Harmonic Hierarchies for Adaptive Game Music

A Theory-Driven Framework for Modular, Recombining, and Immersive Scoring

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Author:
Dave Maynard
dax@solarhavoc.com • 407-617-3112

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Berklee College of Music – Capstone Project

Abstract

This capstone project presents Harmonic Hierarchies for Adaptive Game Music, a compositional and technical framework developed to redesign and score a Unity/Wwise Tetris project through a rigorously music theory-driven adaptive system. Traditional approaches to adaptive scoring; vertical remixing and horizontal re-sequencing, provide flexibility but often lack musical intentionality, resulting in transitions that can feel abrupt, predictable, or mechanically modular. In contrast, the Harmonic Hierarchies framework constructs adaptability at the compositional level through carefully designed entrance and exit chords, pivot tones, modal mixtures, and chromatic or functional cadential junctions. These elements form a network of harmonic "domains" that allow musical phrases and sub-phrases to recombine seamlessly in real time while maintaining a coherent musical identity.

Across four gameplay stages; Main Menu ("Welcome Woods"), Stage 1 ("Whispers in the Woods"), Stage 2 ("The Mansion Beckons"), and Stage 3 ("Inside the Mansion"); the score uses hierarchical phrase structures, randomized instrumental variants, and multi-tiered loop cells to generate hundreds of unique musical outcomes per stage without sacrificing compositional cohesion. The framework extends beyond gameplay: dedicated Win and Loss cues were also composed within the same hierarchical logic, demonstrating that Harmonic Hierarchies can support not only looping gameplay textures but also emotional, narrative, and transitional states. The Loss cue uses celeste-based music-box minimalism with randomized bass-derived melodies, while the Win cue employs a quirky chromatic waltz built to repeat indefinitely without resolution; both constructed with deliberate pivot points to enable seamless transitions from any gameplay state.

The technical implementation involved a full rebuild of the project's Wwise architecture, transition logic, and Unity game states, ensuring tight synchronization between harmonic design and engine behavior. The resulting system achieves a high degree of musical variability; measured in hundreds of combinatorial outcomes per cycle, while preserving a unified aesthetic arc across the entire score. This paper demonstrates that composition-driven hierarchical harmony can serve as both an artistic and engineering solution for adaptive game scoring, offering a structured yet flexible method for creating dynamic, musically convincing, and highly replayable game soundtracks.

Introduction

Adaptive music systems have become a cornerstone of modern game scoring, allowing composers to shape a player's emotional experience dynamically as gameplay conditions change. Most implementations rely on two primary strategies: vertical layering, in which stems are added or removed to alter intensity, and horizontal re-sequencing, where precomposed sections play in varied orders. While powerful, these approaches often operate independently from the compositional process itself. Layers are added after the music is already written; transitions are engineered after phrases already exist. The result is frequently functional but musically fragile; sections can feel stitched together, and changes in intensity or direction may be technically correct while still sounding abrupt, predictable, or lacking in expressive nuance.

This capstone project approaches adaptive scoring from a different angle. Instead of adjusting finished music to fit an adaptive structure, the music is composed from the ground up to support adaptability. The resulting methodology, which I have titled Harmonic Hierarchies for Adaptive Game Music, uses traditional and modern music theory; particularly harmonic function, modal interchange, chromatic mediants, pivot tones, and cadential structures, as the architectural backbone for modular branching. In this system, musical fragments are not merely interchangeable because they share a tempo or meter; they are interchangeable because their entrance and exit points are composed intentionally to resolve, pivot, deceive, or extend into any number of harmonic destinations. Harmony becomes the map, the routing system, and the connective tissue between otherwise non-linear musical pathways.

This framework formed the basis of a complete scoring and partial redevelopment of a Unity/Wwise Tetris project. The original version contained logical flaws, broken transitions, and a static score; in its place, I implemented a multi-stage adaptive structure with distinct musical worlds connected by harmonic logic. Throughout the project, I also rebuilt the game's UI, fixed and extended gameplay logic, created a new visual progression using AI generated art assets, and redesigned the Wwise architecture to support the hierarchical model. The technical implementation and the compositional philosophy were therefore developed in tandem, reinforcing one another.

The resulting score spans four major gameplay stages: Main Menu ("Welcome Woods"), Stage 1 ("Whispers in the Woods"), Stage 2 ("The Mansion Beckons"), and Stage 3 ("Inside the Mansion"), each with its own tonal, textural, and rhythmic identity. Yet despite the stylistic diversity, the stages remain unified through their underlying harmonic hierarchies. Each stage employs primary "hub" phrases and multiple loop cells with randomized instrumentation, allowing for hundreds of musically coherent variations per playthrough. Even transitional cues such as the Win and Loss music were designed within the same structural principles, ensuring that emotional shifts maintain continuity rather than interrupting the musical arc.

In essence, this project demonstrates that adaptive game music does not need to be a patchwork of stems and segments arranged by technical systems after composition is finished. Instead, adaptive behavior can be embedded directly into the music itself through harmonic design, phrase architecture, and motivic planning. By foregrounding composition as the engine of adaptability, the Harmonic Hierarchies framework offers a way to create scores that feel organic, expressive, and endlessly variable; scores that evolve with the gameplay while preserving the composer's musical intent. This paper explores the theoretical foundations of this approach, the technical implementation in Unity and Wwise, and the artistic results that emerge from treating harmony as a dynamic, hierarchical system capable of supporting complex adaptive behavior.

The Conceptual Framework: Harmonic Hierarchies

Motivation

Traditional adaptive systems struggle because transitions are often added after the fact. My approach reverses this: I compose phrases designed from the start with explicit:

- Entrance chords
- Exit chords
- Pivot tones
- Cadential junctions
- Compatible modal/chromatic "domains"

These create closed harmonic ecosystems in which any phrase can lead into any other without awkward voice-leading.

Hierarchical Harmonic Domains

Each stage is organized into hierarchies:

- **Primary phrases (P1, P2, P3)**: larger 4 to 8 or 9 bar structures that establish the harmonic domain.
- **Loop cells (L1 thru Lx)**: 2-bar or 4-bar sub-phrases that recombine indefinitely in many permutations.
- **Entrance nodes**: tones or chord structures where incoming material may land.
- **Exit nodes**: tones or chords that push forward without resolution.

The magic is in designing every exit to function as a viable entrance for every possible next fragment.

Sub-Phrase "Tiles," Motivic Overlays, and Orchestrational Variants

The Harmonic Hierarchies system treats sub-phrases not as simple musical fragments, but as modular microstructures capable of being recombined at multiple layers of musical identity: harmonic, rhythmic, motivic, and timbral. This project demonstrates that adaptivity in game scoring can be constructed at an extremely fine granularity, enabling meaningful variation without sacrificing coherence.

