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# SLAVE TO THE RHYTHM

EXAMINING IMMERSIVE  
EXPERIENCES THROUGH THE  
INTERPLAY OF MUSIC AND  
GAMEPLAY IN 'CRYPT OF THE  
NECRODANCER'

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## Abstract

The recent surge in the popularity of video games has allowed for a deeper understanding and analysis of how video games can create powerfully immersive experiences. The blending of music and sound with the interactive and reactive nature of gameplay provide an experience that draws players into these gameworlds. A striking example of this effect can be seen in the game 'Crypt of the Necrodancer'. Music is used as a controlling element that reinforces the transportational sense of player immersion. The player is restricted to only moving to the beat of the soundtrack. All gameplay and musical elements respond and move in time to the music, resulting in the player 'dancing' around the levels. Isabella Van Elferen's (2016) ALI methodology is used to break down and examine key aspects of the game and its music by drawing connections between the gameplay mechanics and the audio design.

**Keywords:** Video Gaming, Immersion, Music, Musicology, Ludomusicology, Game design

## Introduction

The academic study of video games has progressed significantly in recent years, growing from a seed to a burgeoning field. This has led to Ludomusicology, the study of video game music. Whilst games combine aspects from many different genres together, the key distinguishing feature that truly makes them unique is the nonlinear interactive element (Collins, 2008).

Unlike other forms of media, games are not a passive experience. The player has an active role in determining what sounds are generated. Every time a game is played, the acoustic components are slotted together in new and interesting ways to make a truly unique experience. The linking of player actions to responsive elements creates a feeling of being 'in the game' and is commonly referred to as 'immersion'. Combined with the inherent reactive and interactive nature of video games, this is what makes them stand apart from most other forms of art and multimedia (Tekrø, 2018).

The interactive aspect of video game music is achieved by intertwining elements through multiple different levels of game mechanics and audio design. It involves more than just the background music, rather encompassing soundtracks, sound effects, spatialisation and triggers. These all fall under the banner of dynamic music, yet are broken into two categories, interactive audio and adaptive audio (Collins, 2009).

Interactive audio is music that is directly influenced and controlled by the player as part of the gameplay experience. It is: the gun shots, footsteps, jump sounds, everything that

the player has direct control over. This creates what Collins (2009) refers to as a 'Sound Pallet' that the player uses to create unique musical experiences.

Adaptive audio is a musical event that is unrelated to direct player agency and actions. These are changing sounds that are controlled through automatic processes throughout the game. Examples include: night/day cycles, battle music, health status etc. Whilst still very important to the games' acoustic experiences, there is less mutability in this form of audio.

The connection that is built between interactive/adaptive audio and player agency manifests itself as an immersive experience that captivates players beyond the surface level of multimedia consumption. 'Crypt of the Necrodancer' (Brace Yourself Games, 2015) provides a brilliant example of how incredible synergy between music and player agency can result in a deeply immersive state that extends a player's sense of self beyond the confines of a screen.

Whilst there are a plethora of 'music games' that have been produced, where recreating music is the core gameplay element, such as 'Rock Band' (Harmonix, 2007) or 'Guitar Hero' (Harmonix, 2005), these games are more 'Musical simulators' and whilst they present an engaging form of 'Musicking' (Small, 1998), they fail to expand a player's sense of self and immersion beyond the surface layer of the game. 'Crypt of the Necrodancer' showcases incredible links between core gameplay elements and interaction with musical components. It does this through numerous game mechanics and design choices that make the music inseparable from the gameplay experience, further engaging the player.

Isabella van Elferen (2016) provides a valuable model for examining the connection between player agency and the immersive qualities of music in video games. The ALI model breaks down the music into three categories for easier quantification and analysis; these are 'Affect, Literacy and Interaction'.

'Affect' is the way the music is designed to make us feel. It follows a similar role as film music in giving us the emotional context for what we are seeing. Without music, visuals struggle to convey tone and feeling (Collins, 2008). It is the connection at a conscious and unconscious level that directs the listener 'how' to feel about a given situation, as well as provoking a player to match the style of reaction that is appropriate given the setting. Fast, upbeat music can be used to drive a player to quick decision making, whereas slow, reflective music can be used to inspire moments of contemplation or relaxation.

'Literacy' plays on the notions of familiarity, identification and motifs. When playing games, it is important to understand the conventions and lexicon that the game uses so that a player can be instantly informed as to what situation they should be expecting. Perfect examples of this are battle music and victory sounds. Despite being different in every game, these types of sounds are immediately recognisable to most people who play games and allow one to quickly adapt to the situation at hand. To help categorise this further, it is useful to break literacy into two main components: extra-textual and inter-textual.

