Musicking with Digital Games

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A thesis submitted for the degree of
Doctor of Philosophy
July 2019

Abstract

This dissertation applies the concept of "musicking", introduced by musicologist Christopher Small, to the analysis of digital games. According to Small, "to music is to take part, in any capacity, in a musical performance, whether by performing, by listening, by rehearsing or practicing, by providing material for performance (composing), or by dancing" (Small, 1998, p. 9).

If that is the case, in what capacity players of digital games take part in musical performances? This dissertation provides a detailed answer to this question, situating it within the discipline of Game Studies. Digital games are considered for their cybernetic qualities (Aarseth & Calleja, 2015) as objects that can be traversed and reconfigured by means of ergodic effort. (Aarseth, 1997). The intersection of ergodic effort and musicking practices manifested in digital games generates a new musicking form: *ergodic musicking*. Ergodic musicking is identified as a modern form of musicking, capable of deconstructing established musical roles such as composing, improvising, or dancing. Ergodic musicking, however, is not just a mixture of previous forms: it is instead a unique musicking, only available to digital games. Thanks to their cybernetic qualities, digital games have provided music with an unprecedented platform, actualising a new form of musical participation.

The subject matter of the musicology of digital games is therefore to be understood as the study of musical forms of participation in digital games. Musicking is debated as a new paradigm for musicological enquire of digital games, challenging critical perspectives that have predominantly focused on the study of musical contents.

Ostensibly musical digital games such as *Guitar Hero* (Harmonix/RedOctane, 2005) or *Taiko no Tatsujin* (Namco, 2001) are analysed for their musicking potential. These examples are then contrasted with musical games that do not remediate known musical situations, like *Thumper* (Drool, 2016) or *BIT.TRIP RUNNER* (Gaijin Games, 2010). This dissertation includes a detailed case study of the digital games designed by Japanese media artist Toshio Iwai, understood as a pioneer of musicking.

Ergodic musicking is presented as a modality also available in digital games that feature sparse and occasional musical content, detailing an "experimental" modality drawn from theories of indeterminate works. Finally, ergodic musicking is situated within the larger frame of technological musicking defined by Borgo as transmusicking (2007; 2013), realising the futuristic possibilities of digital and networked technologies.

Acknowledgements

I would like to thank my wife, my family, my supervisors, and everyone at the Institute of Digital Games.

Statement of Originality

I declare that this thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification except as specified.

Costantino Oliva

Contents

Chapter 1

Introduction: musicking with digital games

1. A musical discovery

Audio is present in virtually every contemporary, commercially available digital game: musical pieces are included, alongside various other non-musical sounds. In this context, the dichotomy between musical and non-musical sounds, or "soundtrack" and "sound effects", is imported from the close field of film sound. There are, nonetheless, specific differences. Players are involved in digital games: no matter if they are winning or losing in a given game, their efforts will reconfigure the digital medium, setting it in motion and revealing its constituent parts and potentialities. Players are also in control of a certain portion of the sounds that the developers prepared for them. Quite simply, by pushing buttons on game controllers, audio and visual feedback is initiated. This apparently simple gesture is, however, situated within a deep cognitive operation: by listening to the diverse sounds and musical cues coming from digital games environments, the players make sense of them, gather relevant information, and eventually provide input. This feedback loop of sound production, understanding and interpreting is fundamental to playing digital games.

My interest in music within digital games stems from this statement of fact: as a digital game player, I am in charge of arranging the acoustic output of every play session. When it comes to addressing the aural experience of digital games, this fundamental aspect is

perhaps given less attention than it deserves. Instead, what is predominantly attributed value are recognisable musical tracks. For example, the tunes that Koji Kondo composed for *Super Mario Bros.* (Nintendo, 1985), the first title in the popular franchise, are now part of the collective pop culture imagination. Quite recently, Schartmann (2015) dedicated an agile book to the game's soundtrack. In this work, the author praises Kondo's eclecticism: the "Overworld" track features "a chord more reminiscent of a jazz classic or a Debussy prelude than a video-game track" (p. 52), while the "Underwater" waltz is a perfect accompaniment to Mario's gentle swimming, exemplifying "Kondo's music-as-movement philosophy (p. 72)".

Kondo's compositions are indeed a milestone in digital game audio. Yet, when I recall what I found to be the most distinguished audio feature of *Super Mario Bros.*, a different example comes to mind. I remember my younger self playing the game, and being fascinated by the glissando sound of Mario jumping. As noted by Whalen,

> "Mario's leap has a pleasant sound (i.e., it does not use minor or diminished intervals), not only because we are supposed to identify favourably with Mario, but also because a typical game player will likely hear the same sound repeated hundreds of times in a dedicated period of gameplay" (Whalen, 2004).