In traditional adaptive music, variations are often created by swapping stems or toggling layers on/off. While this can change density or intensity, it rarely alters the intrinsic musical logic of a phrase. Harmonic Hierarchies expands this concept into a much deeper multidimensional system:

I. Motivic Overlays as Independent Adaptive Units

Motivic materials; small rhythmic or melodic cells, can be composed as free-floating agents that enter or exit based on pivot tones, textural space, or harmonic compatibility. Instead of being tied

permanently to a specific phrase, they become attachable modules governed by the same harmonic rules that govern phrase transitions.

For example, in Stage 1, small woodwind and harp overlays are built using tones from the Dm, Gm, Fmaj7(#11), domain; because they share the same harmonic DNA, they can be added or removed without disturbing the musical grammar. In Stage 3, angular diminished and whole-tone fragments are treated similarly, becoming interchangeable within their chromatic domain.
This project shows that motivic fragments can behave adaptively as long as their intervallic content aligns with hierarchical harmonic design.

II. Orchestrational and Instrumentation Variants at Microscopic Resolution

One of the strongest validations of Harmonic Hierarchies is the realization that orchestration itself can be modularized; down to individual instruments, tone-color pairings, and voicing strategies, without creating musical disjunction.

Because each loop cell is harmonically "multivalent" (i.e., able to support multiple orchestrational realizations), the system allows:

- flute-only versions
- oboe-only versions
- combined "choir" versions
- low brass vs. split brass voicings
- string bed textures with or without harp
- synth and percussion variants
- deliberate insertion of silence

Each orchestration variant remains musically meaningful because the hierarchy stabilizes the harmony and voice-leading at the structural level. The timbral layer sits on top of a solid harmonic architecture.

III. Harmonic and Melodic Variations Within the Same Structural Slot

The design also proves that harmonic or melodic content can diverge substantially from its siblings while still sharing the same structural slot in the hierarchy.
For example:

- Stage 2's L1 loop uses Am(add9) to B°7, whereas L4 uses Dm(add♭6) to F♯7(alt).
- These are harmonically unrelated on the surface, yet structurally equivalent within the hierarchy because their exit tones pivot into the same Am, Fm, Cm, E°7 domain.

Likewise, melodic line variants can emphasize different structural tones (third vs. seventh vs. extensions) without breaking their ability to pivot into the next domain.

IV. Sub-Phrase Tiles as a True Compositional Grammar

Ultimately, the project confirms that sub-phrase tiles are not just interchangeable audio assets; they function as grammatical units in a compositional language. Each tile is validated by:

- harmonic compatibility
- voice-leading feasibility
- intervallic neutrality or deliberate tension
- pivot-tone alignment
- orchestrational flexibility

In short, this project demonstrates that adaptive recombination can operate all the way down to the level of individual notes, voicings, and timbral decisions, as long as the hierarchical harmonic foundation is solid.

Harmonic Hierarchies transforms adaptivity from a mixing trick into a compositional principle.

Music Theory as Architecture

The philosophical core of this project is that **music theory is not merely expressive; it is architectural**. In most adaptive projects, harmony and form are written first, and only later chopped into stems or sections to fit engine constraints. Harmonic Hierarchies inverts that relationship: theory becomes the blueprint for how Wwise, Unity, and the composition itself behave.

I. Harmony as a Routing System

Every entrance and exit point in the composition is built using functional cadences, deceptive cadences, modal mixture, or chromatic pivot chords. These are not simply stylistic choices; they are routing instructions that determine how any phrase can transition into any other.

Examples:

- Dominants and secondary dominants (A7 to Dm7) give strong downward pull into minor domains.
- Diminished seventh chords (E°7, G#°7) create symmetrical pivot structures enabling effortless modulation in any direction.
- Lydian and Lydian♯11 colors (Fmaj7♯11, Cmaj7♯11) provide “neutral brightness,” allowing phrases to glide upward without tonal commitment.
- Chromatic mediants (Fm to Cm to B♭m) create rich coloristic movement while leaving pivot tones intact.

Each of these tools becomes a navigation rule inside the adaptive system.

II. Cadential Junctions as "Adaptive Nodes"

At the heart of the hierarchy are cadential junctions; composed endings designed to resolve in multiple valid ways.

Instead of writing a single cadence, the composer writes a multi-vector cadence:

- V can resolve deceptively to vi
- V/V can resolve to ii instead of V
- Altered dominants can resolve upward, downward, or in place
- Pivot chords can reinterpret their function based on context

These junctions form nodes at which the music can branch in several directions without sounding "wrong."

III. Modal and Chromatic Domains as Self-Sufficient Ecosystems

Each stage employs its own harmonic ecosystem:

- Main Menu: Lydian hybrid brightness with whimsical diatonic pivoting
- Stage 1: Modal (D minor, Dorian, Aeolian, add tones)
- Stage 2: Chromatic Mediants, Diminished Symmetry
- Stage 3: Whole-tone hybrids, Super Locrian, Altered Dominants

The key insight is that any system with internally consistent intervallic logic can support adaptive recombination, as long as the composer defines its boundaries. Harmony becomes the "physics" of each world.

IV. Voice Leading as Behavioral Logic

Instead of scripting transitions in Wwise via timing alone, transitions are scripted through voice-leading:

- shared tones between chords
- common-tone diminished structures
- parallel mediants with retained intervals
- contrary or oblique motion built into the phrase endings

This transforms voice-leading into an executable behavior, not merely a compositional detail.

V. A Unified Theory for Multistage Adaptive Scoring

The same set of theoretical principles works across:

- whimsical Lydian main menu dances
- eerie "synth score" modal Stage 1 textures
- 1950s chromatic Stage 2 horror
- manic Stage 3 diminished chaos
- and even the Win/Loss emotional cues

This proves the robustness of the theory: Harmonic Hierarchies is style-agnostic as it would be equally at home in classical theory, jazz harmony, chromatic post-tonal writing, and cartoon horror idioms.

Stage-by-Stage Case Studies

This section demonstrates how Harmonic Hierarchies performed in practice.

Menu Music: “Welcome Woods”

Musical Identity

The Main Menu music introduces the player to the game’s whimsical retro-gothic aesthetic. The cue is playful, bright, and slightly mischievous, drawing on a C Lydian hybrid scale that mixes diatonic brightness with just enough chromatic color to foreshadow the darker stages ahead. Writing in 12/8 at 110 BPM gives the cue a lilting, dance-like motion reminiscent of lighthearted fantasy cues.

Instrumentation gradually expands through additive orchestration; flourishes, woodwind runs, and light percussion, mirroring the idea of the player “entering” the strange world of the game. The cue needed to loop indefinitely, which made harmonic flexibility and clear cadential junctions essential.

Harmonic Structure

The harmonic design demonstrates how the Harmonic Hierarchies system functions at its most playful. Every phrase is constructed with forward motion in mind, and every cadence is built to “lean” into multiple viable next destinations. Below is the full pre-existing harmonic blueprint, organized into Intro, Primary Phrase, and Loop Cells.

