'It's a-me, Mario!' Exploring dynamic changes and similarities in the composition of early Nintendo video game music

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Abstract

As with films, a thoughtfully composed video game soundtrack has the ability to dramatically enhance and elevate the experience for the audience or player. This article explores the potential issues and difficulties of composing for video game systems by studying the sound-producing hardware and music for two popular systems from one manufacturer. By comparing two of Nintendo's *Super Mario* titles, which appeared on both 8-bit and 16-bit systems, through an analysis of the technology, audio, visual (audiovisual), music, and gameplay elements, it is shown that the musical composition was affected by the limitations of processing power. The discussion shows how the composer, Koji Kondo, overcame the issues of limited computing power by using layers of repetition while applying various functions of music for film to enhance player immersion.

Kondo composed theme music that has become engrained in popular culture and is synonymous with one of Nintendo's flagship franchises (Greening, 2014). By attempting to understand the method or approach behind the composition for earlier systems, it is possible to investigate and discuss the evolution of video game music while acknowledging and contributing to the study of music for games. A musical analysis of the *Castle* and *Underwater* themes on each system allows for a direct comparison of the compositional approach, while an audiovisual analysis reveals the presence of existing cinematic tropes and identifies potential influences on the creation of effective musical soundtracks for video games.

Applying audiovisual theory to games will require the use of existing literature from Lissa (1965), Gorbman (1987), Chion (1994) and Tagg (2004), along with the work of Collins (2005; 2007a; 2007b; 2008a; 2008b), which adapts and applies audiovisual analysis to video games.

Key words: Nintendo; *Super Mario*; Video games; Game sound; Audiovisual; Cinematic tropes; Technology.

Introduction
During the late 1980s and early 1990s, Nintendo and Sega, two of the world's largest video game companies, jostled against each other for marketplace position, with Nintendo taking 90% of the United States' video game sector by 1990 (Kelion, 2014; Miller, 1994). This time period coincided with the release of *Super Mario Bros.*, a video game that appeared on the Nintendo Entertainment System (NES) in 1985, and *Super Mario World* on the Super Nintendo Entertainment System (SNES) in 1990. *Super Mario Bros.* shipped with the NES, making it one of the core titles for the console, and provided a large contribution to the 2D side-scrolling platform genre by establishing many core gameplay functions, such as jumping between a series of platforms and ledges while avoiding enemies and obstacles (Collins, 2008a, p. 3; Whalen, 2004). With the gameplay for each title being engaging but fairly repetitive, and the visual elements focused on creating a functional but limited 2D representation of the landscape (Pedersen, Togelius, & Yannakakis, 2009), Nintendo enhanced the gamer's immersion in the game world with the help of Koji Kondo, who composed what can now be considered as some of the most iconic video game themes to have appeared throughout the history of the franchise, and within the wider sphere of popular culture (Greening, 2014).

The central narrative of the *Super Mario* games focuses on a classic trope of Western literature, the damsel in distress (or persecuted maiden), on which many books and films have been based (Laroche, 2012, p. 9). In this case we guide the protagonist, Mario, through a dangerous journey over several different levels and terrains, each accompanied by its own musical theme. Kondo uses music to create various functions that operate in tandem with the moving image, also known as audiovisual theory, which help to drive the story and plot, but the music also works with the gameplay to maintain player immersion so that they will continue to play. Creating music with functions that enhance immersion is a difficult task in itself, but Kondo also had to compose with a technology that limited the possibilities offered to a composer, such as the number of instruments and the quality of the available sounds. These factors make the study of music for earlier video game systems a fascinating topic, as the composer had a very tight set of parameters to work within in order to create effective music.

Koji Kondo is responsible for the original musical compositions of two of Nintendo's flagship franchises, *Super Mario* and *The Legend of Zelda*, both of which were first released on the NES in 1985 (Greening, 2014; Laroche, 2012, pp. 4–5; Nintendo, 2015; Nutt, 2014). The impact of Kondo's work within the game industry has been profound, as up to this point, most video game music was composed by programmers who were not necessarily musicians, or not overly concerned about the quality of the music and sound they produced (Collins, 2007b, p. 215; Collins, 2008b, p. 35; Hsu, 2015; Laroche, 2012, pp. 4–5; Marks, 2001, pp. 3–4). Kondo has continued to compose for these and many other titles, working in the capacity of composer, supervisor and sound support (Ashcraft, 2011; Astrogamer, 2015; Forestl, 2014; Greening, 2014; Koji Kondo, 2015; Nutt, 2014; Otero, 2014; Riendeau, 2014; Siegel, n.d.). Each game title that Kondo has worked on since 1985 contains more than one composed theme to its soundtrack, suggesting that the total number of compositions and sound effects that Kondo has so far helped to produce will amount to a large body of work. In 2007 Kondo received a lifetime achievement award from the Game Audio Network Guild (Bozon, 2007; Kohler, 2007; Williams, 2007).

