece would be a great example of motifs, phrasing, modulation through secondary dominants, and the Neopolitan chord.



The final song of this set is *Busted Bayou* from *Donkey Kong: Tropical Freeze* (2014) by David Wise. Published 19 years after DKC2, *Tropical Freeze*'s tracks are just as catchy as the

originals. No longer bound by sound channels or storage constrictions, *Busted Bayou*'s runtime comes in at over six minutes of high-fidelity live recorded music. The track has heavy reggae and jazz influences. The section begins in C major before modulating to the relative minor, a, in m.69. From then on, the soloist improvises over the backing chords (minor v and iv). The progression repeats starting on the downbeat of m.77. The soloist uses chromaticism and syncopation to accent their melodic line. The structure of this piece is like any jazz standard. The opening motif is played, followed by a solo featuring a different member of the ensemble each time. This short section is an excellent introduction to jazz improvisation, syncopation, and the different instruments of an ensemble.



Video game music has existed for less than a century, yet its compositions reflect the past four hundred years of musical theory technique. This is in part due to the technological limitations of earlier consoles. By limiting the resources that composers had, they needed simple melodies that were also compelling. Video game music provides students with countless modern examples of theory technique outside of the standard four-part Bach chorale. By including musical examples that students can recognize by ear, they can feel more connected to the subject material. The nine tracks I selected for this project are just a small glimpse of what video game music theory has to offer. The simple melodies of early video game music can serve as great templates for a theory composition project as well. Learning video game music on piano was what reignited my passion for making music. Without it, I would not be pursuing a career in music education. I hope to see others including examples from video games in their curriculum, as it has numerous benefits. This project has provided me the opportunity to study one of my favorite passions. I will strive to use this knowledge to better the theory curriculum and my future students. I hope that through this curriculum, my future students will want to invest themselves in music theory. The world of music has much to offer, and I look forward to my continued involvement within it as a music educator.

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Appendix

Arrangements By:

Daniel Thompson – *Overworld* (Super Mario Brothers), *Overworld* (The Legend of Zelda), *Overture* (Dragon Quest III)

_lavenderskies – *Wings That Cross Time* (Chrono Trigger)

Latios212 – *The Bend of Time* (Chrono Cross)

Nine Lives – *Snakey Chantey* (Donkey Kong Country 2: Diddy's Kong Quest)

Brassman388 – *Forest Interlude* (Donkey Kong Country 2: Diddy's Kong Quest)

The Deku Trombonist – *Gruntilda's Lair* (Banjo-Kazooie)

Nintendo Sheet Music – *Busted Bayou* (Donkey Kong: Tropical Freeze)

Playlist:

https://youtube.com/playlist?list=PL3xOsITwjpHePF7L9PtWoHi0JNQyXLP8j