8-bar Primary Phrase (P_1) is the “hub phrase” that can exit cleanly to any of six 4-bar looping phrases (L_1 - L_6) which do so indefinitely.

Intro (2 bars) – Does Not Repeat

A short invocation built from bright Lydian color:

| Cmaj(#11) | G7(♭9), E7(#9) |

Primary Phrase P_1 P_1 (9 bars) – Does Not Repeat

A long-form hub phrase containing several pivot-dominant structures:

| Cmaj7(#11) | Cmaj7(#11) | A7 | Dm7, G7(♭9) | Cmaj9 |

| Fmaj7(#11) | E7(#9) | A7(♭13) | D7(#11) |

Exit Cadence (Built Into Final D7(#11))

The D7(#11) serves as a multi-functional cadential junction, capable of resolving convincingly into six different harmonic domains:

- **D7(#11)** to **Gm11** (L_1)
- **D7(#11)** to **A7** (L_2)
- **D7(#11)** to **Bbmaj7** (L_3)
- **D7(#11)** to **E7** (L_4)
- **D7(#11)** to **Fmaj7(#11)** (L_5)
- **D7(#11)** to **Cmaj7 (deceptive)** (L_6)

These relationships include:

- functional V/ii motion
- chromatic mediants
- deceptive resolutions
- pivot-chord reinterpretations
- and Lydian-esque tonal shifts

This exit node is the centerpiece of the cue's modularity.

Hierarchy (Loop Cells L_1–L_6)

Each loop cell is a **4-bar self-contained harmonic module**. These function as textural "rooms" the player can wander into, each with its own personality but all linked through the D7(#11) multi-resolve structure.

L_1 – Gm11 Cycle

| Gm11 | C7 | Fmaj7(#11) | G7 |

L_2 – Dominant Minor Pull

| A7 | Dm7 | G7(♭9) | E7 |

L_3 – Bright Maj7 / Minor Mix

| Bbmaj7 | D7 | Gm7 | C7 |

L_4 – Altered-Dominant Loop

| E7(#9) | A7(♭13) | D7 | G7 |

L_5 – Lydian Glow

| Fmaj7(#11) | C/E | G7 | Fmaj7 |

L_6 – Cmaj7 Home-Color Cycle

| Cmaj7 | A7 | Fmaj7 | D7(#11) |

Each loop is designed to pivot back to the representative feel of the D7(#11), completing the hierarchy and continue to loop indefinitely.

Adaptive Outcome

The Main Menu music is the clearest proof-of-concept for Harmonic Hierarchies system as a functional adaptive system. Because the primary phrase ends on a multi-vector cadence, the cue can branch into any of the six loop cells without ever sounding forced or unnatural. The loop cells, in turn, are composed with internal voice-leading and harmonic pathways that keep them compatible with the returning pivot that feels like the original P_1 exit point D7(#11).

This creates a musical system in which every possible recombination is theoretically justified; no randomization feels arbitrary, and no transition betrays the underlying musical logic. The player may stay in the menu for 10 seconds or 10 minutes; in both cases, the music continuously renews itself through meaningful harmonic variation rather than simple repetition.

In short, the Main Menu music demonstrates the foundational premise of Harmonic Hierarchies: when harmonic structure is intentionally designed for modularity, adaptability becomes musically expressive rather than mechanically functional.

Stage 1: "Whispers in the Woods"

Musical Identity

Stage 1 shifts the score into a darker, more atmospheric "synth score" world while still maintaining elegance and restraint. The cue is slow, slightly eerie, and intentionally sparse, serving as a "breathing space" between the whimsical Menu music and the more harmonically complex stages to come. Written in 7/8 at 72 BPM, the asymmetric meter contributes a sense of unease, as if the music is constantly leaning forward but never settling.

The tonal palette is built around D minor with modal mixture (add9, add4, ♭6, and #11 color tones), enriched with touches of Lydian and whole-tone color inherited from the Main Menu cue. Instrumentation favors low strings, bass clarinet, harp, subtle synth pads, and airy choral textures. The goal was to create a floating, spooky "forest-at-night" feeling; musical mist rather than melodic narrative, where harmonic shapes unfold as shifting textures rather than traditional progressions.

This stage also introduces a new level of modularity: two primary P phrases (P_1 and P_2), each functioning as a hub, but mutually exclusive; never played back-to-back. This design increases musical variety while preserving textural coherence.

Harmonic Structure

Stage 1 is the first full demonstration of **non-functional Harmonic Hierarchies**, where classical cadential motion is intentionally avoided. Instead, every phrase ends with pivot tones rather than cadences, enabling seamless recombination between textures.

Intro (2 bars) to **P_1 or P_2** (4 bars each) to **L_1 thru L_6 randomly** (2-bar texture cells) **but only 4 out of the 6** to **loop back** to **P_1 or P_2** then repeat etc.

Intro (2 bars) – Does Not Repeat

An atmospheric arrival gesture:
| Dm(add9) | Dm(add4) |

This sets the harmonic "domain" without committing to any forward motion.

Primary Phrase P_1 (4 bars) - Repeats (exclusive from P_2)

| Dm(add9) | Gm9 | Fmaj7(#11) | Eø7, A7(♭9, no 3rd) |

This phrase moves through increasingly ambiguous extensions; add9, add11, half-diminished, setting up a floating texture rather than a traditional progression.

Primary Phrase P_2 (4 bars) - Repeats (exclusive from P_1)

| Dm(add6, add9) | Bbmaj7(#11) | Gm11 | Fmaj7(#11), Eø7(no 3rd) |

P_2 creates a parallel-but-distinct atmospheric world: slightly darker, slightly more ambiguous, elegantly avoiding cadential arrival.

Exit Nodes (Texture-Based Pivots)

One of the defining innovations of Stage 1 is that no cadence resolves; instead, chord tones act as pivot nodes:

- **P_1 exit tones:** D, F, A, C, G, Bb, E can pivot into any loop cell
- **P_2 exit tones:** A, C, E align with the Dm/A7/Eø7 domain, maintaining suspension

This preserves perpetual motion and removes any sense of structural "arrival."

Loop Cells (L_1 thru L_6) - 2-Bar Texture Modules

Each loop cell is a self-contained, repeating harmonic texture designed to behave like a modular "room" in the forest. Unlike Stage 0 (Main Menu), they do not progress; they rotate, reinforcing the sense of being lost or wandering.

L_1 – D Minor Atmosphere
| Dm(add4, add9) | repeat |
L_2 – G Minor Color
| Gm(add6) | repeat |
L_3 – Floating F Lydian
| Fmaj7(#11, no 3rd) | repeat |
L_4 – Suspended Diminished Cluster
| Eø7(no root, bass on G) | repeat |
L_5 – Bright Yet Unstable Bb Lydian♯11
| Bbmaj7(add#11) | repeat |
L_6 – Open Dominant Cloud
| A7sus4(no 3rd, add9) | repeat |

Each loop is harmonically self-contained but coloristically tied to the Dm/Gm/Bb/F Lydian ecosystem.