Both franchises have since expanded in popularity and scope, with new title releases closely following Nintendo's new hardware developments, such as 3D graphics and more interactive control systems, and could now be considered as synonymous with the company's name and identity (Ashcraft, 2011; Astrogamer, 2015; Greening, 2014; Kelion, 2014; Nintendo, 2015; Siegel, n.d.). An interesting survey completed during the peak of Nintendo's success suggested that American children were actually more familiar with Mario than they were with Mickey Mouse and Bugs Bunny (Iwabuchi, 2002, p. 30; Laroche, 2012, pp 4–5; Nintendo, 2015; Stuart, 2010).

The popularity and influence of Kondo's music beyond the video game console can be demonstrated by the numerous live performances, from both amateur and professional musicians, that are available online (Fingro, 2014; iceChiYo, 2007; jwcfree, 2013; kronborg, 2012; MsTintinproductions, 2013; Ochoa, 2012). There are also several touring concerts dedicated to Nintendo's themes, and, more specifically, those from *The Legend of Zelda*, which further highlight the impact that Kondo's work has had on modern culture (Emmer, 2015; Faber Music, 2015; Greening, 2014; Jason Michael Paul Productions, 2015; Nintendo, 2014).

Methodology
A musical analysis of two themes from the games for the NES and SNES consoles allows a demonstration of the technical challenges Kondo faced while composing. This is achieved by first highlighting the capabilities and differences between the sound-producing hardware, and then approaching the material within musical contexts such as the number of voices, instrumentation, and tone quality, showing how these were handled through structuring and other compositional methods that enhanced player immersion within the game world (Huiberts, 2010, pp. 36–41). A harmonic and melodic analysis demonstrates how the composer deals with the various limitations of the hardware, and serves to identify the presence of cinematic tropes and audiovisual functions that were traditionally used in cinema to immerse audiences in the story (Chion, 1994). The audiovisual analysis aims to show how sound and music can enhance or establish the atmosphere of a film, which is also being presented by the visual element of the moving image: the visual and audio elements combine to create a convincing and immersive environment for the audience. Conducting an audiovisual analysis allows, in turn, for a discussion about the impact of the music upon the gameplay and the storyline, which further enables a comparison to be made with Western literary and cinematic tropes.

The two musical themes under examination are *Castle* and *Underwater*, as they feature in both game titles. The analysis of each element (technology, melody, harmony and audiovisual) offers explanations as to how Kondo composed within the limits of the technology, and contributes to the understanding of how the themes enhance the overall gaming experience for the player. As the discussion involves a study of the audiovisual functions, existing terminology from Lissa (1965), Gorbman (1987), Chion (1994) and Tagg (2004) will be employed. It is vital to acknowledge the origin of these audiovisual functions and concepts, as, unlike a game, film is passive and requires little physical interaction from the audience in order for the functions to be realised (Marks, 2001). Therefore, drawing on the work of Collins (2005; 2007a; 2007b; 2008a; 2008b) will be essential in explaining the different ways in which the existing audiovisual functions have been adapted and used to enhance the

gameplay design. In the context of this article, the term 'gameplay design' is used to describe the control system for human interaction as well as the rules of the game, and will be referred to as the game's ludic or ludological framework; this should be thought of as integral to the game, as it will continue to run, and therefore any audiovisual and gameplay (ludic) functions be realised, only as long as the player continues to interact with it.

It is important to mention here that each new level the player engages with has a musical theme that does not exist in the game world: no suggestion or visual evidence exists of a band or musician inhabiting the game world with Mario, and, therefore, the player is not led to believe that Mario can hear this music too. These types of soundtrack are referred to as being 'adaptive non-diegetic' (Collins, 2007a, pp. 3–4; Collins, 2007b, p. 211): 'adaptive' meaning that the music changes between gameplay levels, and 'non-diegetic' meaning that the music source is not presented on screen, nor does it appear in the game's narrative.