Extra-textual literacy relies on recognition garnered from outside the gameworld itself. It builds upon impressions and experiences drawn from cultural tropes and themes. Frequently

this references the repertoire of film music and builds upon the themes and styles we expect to hear and have become accustomed to. When fighting an epic battle scene in large production role playing games (RPGs) it would not be uncommon to find music reminiscent of Lord of the Rings by John Williams, or when encountering a boss fight in a first-person shooter (FPS) to hear heavy metal music start to play (Munday, 2007). By composing music in a similar style to popular and well-recognised pieces of media, composers are able to tap into the emotional feelings, excitement and wonder that players have experienced in different mediums that share genres with the games they are currently playing.

Inter-textual literacy instead draws musical meanings and connotations from within the gameworld. These are sounds that the player can learn to recognise, and which then allow the designers and composers of video games to assign meaning to these sounds. This can include leitmotifs for certain characters, audio triggers for events (dodge cues or critical hits) or even specific battle or death themes. The important factor within inter-textual literacy is that the players are not expected to already have associations attached to the sounds. They can be taught what these sounds mean during the game and this becomes a pallet for the composers to paint cues on an auditory level.

The final aspect of the ALI model is 'Interaction'. It focuses on the way the player's actions actively interact with musical elements within the game. It does this by working with the different elements of dynamic game audio. Karen Collins (2008) breaks down dynamic music into five different categories in 'Game Sound'.

The first two distinguish between the context of the music, being either: diegetic (part of the game world, e.g. a musician on screen playing music, the wind, a character speaking), or non-diegetic (not part of the game world, e.g. background music, a health bar beeping).

The second two distinguish between the levels of interaction the player has with the sound. It can either be adaptive, responding to changes in the state of the game without direct input from the player, or interactive and result directly from actions the player has taken.

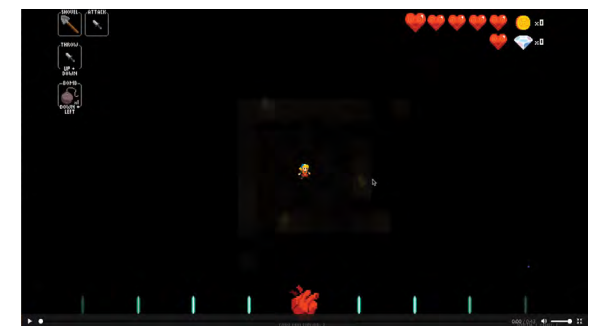
The final distinction is linear non-dynamic music. This is music that is scripted, much like a film and plays out without player interaction. This is frequently used in sections of the game where the player loses control of their character and instead watches a pre-made scene, often called a cutscene. As it does not interact with the players' choices, this form of interaction can result in a loss of immersion (Collins, 2008).

### Immersion through the fusion of music and gameplay, an analysis of 'Crypt of the Necrodancer'

'Crypt of the Necrodancer' (2015) is a procedurally generated dungeon crawler, commonly referred to by game manufacturers as the genre 'Rogue-like' in homage to the first quintessential game to utilise these core mechanics, 'Rogue' (A.I Design, 1980). In the game, you control a character who travels through levels fighting off enemies, avoiding traps and obstacles, collecting treasure and items, and ultimately attempting

to defeat 'The Necrodancer' that has taken possession of the player's heart.

The game is rife with musical and gameplay connections, the most obvious being that everything in the dungeon is synchronised and can only move in time with the music. Each level has its own distinct soundtrack and all interactions take place to the beat. The entire dungeon responds and interacts with the music (Video Excerpt 1). There is constant motion; both the player and enemies move, the player's health in the top right corner pulses, even the floor lights up and strobes, all in time with the beat of the music. This beat is displayed and tracked by the heart in the bottom of the screen. The music becomes the core synchronistic element of the entire game. If the player attempts to move off the beat, they will be unable to and will 'miss' their chance to move. In this way the music is exerting direct control over the player's actions and forces them to work with the music in order to play the game. The only way to advance, or even attack, is by moving to the rhythm of the soundtrack; missing a single beat can often be catastrophic at later levels.



Video 1 Crypt of the Necrodancer (2015). Video Excerpt.