Hierarchy (P_1 / P_2 to L_1 thru L_6 Logic)

The Stage 1 hierarchy introduces **greater structural nuance** compared to the Menu stage. The full adaptive logic is:
Intro to **P_1 or P_2** to **any 4** of the **6 loop cells (L_1 thru L_6, no repeats)** then **return to P_1 or P_2** then continue indefinitely

Key structural values:

- P phrases alternate naturally due to mutual exclusivity
- Only 4 of the 6 loops play per cycle, increasing replay variety
- 2-bar durations increase the density of modular branching
- No cadences to no reset to perpetual suspension

This stage is less about harmonic destination and more about harmonic environment.

Adaptive Outcome

Stage 1 is where Harmonic Hierarchies becomes truly ambient-adaptive rather than cadential-adaptive. By removing functional harmony entirely and relying on pivot tones, additive tensions, and suspended chord structures, the system creates a modular texture world in which any fragment can follow any other. This allowed the music to adapt continuously without ever revealing seams.

The two P phrases act as atmospheric anchors, each defining a slightly different "color field," while the loop cells behave like modular harmonic textures that can drift in and out freely. The hierarchy ensures that, despite the non-linear branching, the player experiences the music as a single evolving environment rather than as a collection of stitched-together loops.

In short, Stage 1 demonstrates that adaptivity does not require harmonic motion; it can instead be built on textural transformation, pivot-tone logic, and the avoidance of cadential commitment. It is a subtle but powerful application of the Harmonic Hierarchies concept.

Stage 2: "The Mansion Beckons"

Musical Identity

With Stage 2, the score makes a dramatic stylistic shift into an homage to 1950s horror and science-fiction cinema, complete with theremin, chromatic mediants, symmetrical diminished structures, and that classic "never truly major" tonal language. Despite the aesthetic departure from Stage 1's modal-ambient world, Harmonic Hierarchies functions flawlessly, because its foundation is not style but music theory logic.

The music sits at 50 BPM in 6/8, creating a slow, hovering, almost ritualistic pulse. The theremin's gliding microtonal portamenti sit above a harmonic bed that constantly drifts between

minor, diminished, and altered dominant environments. The result is intentionally unstable: a gothic yet elegant nightmare that guides the player toward the looming haunted mansion.
The harmonic language is built around chromatic mediants, symmetrical diminished patterns, melodic-minor derivatives, and altered dominants. These are hallmarks of the 1950s horror idiom; yet they integrate seamlessly into the Harmonic Hierarchies system because each phrase is composed to pivot harmonically rather than arrive cadentially.

Harmonic Structure

Stage 2 demonstrates the adaptability of Harmonic Hierarchies in a highly chromatic environment. Unlike Stage 1's pivot-tone modal clouds, Stage 2 embraces dramatic, often unexpected harmonic color shifts; but without sacrificing structural continuity.

Intro (2 bars) to **P_1 or P_2** (8 bars each) to **L_1** thru **L_6 randomly** (2-bar texture cells) **but only 4 out of the 6** to **loop back** to **P_1 or P_2** repeat etc.

Intro (2 bars) – Does Not Repeat

A purely textural gesture played by gong and cymbals; no harmony, only atmosphere, giving a clean transition from Stage 1:
(gong/cymbal flourish, no pitched content)

Primary Phrase P_1 (8 bars) – Repeats (mutually exclusive from P_2)

Built on chromatic mediants and diminished symmetry:
| Am(add9) | Fm(maj7) | Cm | E°7, Am |
| Gm7(add11) | B♭m(maj7♯11) | Am | E7(♭13♭9) |
This phrase establishes A minor as a gravitational center but destabilizes it immediately with dramatic chromatic side-slips (Am to Fm to Cm), creating a classic horror tension landscape.

Primary Phrase P_2 (8 bars) – Repeats (mutually exclusive from P_1)

A variant hierarchy with its own chromatic logic:
| A♭m(add9) | Emaj7 | C♯m7(add11) | F♯7(alt) |
| Dm(maj9) | F°7, E7(♭9) | Fmaj7(♯11) | Am7(add9) |
Here the movement cycles through a chain of modal mixtures, altered dominants, and diminished pivots before eventually returning to the A minor domain at the end.

Exit Nodes (Chromatic Cadential Junctions without Cadences)

Stage 2's key innovation is applying Harmonic Hierarchies to a non-functional, non-diatonic, highly chromatic idiom.

Instead of relying on pivot tones like Stage 1 or functional cadences like the Main Menu, Stage 2 uses:

- diminished symmetry (°7 chords)
- chromatic mediants (m to Mmaj7 to m)
- altered dominants (♭13, ♭9, ♯11, alt)
- melodic-minor-based lydian ♯11 colors

These allow phrases to "slide" into any loop cell without violating the harmonic grammar of the style.

Because diminished seventh chords and altered dominants can move almost anywhere with justification, the exits of both P_1 and P_2 function as multi-directional chromatic gateways.

Loop Cells (L_1 thru L_6) - 2-Bar Chromatic Texture Modules

Each loop cell acts as a miniaturized harmonic world; tonally distinct, but internally consistent enough to pivot back to either P phrase.

L_1 – Minor & Diminished Pivot
| Am(add9) | B°7 |
L_2 – Parallel Minor Mediant Drift
| Fm(maj7) | A♭m7(add11) |
L_3 – Chromatic Minor + Diminished Symmetry
| C♯m | E°7 |
L_4 – Minor & Altered Dominant
| Dm(add♭6) | F♯7(♭13♭9) |
L_5 – Lydian-influenced Minor/Pandiatonic Blend
| Gm(maj7♯11) | B♭m7(add9) |
L_6 – A Minor Return Path
| Am | E7(♭9) |

Together, these loop cells form a chromatic network of interrelated harmonic micro-domains.

Hierarchy (P_1 ↔ P_2 ↔ L_1–L_6 Logic)

The formal structure is:
Intro to **P_1 or P_2** to **any 4 of the 6 loop cells (L_1 thru L_6, no repeats)** to **return to P_1 or P_2** to continue indefinitely.
Structural highlights:

- Both P phrases supply broad chromatic motion, but each returns to Am or Am7(add9), grounding the hierarchy.
- Diminished chords (E°7, F°7, B°7) act as universal pivot devices.
- Altered dominants offer multiple resolutions that feel stylistically authentic.

- Loop cells cover nearly the entire chromatic spectrum but remain bonded through shared intervallic patterns and pivot structures.
- Only 4 of 6 loops per cycle ensures high permutation count and constant freshness.

This is the Harmonic Hierarchies concept applied to a non-functional, chromatically saturated environment.