Console technology
The physical make-up and sound-producing capabilities of each console's integrated sound chip share some basic similarities, with many composers approaching them differently to create the desired effect (Collins, 2007b, pp. 224–225). The NES's sound chip, the 2A03, is capable of producing five separate analogue channels, each one dedicated to a particular function: two square wave channels, one triangle wave channel, a noise-generation channel, and a channel that functions as a basic sample channel called the Delta Modulation Channel (DMC) (Collins, 2007, p. 214; Taylor, 2003). Each channel has a set of very musical attributes. The triangle wave, with its lower range and lack of volume control, is dedicated mostly to bass lines; the square wave channels are able to create effective harmony and lead effects as a result of their ability to produce various sliding effects between notes; and the sample DMC is used mostly for percussion (Collins, 2007b, pp. 214–216). The abilities of the SNES's sound chip are far more advanced, starting with the presence of a Digital Signal Processor (DSP), which provides digital sound conversion (Collins, 2008b, pp. 45–46; O'Shea, Hussain, & Sadik, 2011, pp. 6–7; Paradis, 2014; The Unknown Base, n.d). The SNES's main sound chip, the SPC700, is capable of producing eight channels, plus many more effects than the NES's 2A03 sound chip, including echo, reverberation, chorus, time stretching, compression, equalisation and filtering (Collins, 2008b, p. 46). This extra versatility, when compared to the 2A03, allows the composer to create much more sonically realistic and compositionally advanced music, which, in turn, works to reinforce the game's narrative structure and the immersion of the player in the game world by 'suspending disbelief' (Gorbman, 1987, p. 39). The suspension of disbelief refers to the audience, or, in this case, the player, becoming absorbed enough in the game through various methods, such as having a strong story, dazzling visuals, and crisp audio, to temporarily forget that they are actually sitting in a room in front of a screen; instead, their full attention is drawn into the story and gameplay. The use of such audiovisual functions to enhance gamer immersion was rapidly becoming more important to Nintendo by the 1990s as the development of more sophisticated technology, marketing strategies and titles from rival companies were increasing (Kelion, 2014; Miller, 1994).

In the loop
Despite its more sophisticated hardware, even the SNES has issues to consider: both consoles have a finite amount of memory available to deal with all system functions. This means that to create music with effective audiovisual functions, the composer must carefully engineer the music so that certain tracks can loop on themselves without becoming tiresome (Marks, 2001, pp. 192–193). This looping is clearly audible within both *Super Mario* titles, and in the composition of each theme, but because the NES's sound chip has less memory than the SNES's, these loops are more noticeable in *Super Mario Bros.* (GilvaSunner, 2010a; GilvaSunner, 2010b; PlatanoGames Network, 2012; Rodreges742, 2011). When examining the *Castle* theme for *Super Mario Bros.*, it is clear that the entire material is based within a 9-second loop (Rodreges742, 2011), which is typical, and to be expected of the NES (Collins, 2007b, p. 221). When the same theme is examined for *Super Mario World*, however, there are some clear differences. The most distinct difference is the duration, which stands at 2 minutes 41 seconds (PlatanoGames Network, 2012); this, it be argued, indicates that the composition does not rotate around the same approach to looping as used in the NES theme. Kondo clearly took advantage of the more advanced sound chip by using several different loops within the composition to create a longer, more detailed structure for the theme, as well as accessing the broader array of timbres, effects and textures available to the SNES (Collins, 2008b, p. 46).

Analysis of the *Castle* themes
Super Mario Bros. Castle theme
A melodic and harmonic analysis of the *Castle* theme from *Super Mario Bros.* on the NES indicates that the triangle wave channel plays the role of a bass instrument, and the two square wave channels create the upper harmony, as expected (Collins, 2007b, pp. 214–216; Kondo, 1985a; Rodreges742, 2011). The most defined melodic line that is audible to the player is the bass, which has a very dark timbre in contrast to the upper voices, courtesy of the triangle wave channel (Rodreges742, 2011). An examination of a transcription of the theme clearly shows that the use of consecutive notes through a stepwise motion to create a constant succession of dissonant pitch intervals, such as minor seconds and diminished fourths and fifths, is prolific within each voice (Kondo, 1985a). Changing pitch intervals so quickly creates constant melodic and harmonic movement that is further highlighted by the contrasting rhythm between each voice. This constant motion and seeming lack of musical resolution combats the short duration and repetition of the loop, and functions to instil a heightened sense of tension or anxiety in the player, just as a violin playing tremolo in the high register acts as a 'mood function' (Kassabian, 2001, p. 59) in horror movies: high pitches are often used in the horror film genre, and tend to increase in number or intensity as the scene unfolds, leading up to a terrifying climax in the narrative, which the audiovisual elements have been attempting to establish (Donnelly, 2005, p. 91; Kassabian, 2001, p. 59).