As you progress through the game, you descend through different levels and zones, each with a consistent and unique soundtrack for that floor of the game. Each of these songs has a different tempo that gradually increases as you progress further in the game. This not only changes the pace at which each level is played, but allows for difficulty to directly match the speed and intensity of the music. Additionally, each level only lasts as long as the track lasts. If the player has not completed a level before the end of the song, they find themselves dropped through the floor to the next level.


This fusion of game mechanics and soundtrack provides a fantastic standpoint for examining the game from the ALI standpoint, as it is impossible to separate the gameplay elements from the musical elements that they are intertwined with.

### Musical Affect

Musical Affect relates to how the music is supposed to make us feel, and informs us, as players, what style of play is appropriate given a specific circumstance. By understanding how we are supposed to feel, we can share a sense of mental flow that is synonymous with the character in the game and fosters deeper levels of immersive interaction. The pulsing and driving soundtracks that are ubiquitous throughout the game provide us with a sense of intensity, and the heavily focused bass sounds provide a stable footing that makes you want to tap your foot to the beat. There is a focus on quickly establishing the beat of each track to assist the player in finding their rhythm, with many of the levels having simple drum and bass introductions that help cement the pacing of each floor. The synthesised sound sources pair well with the pixel-art

visual design and instantly transport the player to a retro style of gameplay. As the levels progress, the soundtrack develops more complicated and syncopated musical elements, providing further challenge for the player in order to internalise the beat.

The immersive benefits of Musical Affect are further developed through the different musical styles present throughout the four different Zones. Zone 1 (Audio Excerpt 1)  features bass-heavy electronic dance music that immediately hammers the beat into the listener. Whilst seeming intense, the first Zone begins with a sedate 115 beats per minute (BPM) and finishes with a BPM of 140. There are very few complicated musical elements in these first tracks; instead, the pounding bass lines, pulsing pads and simple drum patterns are all designed to help the player identify the beat and learn the basics of the game without any added musical complexity.

Zone 2's (Audio Excerpt 2)  music initially takes a step back to a BPM of 130 and features a laid back funk groove with more interesting musical syncopation that provides greater complexity to the music. This has an interesting effect on the gameplay and immersive experience. It relaxes and resets the player after completing the first Zone. This is done through a combination of the more relaxed and groove-like music, as well as the slower BPM of the first track. This entire Zone feels more relaxed than the first, and in so doing, provides another level of challenge to the player. The chilled vibe of this Zone triggers players to assume a less focused and intense performance response. Rather than the heavy and powerful patterns that you encounter in the first Zone, this Zone instead sounds safer at first glance, and therein lies the

trap. The enemies, traps and dangers of Zone 2 are far more dangerous than Zone 1. Up until this point, each enemy encountered has either moved every beat, or every second beat and despite different health values, they require basic comprehension of the game's mechanics to defeat. Zone 2 introduces enemies that have far more complicated movement and aggression patterns, with enemies that have 3, and 4 beat patterns as well as protection from attacks that require significantly more advanced understanding of the game's mechanics to defeat. The slower BPM of the first track allows for the player to start to get used to these increased challenges, harder enemies and increased hazards, before the tempo soars back to its previous speed and then exceeds it to 150 BPM. For a Zone featuring hidden traps and harder enemies, the Affective tone and emotional indicators within the music play with our sense of emotional safety on the one hand, providing a relaxing, groovy beat, and on the other, presenting new dangers and challenges to clash with the music's emotional tone.

Zone Level	BPM	Zone Level	Zone Level
1.1	115	3.1	135
1.2	130	3.2	145
1.3	140	3.3	155
2.1	130	4.1	130
2.2	140	4.2	145
2.3	150	4.3	160
		<b>Final Boss</b>	<b>160</b>


Table 1 BPM of tracks in Crypt of the Necrodancer

Zone 3 (Video Excerpt 2) introduces a new feature that again ties together both musical and gameplay connections. Zone 3's levels are each split between fire and ice regions; each region provides different game challenges, traps and unique enemies to encounter. This game mechanic connects with musical elements by now having two soundtracks for every level. These two tracks are essentially the same song, following the same rhythmic and melodic elements, but the use of different instrumentation to provoke different emotional responses from the player. Whenever the player transitions from one region to the other, the music is faded to the other track. The ice region features a smooth electronic dance beat similar in style to Zone 1. This feels like a recapitulation back to the original ideas presented at the beginning of the game. What truly makes this level the perfect gateway to the final zone is the introduction of the fire region's music. The fire region features electric guitar and real drums as opposed to the electronic styles presented in the other tracks. This makes the different regions stand out drastically from each other whilst providing an increased sense of intensity. This rise in




Video 2 Crypt of the Necrodancer (2015). Video Excerpt.

tension disrupts any possible notion that there will be a return to the electronic dance music style of Zone 1 or a decrease to that level of intensity or difficulty. Zone 3 uses the different environmental themes presented in the two regions to great effect by utilising a new suite of enemies that spread their Zone's new mechanics, ice or fire, to introduce greater levels of environmental instability and danger.