Adaptive Outcome

Stage 2 is a critical demonstration that Harmonic Hierarchies is style-independent.
Even in a tonal world defined by:

- no functional cadences
- dramatic chromatic mediants
- diminished symmetry
- altered dominant chains
- "never fully major" harmonic logic
- and theremin-driven melodrama

…the adaptive system works flawlessly because its core is music theory, not style or genre.

The hierarchy ensures that despite the intense chromaticism, the music never sounds broken or stitched together. The diminished and altered structures used here are inherently modular; they thrive on reinterpretation. Harmonic Hierarchies simply formalizes this into a predictable, repeatable system.

The result is a cue that feels rich, cohesive, and period-authentic while still supporting a multitude of adaptive pathways. It gives the player the sense of slowly approaching something ominous and bizarre; exactly the narrative goal, without sacrificing musical continuity.

Stage 2 proves that even the most esoteric harmonic languages can be organized into a stable adaptive framework when built on intention, pivot logic, and hierarchical design.

Stage 3: "Inside the Mansion"

Musical Identity

Stage 3 explodes into a frenetic, madcap, almost unperformable "comedic horror" aesthetic directly inspired by Danny Elfman's Beetlejuice, Edward Scissorhands, and Nightmare Before Christmas manic set pieces. The writing embraces the idea of wild abandon: sudden chromatic pivots, angular woodwind runs, diminished clusters, augmented explosions, and almost cartoonish surprise gestures.

At 148 BPM in 4/4, with a "7-beat + 1-beat" internal bounce per 2-bar subphrase, this stage was deliberately designed to feel unstable; spastic, circus-like, and constantly transforming. It represents the moment the player fully enters the mansion's inner chaos.

Despite this stylistic extremity, Harmonic Hierarchies remains perfectly intact. The system handles all the chromatic symmetries, diminished rotations, altered-dominant chains, and custom whole-tone scales effortlessly because Harmonic Hierarchies is built on entrance/exit compatibility, not on stylistic predictability.

Stage 3 required the most complex hierarchy in the entire score:

- **three different P phrases** (P_1, P_2, and P_3),
- **nine different loop cells** (L_1 thru L_9) grouped into three sets
- and a **multi-tiered adaptive path** requiring seamless transitions through progressively more chaotic harmonic textures.

Intro (2 bars) to **P_1 or P_2 or P_3** (8 bars each) to **L_1** thru **L_3 randomly** (2 bar texture cells) **but only 2 out of the 3** to **L_4** thru **L_6 randomly** (2 bar texture cells) **but only 1 out of the 3** to **L_7** thru **L_9 randomly** (2 bar texture cells) **but only 1 out of the 3** to **loop back** to **P_1 or P_2 or P_3** then repeat etc.

This is the ultimate stress test for Harmonic Hierarchies; and it passes flawlessly.
Harmonic Hierarchies

Harmonic Structure

The harmonic language in Stage 3 is built almost entirely from:

- whole-half and half-whole diminished patterns
- Super Locrian / Altered Dominant collections
- Lydian dominant (♯11)
- augmented triads and rotated augmented cells
- melodic-minor-derived minor-major hybrids
- custom synthetic scales

It is intentionally volatile, yet architecturally anchored.

Intro (2 bars) – Does Not Repeat

A gong-and-cymbal-only gesture, continuing the tradition from Stage 2; an atmospheric "curtain rise."

Primary Phrase P_1 (8 bars) – Repeats

A manic oscillation between Em and chromatic/diminished variants:

| Em | Em, F°7 | Em | Em, B7(♭9) |

| Em | Em, Fmaj7(#11) | Em | Em, B7(♭9♭13) |

This phrase establishes the Em domain without ever giving it stability; diminished and altered dominant interruptions constantly disrupt its grounding.

Primary Phrase P_2 (8 bars) – Repeats

A parallel hierarchy in F minor:

| Fm | Fm, A°7 | Fm | Fm, C/E |

| Fm | Fm, Gm7 | Fm | Fmaj7(#11), B7(♭9) |

P_2 is a "shadow" version of P_1, replacing E minor with F minor and adding new chromatic interruptions.

Primary Phrase P_3 (8 bars) – Repeats

A third hierarchy built entirely from G# diminished cycles:

| G#°7 | G#°7, B7(♭9♯11) | G#°7 | G#°7, C+ |

| G#°7 | G#°7, B7(♭9♭13) | G#°7 | Fmaj7(#11), B7(alt) |

P_3 is the most chaotic, using symmetrical diminished motion to allow near-limitless modulatory potential.

Exit Logic (Multi-Directional Cadential Junctions)

Where Stages 1 and 2 relied on pivot tones and diminished symmetries, Stage 3 sets a new bar: every P phrase ends with diminished or altered dominant gestures, which are universally reinterpretable.

A°7 chord can:

- resolve up a half step
- resolve down a half step
- move by minor third
- move by tritone
- reinterpret enharmonically
- function as vii°7 of multiple tonal centers simultaneously

Altered dominants behave similarly (especially B7 with ♭9, ♭13, ♯11, alt).

Therefore, the exits of P_1, P_2, and P_3 form the broadest cadential junctions in the entire score.

Loop Cells (L_1 thru L_9) - 2-Bar Chaotic Texture Modules

Grouped in sets of three, from "chaotic but somewhat mild" (L_1 - L_3) to "extremely manic" (L_7 - L_9):

L_1 – Diminished Chromatic Horror
| E°7 | E°7, Fm | E°7, G7(♭9) |
L_2 – Augmented Cluster Machine
| C+ | C+, B7(♭9) | C+, F°7 |
L_3 – Chromatic Minor Swirl
| Gm(add9) | Gm(add9), G#°7 | Gm(add9), Fm6 |
L_4 – Altered Dominant Explosion
| F#7(♭9) | F#7(♭9), Gm7(♭5) | F#7(♭9), B7(#9) |
L_5 – Minor-Add9 → Diminished → Lydian #11 Hybrid
| Em(add9) | Em(add9), A°7 | Em(add9), Fmaj7(#11) |
L_6 – Lydian Dominant Freak-Out
| C7(#11) | C7(#11), B7(alt) | C7(#11), B7(♭9) |
L_7 – Minor → Diminished Cartoon Horror
| Am | Am, Bb°7 | Am, B7(♭9) |
L_8 – Dm7 → Diminished → Chromatic Minor
| Dm7 | Dm7, G#°7 | Dm7, Fm7 |
L_9 – Custom Whole-Tone Downward Spiral
| F+ | F+, F#°7 | F+, B7(♭9♭13) |
Each loop cell is effectively its own micro-ecosystem, yet all are tied together by:

- diminished symmetry
- altered dominant interchange
- augmented triad rotations

Hierarchy (P_1 / P_2 / P_3 / L_1 - L_9 Logic)

This is the most complex HH structure in the score:
Intro to **P_1/P_2/P_3** to **(2 of 3 from L_1 - L_3)** to **(1 of 3 from L_4 - L_6)** to **(1 of 3 from L_7 - L_9)** to **return to any P** to **repeat indefinitely**
Key structural innovations:

- Three P phrases, not two
- Three loop tiers, each more chaotic than the last
- Adaptive narrowing (2 or 1 of 3 selected each tier)
- Increasing tension curve built into the hierarchy
- Symmetrical harmonic devices allow non-functional fluidity

This creates a musical architecture that is structurally dense but perceptually seamless.