The *Castle* levels house a final enemy who must be defeated before the player can advance to a new part of the game world. Therefore, the *Castle* theme accompanies a perilous moment in the narrative, while the gameplay and ludic functions become much more challenging (The Game Design Forum, 2011). Considering the importance of this point in the story and gameplay, the short duration of the loop could have created problems, but, instead, it is successful in creating a 'genre

synecdoche' (Tagg, 2004, p. 3). The presence of a genre synecdoche is apparent when the style of the combined elements of the audiovisual design, known as the mise-en-scène, is aligned with that of existing cinematic genres or tropes. In this case the mise-en-scène of the *Castle* level could be aligned with early horror movies such as *Nosferatu* (Murnau, 1922), *The Phantom of the Opera* (Julian, 1925) and *The Wolf Man* (Waggner, 1941). As well as being easily identifiable as belonging to the horror genre, the *Castle* theme has another audiovisual function as it creates a non-diegetic representation of location (Lissa, 1965): as the music is not being shown to be present in the game world, the musical suggestion of a location can be described as non-diegetic, meaning that it has no clear on-screen source. This non-diegetic representation of location is achieved via the similarities between the mise-en-scène of *Super Mario Bros.* and the early horror genre: the player's exploration of the dark, dangerous spaces that are accompanied by the turbulent and unsettling music are a very strong and clearly identifiable trope of the early horror genre, and can be argued to create the same effect on the player in the *Super Mario Bros.* game.

Super Mario World Castle theme
Interestingly, this theme borrows from the tropes originally created by Kondo and Nintendo for *Super Mario Bros.* on the NES: the use of a similar rhythm in the bass and top voices, coupled with the combination of minor second and diminished fourth pitch intervals to open the theme and signal the start of the gameplay, goes some way towards showing that Kondo's approach is consistent and communicable (Kondo, 1990a). As a result of the SNES's more advanced sound chip, Kondo was able to create a clear harmonic sequence and resolutions that further reinforce the immersion and narrative: within the key of C minor, the minor fourth and major fifth chords are used in succession throughout the theme to create a more stable, but nevertheless ambiguous, tonal centre when compared to the *Castle* theme of *Super Mario Bros.* The use of harmonic sequences featuring the first, fourth and fifth chords are common in Western traditional and popular music forms, and often function to propel the music forward through familiar sonic territory, giving a sense of movement towards a final destination (Ball, 2011, pp. 178–183). This demonstrates that Kondo is now beginning to employ some emotionally complex processes to lead the player through the gameplay and narrative frameworks of the game, which is another common function of music for film (Whalen, 2007, pp. 69–70): a change in the texture, seen at bb. 10–14 (Kondo, 1990a), leads on to a B diminished arpeggio that acts as a segue to the next motif, in which the bass continues a sparse rhythmic accompaniment around the key of C minor.

Nintendo's development of the console technology enabled Kondo to explore new musical territory on the SNES via the availability of extra voices and increased memory, which facilitated the creation of larger, more detailed musical phrases and ideas. Another interesting observation from some *Castle* gameplay for the SNES shows the presence of an audiovisual technique that is new to the Mario franchise. The degree to which the player or audience member is engaged with the story, known as the 'imaginative immersion' (Huiberts, 2010, pp. 46–47), is enhanced here using a dissolve or fade-in effect for the visual element that enters after the first bar of the musical theme, and can be seen in some pre-recorded gameplay footage running from 0:02–0:04 (PlatanoGames Network, 2012). This adds yet more established and important audiovisual features and tropes to the Mario franchise

which, as discussed earlier, were very important in enticing players within a tough market climate (Kelion, 2014; Miller, 1994).