Zone 4 (Audio Excerpt 3)  follows the same design pattern as the previous Zone transitions by initially slowing back down to a BPM of 130. This helps the player deal with the significantly harder enemies and new obstacles presented in this Zone. Enemies up to this point have only been able to move single spaces at a time in the cardinal directions, similar to the player, but in this Zone, enemies are encountered that move diagonally or even skip spaces for even greater challenges. The music perfectly highlights this intensity with a dark techno beat. Level 1 initially seems like a return to the musical style of Zone 1, just with a darker tone, but Levels 2 and 3 diverge from this feeling almost instantly. The BPM of the following tracks jumps dramatically to 145 and then to a blistering pace of 160, and the music changes to a trance-like beat with fast, shuddering movements. At these later levels, the rapid speed at which the player has to move, interact and react, combined with intense driving music, places you, as the player, under a level of stress that forces you to focus and react in time. Pairing this emotional intensity with the hardest and most complicated enemies encountered so far places the player in a heightened intense state of flow, providing a captivating and immersive experience. The blistering speed and new enemies that break the established conventions mean

that missing a single beat is more dangerous than ever before, yet also far more likely.

The final boss fight (Audio Excerpt 4)  maintains this fast 160 BPM tempo, but returns to the electronic instrumentation and style similar to Zone 1. This provides an emotional sense of coming full circle, yet with a significantly increased pace to match the intensity required in this final fight.

Throughout every Zone, the music is providing the emotional backdrop for each level, and in so doing, creating an immersive experience where the music transcends the game to become an almost physical entity that must be interacted with. The BPM of each track in this game directly relates to the reaction speed required by the player and provides a seamless way of pairing musical pacing to game difficulty. On a deeper level, moving in time with the music necessitates an internalisation of beat and rhythm. By having every entity in the game move to this internalised beat, it reinforces the immersive connection between the gameworld and the player. Other games can often struggle to foster this connection and this inability to connect appropriate musical accompaniment to desired emotional tones can cause for massive breaks in the immersive experience. The non-linear nature of video games means that music is generally handled by various triggering events. These triggers often do not have the complexity to scale accurately with challenges and can result in epic battle music being triggered for a single non-threatening enemy, which can often feel extremely anticlimactic. Having intense battle-music cues in games for unworthy situations causes disconnect between the music and gameplay, which

makes the tangibility and believability in the gameworld fall out of synchronisation. Often the player's sense of immersion is shattered by this incongruity.

The way 'Crypt of the Necrodancer' uses Musical Affect to match and mirror the intensity required by the players as they navigate the game fosters a deep, internalised immersive experience. As the levels progress, the BPM increases and the player has less time to contemplate decisions and as such, their investiture is swept up in the experience. The way the gameplay features mesh masterfully with the musical elements heavily impacts the sense of Musical Affect and immersion. It becomes impossible not to feel the intensity demanded by the music and the levels and not to match it with actions. If the player doesn't keep up, they fall out of synch with the music and will struggle to complete the level.

### Musical Literacy

Musical Literacy is utilised in two main ways in 'Crypt of the Necrodancer'. In terms of Extra-textual Literacy elements, the music relies on the tropes and themes presented through electronic dance music. Despite the numerous different music styles present throughout the different Zones, every track features heavy use of bass and synthesisers to create songs that would not sound out of place on a nightclub dance floor. However, where the game truly shines is in its heavy reliance on an inter-textual palette of sounds. Players are taught numerous audio cues that can then be used to understand common gameplay situations that can unfold. These audio cues transcend the visible portion of the screen, and in so doing

provide a sense of spatialisation comprehension of the gameworld that goes beyond simply what is seen at a given point in time. Being able to hear specific enemies, traps and environmental hazards, each with their own particular sounds, allows the player to identify and preempt what is happening outside their field of view. This taps into a player's sense of sound in order to allow them to localise themselves in the gameworld and is an incredibly immersive experience. A good example of this effect occurring is the sound of walls being broken. Breaking walls is generally a mechanic that only the player can perform; therefore, when you hear this sound it almost always signals a powerful mini boss approaching and warns the player to prepare. Whenever a mini boss comes into visual range, a recognisable sound effect, sorted by type of creature, is played to let the player know that danger is finally close and to immediately identify what mini boss is present. By using this inter-textual palette of sounds, the game can interact and inform the player beyond the immediate visual elements to provide a much greater level of immersion.