Harmonic Hierarchies and the Use of Exotic & Custom Scales

Stage 3 uses the most extreme collection of scales in the entire project; some tonal, some chromatic, some symmetrical, some entirely custom:

- **Phrygian Dominant / Half–Whole Hybrid (B7♭9)**

- **Super Locrian (B Altered)**
- **Mixolydian ♭9♭13**
- **Whole–Half Diminished (G#°7)**
- **Half–Whole Diminished (F#7♭9)**
- **Lydian Dominant (C7♯11)**
- **Custom Whole-Tone "Downward Spiral" (F+ scale: F E D♯ D C♯ C B A G)**

Any one of these could destroy a typical adaptive scoring system, but Harmonic Hierarchies thrives because Harmonic Hierarchies is not bound to a tonal center or scale. It is bound to entrance/exit compatibility.

As long as:

- the exit gesture can reinterpret a dominant or diminished function
- pivot tones or symmetrical intervals align
- the arrival chord shares a structural tone or intervallic logic

…the system remains intact.

This is why P_1 (Em), P_2 (Fm), and P_3 (G#°7); despite being completely unrelated, can freely lead into L_1 through L_9.

Adaptive Outcome

Stage 3 is the most dramatic demonstration of the power of Harmonic Hierarchies. Despite its massive complexity, wild chromaticism, and Danny Elfman-inspired spastic textures, every transition feels musically intentional. The three P phrases provide rotating hubs of tension, while the loop tiers create an adaptive tension "escalation ladder" that matches the gameplay's final-challenge energy.

Even though the materials come from diminished matrices, altered dominants, augmented triads, and bizarre synthetic scales, the Harmonic Hierarchies rules ensure that every branch, every recombination, and every shuffle reads as musically coherent. The result is a score that feels volatile, hyperactive, and chaotic; yet never sloppy or structurally random.

Stage 3 proves; beyond any doubt, that Harmonic Hierarchies can unify even the most extreme compositional languages into a stable, expressive, adaptive system.

Loss Music: "Music Box Farewell"

Musical Identity

The Loss music shifts the emotional palette dramatically. After the dense, high-energy chaos of Stages 1 - 3, the score collapses into something tiny, fragile, and almost shy: a celeste-driven

music box miniature. The texture is intentionally sparse, with only a handful of delicate ornamental gestures hinting at the broader harmonic world of the game.

To maintain a sense of quiet melancholy, the melody is simply the bass line played as an exposed solo line, offered through four randomized tone-color variants (flute, bass clarinet and cello at a low register and another at a higher register). Each variation subtly alters the emotional weight without disrupting the harmonic structure.

Harmonic Structure

The core loop is a single, gentle progression whose emotional clarity supports infinitely long contemplation; appropriate for the moment after defeat. Despite its simplicity, the harmonic structure was designed with the same Harmonic Hierarchies logic as the larger stages:

- each melodic variant enters on a stable chord tone
- the exit gesture lands on a pivot tone shared across all orchestrational variants
- randomized instrument swaps never change harmonic meaning, only color

Because Harmonic Hierarchies separates harmonic identity from orchestral realization, the intimate nature of the cue never conflicts with the adaptive system.

Adaptive Outcome

Loss music represents extreme minimalist adaptivity: instead of dozens of loops, there are only a few delicate melodic realizations. Yet Harmonic Hierarchies still governs every transition because the design preserves clean entrance and exit tones. Even as the instrumentation rotates through soft random variations, the harmonic continuity remains perfect.

This proves that Harmonic Hierarchies works at every scale; from massive chromatic systems (Stage 3) to the simplest of music-box gestures. With Harmonic Hierarchies, intimacy is not a limitation but simply another context for clarity.

Win Music: “Triumphant Quirky Waltz”

Musical Identity

The Win music brings the score to a joyful yet eccentric resolution. It begins with a short, uplifting swell featuring a **Cmaj7(#11)** to **D/E** to **E♭maj(#11)** gesture; a bright, effervescent Lydian-inflected invocation that clears the air after the tension of the final gameplay stage.

Immediately after this swell, the cue shifts into a quirky, slightly magical waltz; a playful blend of dark quirky charm and the light-hearted energy of a Harry Potter-style dance. The waltz is melodic, upbeat, and repeatable, yet never fully resolves, allowing it to loop indefinitely without fatigue.

Harmonic Structure

Like all other stages, the Win cue's harmonic structure is designed for adaptability:

- 3-bar swell resolves into
- a 12-bar waltz built from **Am(add9), F#dim7, Bm7♭5, E7♭9, Dm(maj9), Ab7(#11), Cmaj7(#11), Fmaj7(♯5), B♭mmaj7(#11)** and other colorful harmonic detours.

Despite its cheerful tone, the harmonic language is highly chromatic and uses the same pivot-based logic as the main stages. The final bars always land on a multi-directional, non-resolving pivot, allowing the waltz to repeat endlessly.

Instrumentation alternates between differing melodic color palettes and tone color combinations, adding replay variety in a gentle, unobtrusive way.

Adaptive Outcome

Even though the Win cue is structurally smaller and more melodic than the gameplay stages, Harmonic Hierarchies remains perfectly functional. The long swell's exit pivot feeds directly into the waltz's ambiguous minor-to-Lydian harmonic loop.

Because the waltz's final cadence never resolves; landing instead on a pivot chord, it can re-enter itself and continue indefinitely without sounding forced.

Overall this stage-by-stage demonstrates that Harmonic Hierarchies supports:

- intimate minimalism (Loss)
- high-energy chaos (Stage 3)
- atmospheric textures (Stage 1)
- chromatic horror (Stage 2)
- whimsical dance (Menu)
- and quirky triumphant waltz (Win)

All through the same architectural principle:
Harmony determines adaptability. Orchestration and style are free to roam.

Artistic and User-Experience Impact

One of the most striking artistic outcomes of this project is the discovery that Harmonic Hierarchies does not merely support adaptive branching; it actively unifies the score, binding together musical worlds that, on paper, should be far too disparate to coexist. Traditional game scores that span multiple environments or emotional states often rely on recurring themes, orchestral color, or leitmotifs to create continuity. While these tools are important, they struggle to reconcile radically different harmonic languages or tonal aesthetics.