Loop-de-loop: composing within the limits
By employing the similar techniques of looping and repetition used to compose for the NES, Kondo is once again able to create an unsettling atmosphere for the player on the SNES. Although functional and effective, looping is also a very strategic consideration, as memory conservation was still a major consideration when composing for the SNES (Collins, 2008b, p. 47). Collins observes that many composers of 8-bit computer game music, like Kondo, used a method called 'accumulative form' (Collins, 2007b, pp. 218–219), in which a large composition is constructed from several smaller loops. There is some evidence of this approach within the harmonic scheme of the composition for the 16-bit SNES, seen at bb. 16–19 (Kondo, 1990a), where the strong repeated sextuplet rhythmic figure (ostinato) moves through the key of C minor via the chords C minor, F sharp diminished seventh, F minor, and G dominant seventh, before repeating in full. The rhythm in the bass doubles after each repeat, and another voice is added to the top of the texture over the continued ostinato line until the entire passage repeats from b. 16, suggesting that the ostinato figure is the progenitor to the accumulative form.

The Castle themes and popular culture
The dark mood that Kondo created for both *Castle* themes is suggestive of the early cinematic portrayal of a spooky haunted house or a ghostly scene, similar to those present in Disney's 1929 animation *The Skeleton Dance*, which itself is argued to take influence from Saint-Saëns's *Danse Macabre* (1874), and was considered to have played an important historic role in the development of sound and film (Whalen, 2004). It could further be argued that the musical themes from the *Super Mario* franchise may yet prove to play an equally important role within popular culture as any other musical movement of this, or the last, millennium (Schnur, 2004, p. 10). For example, the bass line in both *Castle* themes is similar to a vocal and trumpet line that appears in Louis Armstrong's *'Zat You, Santa Claus?* (1953), found in bb. 7–8 (Fox, 1958), which may also be referencing a trope from the silent film era, as seen in Figure 1; the theme was often used to depict a villainous character and has no known author.
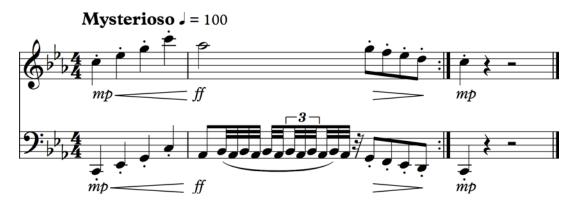

Figure 1. Cinematic Theme from the Silent Film Era: Portraying a Villain, Transcribed by James Fox, 2015

Analysis of the *Underwater* themes
Super Mario Bros.: Underwater theme
In contrast to the dark and somewhat frenetic theme of the *Castle* is the gliding *Underwater* theme from *Super Mario Bros.*, with its waltz-like feel in C major, rather than the more sinister C minor (GilvaSunner, 2010a; Kondo, 1985b). On the whole, the amount of notes that are not represented in the key signature, known as chromatic notes, is reduced significantly here, with the material shifting focus towards a strong key-centric tonal harmony: first and fifth chord relationships feature heavily over eight 4-bar phrases, while some chromatic alterations on neighbouring chords extend these harmonic functions, as seen in bb. 3–5, and bb. 13–15 (Kondo, 1985b). As the theme approaches the end of the loop, a modulation to the key of D minor is reached via a succession of diminished chords in the sixth phrase, as can be seen in bb. 23–25 (Kondo, 1985b). This brief movement away from the largely tonal centre provides some musical interest, which is vital to prevent a loop with a strong tonal centre from becoming tedious (Collins, 2005, p. 5).

Kondo's choice of metre and tempo for the *Underwater* theme plays a vital role in its success and function for the game: a simple triple-time metre with a quick tempo provides a waltz-like feel which, although not directly corresponding to the player's interaction with the Mario character through the controller, does act as a musical representation of movement known as a 'kinetic anaphone' (Tagg, 2004, p. 2): as the character physics model in the *Underwater* gameplay is altered to provide less accurate control and simulate the different environment, it produces a floating, waltz-like movement effect that creates a strong connection between the audiovisual and ludic frameworks (Schwab, 2009, p. 630). When the player does interact with the Mario character, the resulting motion can be likened to that of aquatic sea creatures; the ludic framework of the *Underwater* levels involves avoiding aquatic animal characters that move in a similar manner to Mario and also follow the Mario character for a short distance (Schwab, 2009, pp. 629–630; TheMushroomKingdom.net, 2015). This flowing movement of the sea creature has been described as 'ballet-like' (Cooke, 2014, pp. 18–19), a narrative that is assisted by the use of a waltz in Jacques-Yves Cousteau and Louis Malle's *Le Monde du Silence* (1956) (Cooke, 2014, p. 18).