### Musical Interaction

The complex interaction between gameplay and music, at an intrinsic design level, provides such a high degree of Musical Interaction throughout the game that it can be argued that all sounds present are, in fact, diegetic. Further to this, there are a number of interactive elements where gameplay actions exert direct control over not only the sound effects, but also the music, all whilst still remaining diegetic. Traditionally the soundtrack for a video game is almost always non-diegetic, with backing music that is used to provide a

sense of emotional context, yet not interacting or being part of the gameworld itself. This closely matches how music is used in films. In 'Crypt of the Necrodancer' it can clearly be seen that the music is part of the game's diegesis and beyond that, a powerful controlling element that influences how the player can interact with the rest of the world. Generally, Musical Interaction is beholden to player actions, yet in this circumstance the control travels both ways. There are three key examples that showcase how the Musical Interaction flows in both directions and reinforces the diegetic nature of the game's soundtrack.

Firstly, there are the speed up/down traps. Whenever the player steps onto one of these traps the tempo of the track will either accelerate or decelerate for a short while. This results in everything in the game shifting to match the new temporary tempo. Player movement, enemy movement and sound effects are all shifted to match this temporal change. Having an in-game object that influences the music, which in turn interacts with literally all in-game entities, is a clear example of not only player-directed diegetic interaction, but multi-directional Musical Interaction.

The second example is that of 'The Shopkeeper'. This friendly character sings along with the melody of each level. As an interactive entity, he is clearly part of the game world and provides melodic variation as well as occasional countermelodies to the soundtrack for each floor. Having a responsive character that interacts with the background audio just provides another level of Musical Interaction and evidence of a truly diegetic soundtrack.

The final key that reinforces that the soundtrack is not only interactive, but diegetic, is the 'Banshee' mini boss. Whenever the player strikes this character, they are struck with the 'deafened' de-buff. This applies a powerful low-pass filter on the soundtrack for the level, allowing only the fundamental beat to be conveyed whilst this is active. Having the enemies within the game actively change how you hear and interact with the music reinforces and confirms the diegetic and tangible nature of the soundtrack.

When you consider these three elements in combination, we can see that: the player can assert control over the soundtrack, the in-game entities can interact with the audio, and the enemies can influence how we hear and interact with the music as a whole. All of this Musical Interaction makes it feel like you are hearing, experiencing and interacting with a tangible world and provides a powerful immersive bridge.

Apart from the soundtrack itself, almost every other sound in the game is interactive, as opposed to adaptive. Every attack, trap, spell, pickup, monster death or damage is interactively controlled by the player. Every action you take as the player has direct auditory repercussions that easily helps immerse the player in the game's diegesis. The few adaptive elements present in the game become functional guideposts to help navigate through the levels. A perfect example of this can be seen again in 'The Shopkeeper'. The shop provides a safe haven where you can buy items to help survive the dungeon. The shopkeeper singing along with the music helps to orientate the player and provides a musical clue to a safe location. The distinct synthesised musical

timbre of The Shopkeeper's voice connects with Inter-textual Literacy elements by providing a recognisable musical instrument sound to find, which gets louder the closer you are to the shop. It provides the player with a musical compass that directs them not only to a safe space, but provides added depth and interaction to the audio without increasing complexity.

The incredible levels of Musical Interaction and the way music and gameplay elements are intertwined on a fundamental level result in a wonderfully immersive experience. Whilst playing the game, you, as the player, can feel like your actions are truly meshing with the gameworld itself and this fosters a sense of synchronicity and immersion that goes beyond simply experiencing a story.

## Conclusion

Designing and developing video games, with fundamental connections and interactions between gameplay and musical elements, allows for an immersive experience that transcends the surface level interaction seen in most forms of multimedia. The multilayer and integrated nature of immersive connections in 'Crypt of the Necrodancer' helps to foster a feeling of investment and flow that offers a gripping multi-sensory experience for players. By investigating how the linking of gameplay elements and musical interactivity help create deeper levels of immersion, we further our understanding of how we engage with media at a deeper level than would otherwise be possible.

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