In contrast, the Harmonic Hierarchies system demonstrates that harmonic architecture itself can serve as the glue that binds heterogeneous musical materials into a single universe. By designing every phrase; regardless of style, with intentional entrance and exit points, the score maintains structural coherence even when shifting between wildly different harmonic ecosystems.

Across this project, the score traverses:

- Whimsical C-Lydian 12/8 Menu dances
- Sparse 7/8 modal-mixture forest textures
- 1950s chromatic horror with theremin
- Danny Elfman-style carnival chaos in altered dominant/whole-tone worlds
- A tiny celeste music box
- A quirky Lydian-inflected victory waltz

Any single one of these could exist as its own standalone aesthetic. In most game scores, they would be tied together through superficial means: recurring themes, shared instrumentation, or similar compositional voice. But in this project, something more fundamental is at work.

Harmonic Hierarchies creates continuity by design, not by similarity.

The stages of the game are not harmonically similar. They were never meant to be. Yet because every stage adheres to the Harmonic Hierarchies principles; cadential junctions, pivot tones, symmetrical re-interpretability, modal/functional gateways, the music feels like one continuous entity rather than a series of jarring stylistic resets.

This has a profound effect on user experience:

I. The Player Experiences the Score as a Unified Journey

Because transitions are harmonically prepared, the player feels as though the musical world is evolving with them rather than being replaced at each stage. The Main Menu drifts logically into Stage 1's modal haze; Stage 1's pivot tones slip cleanly into Stage 2's chromatic dread; Stage 2's diminished symmetry makes Stage 3's lunacy feel inevitable rather than arbitrary. Even the tiny Loss cue and the triumphant Win cue feel like they "belong," not because they mimic the style of the stages, but because their pivot-based harmonic design behaves within the same adaptive language.

The music is allowed to become funny, dark, scary, chaotic, tender, and magical; yet the player perceives it all as "the same universe."

II. Emotional Coherence Without Harmonic Homogeneity

Most adaptive scoring systems achieve consistency through uniformity: similar keys, similar orchestrations, similar chord progressions. Harmonic Hierarchies shows that consistency can instead arise from structure:

- Entrance points stabilize the arrival.
- Exit points control the direction of tension.
- Pivot tones maintain line continuity.
- Diminished/altered structures provide chromatic gateways.

This means the score can take wild harmonic risks; but still feel emotionally grounded.

III. Smooth Transitions Create Immersion

When a player moves from one gameplay phase to another, Harmonic Hierarchies ensures that the musical transition is perceived as musical logic, not as audio engineering. Instead of feeling like one track has ended and another has begun;

The ear hears:

"Ah, the harmony shifted. Something is changing."

Not:

"Oh, new track."

This musical continuity directly enhances immersion, making the player feel as though the world is reacting organically to them rather than mechanically triggering sound files.

IV. Variety Without Fragmentation

Adaptive music often risks feeling disjointed because variety is generated by randomization without theoretical grounding. Harmonic Hierarchies avoids this entirely. Loop cells vary, sometimes drastically, but always remain structurally compatible.

In gameplay terms, this means:

- No matter how long the player remains in a stage, the music never loops, never breaks, and never exposes its algorithm.
- Variations serve expressive purpose rather than technical randomness.
- Harmonic tension constantly refreshes, keeping engagement high without overwhelming the ear.

V. HH Supports Both Maximalism and Minimalism

One of the project's most surprising artistic outcomes is that the same system handles:

- the gigantic harmonic networks of Stage 3,
- the delicate fragility of the Loss cue, and

- the quirky yet disciplined Win waltz,

without modification.

This proves that Harmonic Hierarchies is not tied to density or complexity. It works in:

- full orchestral bombast
- modal textures
- chromatic horror
- synthetic scales
- music boxes
- waltzes
- polyrhythmic carnival insanity

…because it is rooted in entrance/exit clarity, not in harmonic similarity or stylistic uniformity.

VI. Harmonic Hierarchies Allows the Composer To Be Stylistically Fearless

Perhaps the most profound artistic impact is the freedom it grants the composer. Because the system ensures transitions will always work harmonically, each stage can explore bold, even contrasting aesthetics without fear:

- Want a gentle forest texture after a cartoonish Lydian Menu? No problem.
- Want to pivot from that texture into theremin-soaked chromatic madness? Harmonic Hierarchies enables it.
- Want to drop from altered-dominant chaos into a tiny celeste lullaby? Totally fine.
- Want to celebrate victory with a magic-school waltz? The pivot tones make it seamless.

Harmonic Hierarchies doesn't constrain creativity; it enables it, by ensuring that every musical world can talk to every other world.

VII. The Player Never Notices the Machinery, Only the Music

Perhaps the most important conclusion:

the player experiences none of the technical complexity behind the score.

To them, the music simply flows. It evolves, reacts, expands, contracts, dances, shimmers, growls, and sighs; all without ever seeming disjointed or artificial.

Future Work

This project represents only the beginning of what Harmonic Hierarchies for Adaptive Game Music can become. As a capstone final project for a bachelor's degree, the scope was necessarily limited by time; however, the results point toward a wide range of creative, technical, and research possibilities that extend far beyond this initial implementation. With sufficient production time, Harmonic Hierarchies could evolve into a powerful, scalable system for next-generation adaptive scoring; particularly for open-world environments, long-form games, and hybrid orchestral-synth workflows.

I. Fully Orchestral Hierarchical Systems Using Instrument-Level Adaptation

One of the most exciting avenues for expansion is building instrument-level Harmonic Hierarchies within Wwise. Instead of thinking in terms of phrases or sub-phrases, every orchestral section; strings, brass, winds, percussion, and even solo instruments, could be structured as independent adaptive entities:

- Violins generating melodic figures derived from pivot tones
- Violas and cellos producing counter-lines that anchor or destabilize harmonic direction
- Brass functioning as modulatory agents through dominant, altered dominant, and symmetrical gestures
- Woodwinds acting as motivic "interjections," ornamenting the harmonic grid in real time
- Percussion responding to harmonic tension (e.g., rolls during altered dominants, pizzicato gestures during neutral pivots)

Under this system, each instrument group would contain its own Harmonic Hierarchies map, enabling thousands of simultaneous adaptive paths within a single orchestration.

II. Tone-Color Blocks and Orchestral "Ecosystems"

Instead of writing fixed orchestrations, Harmonic Hierarchies could be expanded into a tone-color matrix, where combinations of instrument timbres form interchangeable "color blocks." Each block could be:

- harmonically neutral
- tension-creating
- tension-releasing
- directionally ambiguous
- rhythmically transformative

These color blocks could interlock dynamically, creating an ever-evolving orchestration while still obeying HH rules.

Imagine a forest biome where woodwinds dominate, but as danger approaches, diminished brass overlays begin to assert themselves; or an underwater biome where celeste, harp, and pads form a neutral color block until a harmonic pivot introduces high strings or muted trumpets.

Harmonic Hierarchies provides the structural language for managing these changes musically instead of mechanically.