Another typical musical trope of an underwater scene in cinema is the heavy use of smooth, gliding effects between notes, known as glissandi, and sparse instrumentation (Cooke, 2014, p. 17). A good example is Bernard Herman's score to *Beneath the 12-Mile Reef* (Webb, 1953), in which nine harps play a succession of B major arpeggios in different pitch registers and intervals to create a steady undulating motion (Cooke, 2014, p.17). Unfortunately, glissandi were unavailable to Kondo, as the NES was unable to create glissandi effects, nor could it produce nine separate channels (Collins, 2007b, pp. 214–216). Thus, by creating a simple waltz-like feel and augmenting the plasticity of the key through chromatic alteration of neighbouring harmony, the musical narrative and ludic frameworks of the *Underwater* theme were aligned with another familiar trope and existing cinematic codes, in a similar way to Kondo's approach to the *Castle* theme.

Super Mario World's Underwater theme
As with the *Castle* themes, Kondo tackled *Super Mario World's Underwater* theme in a similar way to the NES's; in recent interviews, Kondo has mentioned that actually

playing the game brought the realisation that the music needed to have the speed of the character and match the movements on screen (Nutt, 2014; Rone, 2014), something that Laroche (2012, p. 15) also notes:

> Kondo eventually found that the best way to coordinate the music and images of Super Mario Bros. (1985) and Mario games thereafter lay in identifying the game's rhythm (N.B., not the music's rhythm)—the speed at which Mario runs, jumps, swims, etc.—and then to try to capture the feel of that rhythm in composing music which fits it. Kondo cites the physicality of game control inputs as one way of identifying a game's rhythm, in that depressing buttons on a controller is inherently a physical activity whose patterns can be felt by a player.

Here the use of a simple triple metre is replaced by a simple quadruple metre and triplet motif, which maintains the waltz-like feel (GilvaSunner, 2010b; Kondo, 1990b, pp. 158–159). Although the approach to the composition is based around the same premise, *Super Mario World'*s theme has a rather different harmonic language to that of *Super Mario Bros.* A fairly strong F major tonality is achieved through several strong dominant-tonic resolutions that bolster the F major tonality after traversing some very colourful harmony, as seen in bb. 6–7 (Kondo, 1990b): F augmented leads to B flat major, then on to B natural diminished before arriving at F major via G minor and C major. This harmonic language is again used to create interest and motion in much the same way as the chromatic alterations to the neighbouring harmony for the NES's *Underwater* theme, suggesting that Kondo had found an ideal sound for these themes, which were perhaps only realised owing to the constraints of the system and similarities of the audiovisual elements and mise-en-scène.

Concluding thoughts

This exploration of a small portion of the musical output from the *Super Mario* franchise clearly shows that the limitations imposed by the technology did have an effect on the possibilities for musical composition, the scope of the musical narrative, and therefore the degree of support provided to the ludological and narratological frameworks. This is reflected in the different quantities of looping, ranges of polyphony, changes in the quality of timbral characteristics and sound effects, and the reliance on existing cinematic tropes between the two studied video game releases.

Working on this analysis has produced several clear frameworks that can be refined and used to explore the rest of the themes of the Nintendo titles currently being studied. Exploring this material fully should provide a logical and coherent account of Kondo's approach to the changing technological landscape through the narratological, ludological, musical and audiovisual elements. Further exploration of other titles and game genres from the composer's repertoire could expand these frameworks to deal with other ludic and audiovisual elements that are present in different game genres, such as role-playing games, released for the NES and SNES platforms. The repertoire of other composers from the same time period on the same console platforms could also be explored before moving on to study earlier systems and compositions using the established frameworks.

Another interesting line of enquiry that may further this investigation would be whether the technological expansion into 3D visual systems and more advanced sound hardware might alter a composer like Kondo's freedom and scope to create music for games, or whether the new technology demands an alternative approach to composition than that investigated in this article. One such approach would be investigating how the composer handles the introduction and use of dynamic, adaptive and interactive audio (Collins, 2007a, pp. 2–6), as well as other inventions within the industry, to improve gamer immersion, revenue and commercial success, and whether this can lead to the composer having to compromise their original musical aesthetic. Furthermore, it would be fascinating to see if there is any correlation between the increase of processing power in the gaming system and the continued use and presence of literary or cinematic tropes within the music, narrative and ludic frameworks for gameplay; or if the new technology and subsequent developments in ludic frameworks allow the gaming industry to break free from the influence of existing cinematic and codal frameworks upon its output.

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