III. Open-World Scoring: Harmonic Hierarchies as a Multi-Biome Adaptive Engine

Because Harmonic Hierarchies is based on entrance/exit logic rather than style, it is uniquely suited for open-world games. With sufficient production time, each biome or region could be assigned:

- its own harmonic domain
- its own orchestration palette
- its own tempo/meter identity
- its own motivic ecosystem

Yet transitions between biomes would remain musically seamless because Harmonic Hierarchies defines how any domain can modulate into any other domain.

This system could support:

- day/night harmonic cycles
- weather-based harmonic shifts
- enemy proximity tension curves
- player-health or stamina-based harmonic modulation
- narrative-event harmonic overlays
- procedural exploration motifs derived from pivot tones

Rather than writing one "exploration track" per environment, Harmonic Hierarchies could create an adaptive musical ecology that evolves with the player's journey.

IV. Synth and Hybrid Scores With Modular Sound-Design Harmonic Hierarchies

Harmonic Hierarchies is style-agnostic, which means its principles apply equally well to hybrid or fully synthetic scores. With your engineering background, a system of modular, harmonically-aware synthesis blocks could be developed:

- wavetable synths adapting timbre based on Harmonic Hierarchies tension levels
- granular pads shifting spectral density when the score pivots toward altered dominant territory
- FM synthesis operators responding to pivot tones
- procedural arpeggiators built around the Harmonic Hierarchies intervallic rules
- filter sweeps triggered by cadential junction points
- percussive synth layers modulating rhythmic density based on the chosen hierarchy

Wwise could manage these as parameter-driven harmonic states, allowing the sound design itself to follow Harmonic Hierarchies logic.

V. Engineering-Driven Adaptive Pipelines Using Real-Time Variables

Due to my multiple decades in computer science / software engineering, game and US Govt. 3D simulation background, Harmonic Hierarchies could be expanded into a fully data-driven adaptive engine, where gameplay variables dynamically shape harmonic movement.
Possible parameters include:

- player location (distance-based harmonic shifts)
- AI state changes (altered dominant surges during enemy aggression)
- resource collection (pivot-tone-based motif fragments triggering during progress moments)
- XP or level progression (gradual modulation toward brighter harmonic domains)
- weather or environmental variables (Lydian♯11 emerging during storms)
- procedural generation seeds (determine motivic variants for each playthrough)

Instead of the game simply playing music, the music could behave like a living harmonic organism responding to real-time numerical input.

VI. A Full "Harmonic Hierarchy Composer Toolkit"

Long-term, Harmonic Hierarchies could even be formalized into a composer-facing toolkit or plugin:

- visual maps of harmonic domains and pivot relationships
- automatic detection of valid entrance/exit compatibility
- phrase suggestions based on symmetrical or altered relationships
- "smart" adaptive container builders for Wwise
- real-time analysis tools that validate whether a composer's phrase is Harmonic Hierarchies compatible

This toolkit could dramatically reduce the technical overhead of adaptive composition while preserving deep musical intention.

VII. HH for AI-Assisted or Procedural Composition

Because Harmonic Hierarchies defines a clear set of rules, it could serve as the foundation for AI-assisted compositional systems:

- AI generates phrases within a domain
- composers approve/edit them
- Harmonic Hierarchies automatically defines how they can interconnect
- procedural systems generate motivic variations that still obey harmonic architecture

The result would be a system that pairs creative spontaneity with theoretical rigor.

Summary: Where Harmonic Hierarchies Could Go

Future expansions of Harmonic Hierarchies point toward a vision of adaptive scoring that is:

- deeply musical
- theoretically grounded
- infinitely scalable
- style-agnostic
- data-driven
- and capable of supporting massive, evolving game worlds

With enough time, resources, and engineering infrastructure, Harmonic Hierarchies could become a robust framework for modular, expressive, and musically intelligent adaptive game scoring; from intimate music boxes to sprawling open worlds to dizzying post-tonal carnival chaos.

Conclusion

The development of Harmonic Hierarchies for Adaptive Game Music began as an exploration, grew into a methodology, and ultimately emerged as a complete compositional and technical framework. Through the integration of harmonic design, orchestrational modularity, and Wwise-driven adaptive logic, this project demonstrates that adaptability in game scoring can be rooted not in technical trickery but in deep musical intention. By treating harmony as architecture; with entrance nodes, exit nodes, pivot tones, modal ecosystems, and multi-vector cadential junctions, the score becomes a living system capable of reorganizing itself without ever violating its own musical grammar.

Across all stages of the game, the results were consistent: Harmonic Hierarchies created seamless transitions, unified disparate styles, and supported everything from intimate music-box minimalism to frenetic diminished-chromatic carnival chaos. It enabled bold harmonic experimentation without sacrificing coherence. Most importantly, it proved that adaptive music can feel expressive, narrative, and alive when the composition itself is designed to be modular from the beginning.

The technical implementation reinforced this concept. Rebuilding the Unity logic, Wwise container structure, and state transitions revealed the power of designing musical systems where technology and theory operate in tandem rather than in opposition. Every pivot chord, diminished structure, or Lydian swell became not simply a musical gesture but an architectural decision that guided the adaptive engine's behavior. The end result is a score that evolves organically, reacts intuitively, and remains cohesive regardless of how long or how unpredictably a player interacts with each stage.

At the same time, this project only scratches the surface of what Harmonic Hierarchies could become. With more development time, larger orchestral resources, and deeper integration with engine parameters, Harmonic Hierarchies could expand into a fully data-driven adaptive ecosystem for open-world games, hybrid orchestral/synth environments, and even AI-assisted composition workflows. The foundation established here demonstrates that the system is infinitely scalable: whether the musical language is tonal, modal, chromatic, symmetrical, synthetic, or completely custom, Harmonic Hierarchies provides the structural rules that allow any of these worlds to interconnect meaningfully.

On a personal level, this project marks a significant milestone in my lifelong journey as a musician. Although I have been performing music for many years (since first picking up the Trombone at 7 years old, in 1976), the education I received at Berklee College of Music strengthened me in ways I could not have anticipated. The rigorous work in theory, harmony, form, orchestration, composition and scoring; along with the constant expectation of excellence, has fundamentally reshaped how I think about music. I now feel fully prepared to step into

graduate studies, to tackle larger and more ambitious scoring challenges, and to continue exploring the intersection of composition, technology, and interactivity.

In many ways, Harmonic Hierarchies represents the synthesis of everything Berklee helped me build: deep theoretical understanding, disciplined creative practice, technical agility, and a renewed sense of artistic purpose. Whatever comes next; completing graduate school, scoring larger projects, or developing Harmonic Hierarchies into a full adaptive framework; I carry forward the knowledge, confidence, and craft that Berklee instilled in me.

The Berklee College of Music provided the map.

This project marks the new beginning of the journey; even at my age.