And I myself certainly heard it a few hundred times at least. Eventually my fascination with that specific sound encouraged me to repeatedly jump on the spot, as rapidly as possible, and I would disregard, for a moment, all the challenges of the game; for instance, completing the level within the allocated amount of time – an important restraint placed by the game designers. By jumping increasingly faster, I would notice that the sound was actually being reproduced in a different fashion. The game engine would cut the final part of the glissando, effectively eliminating the decay of the sound. If

we think of the jump sound as a smooth *boing* sound, the result of my actions was a frenetic *boi-boi-boi-boi-boi* followed by a final, complete "bo*ing*", when I stopped. Amused by my discovery, I would try to catch my older sister's attention in order for her to witness my humorous performance. This subversive but exhilarating moment may have been insignificant in the grand scheme of things, but it is one of the fondest memories I have of the game, likely because it allowed me to personally impact and reinvent that "pleasant sound", turning it into the material for a rather cacophonic moment. It is also important to note that all the actions I just described occurred in tandem with the sonic backdrop described by Schartmann – that is, the famous "Overworld" tune.

How could my impromptu actions be described? On the one hand, I was momentarily disregarding the objectives that the game designers had carefully and consciously set out for me to achieve, i.e. completing the course in due time, and preferably as fast as possible. Also, I was effectively retooling the game to put on a comedic musical performance for an audience (albeit a small one). This is not a unique occurrence: Švelch (2014) describes the exploits of various players he labels as "mischief makers", players that take "advantage of the capacity of video games to generate unexpected coincidences, collisions, and nonsensical situations [and] utilise them for comical effect". (Švelch, 2014).

Years later, I repeated the same operation with *Super Mario Bros*. This time, though, it was not simply a playful folly: I wanted to re-enact that specific occurrence, in order to understand it critically. Flanagan describes various instances of "critical play": the concept includes acts in which the players "occupy play environments […] in order to question […] an aspect of a play scenario's function that might otherwise be considered

a given" (Flanagan, 2009, p. 6). In this regard, playing critically means to perform in a subversive fashion in the context of a given situation imbued with semiotic meanings, expectations, and appropriate behaviours.

Were my musical performances with *Super Mario Bros.* "mischievous", or "subversive"? Are playing games and performing musically thus mutually exclusive, and does performance space have to be carved out in a creative fashion from digital games' limited real estate? Other examples indicate the contrary. For instance, years after my original encounter with *Super Mario Bros.*, I found myself playing *Electroplankton* (Nintendo, 2005), a remarkable work from Japanese media artist Toshio Iwai. By exploring the different possibilities at hand, I began improvising with the music. Devoid of any save function, the digital game encourages extemporaneous moments of musicality. My musical performances were no longer subversive or inappropriate, but in fact fell squarely into the context envisioned by Iwai.

While my experiences with *Super Mario Bros.* and *Electroplankton* may seem polar opposites, I would argue that in both cases I was using digital games to participate, albeit in a different fashion, in a musical performance.

2. Music as performed

Forms of musical performance are sometimes rendered evident in specific digital games. In fact, in several different cases, players find themselves in familiar and recognisable musical situations. Examples such as *Guitar Hero* (Harmonix/RedOctane, 2005), *Rock Band* (Harmonix, 2007), or *Dance Dance Revolution* (Konami, 1998) require the player to

participate in musical performances, “simulations” of concerts or dance events. These particularly popular examples tend to fall into the genre of “music games”, or “rhythm games”.

In *Guitar Hero*, players brandish a plastic guitar, mimicking the bravado of rock guitarists. *Rock Band* expands on this idea, adding several other plastic instruments, while also including singing. In *Dance Dance Revolution*, players dance to the music, stepping rhythmically on coloured input devices.

While ostensibly musical, the forms of participation made possible by these digital games can be considered as fairly diverse and distinct: playing an instrument, singing and dancing, are certainly not identical activities. Most importantly for research purposes, the academic disciplines covering these subjects are quite different, while largely being framed within music, performance and dance studies.

New Zealand musicologist Christopher Small criticises academic takes that focus on music as an aesthetic object, composed in the form of finished works, and eventually notated in musical texts. According to Small, this is a theoretical simplification, which diminishes the complex and manifold manifestation of music. In other words, by applying the perspective he criticises, “the word *music* becomes equated with works of music in the Western tradition” (Small, 1998, p. 3). Small instead assigns primary relevance on music as performed: “*performance does not exist in order to present musical works, but rather, musical works exist in order to give performers something to perform*” (1998, p. 8). Thus music is not an object: “music” should not be solely identified with musical objects, texts or works. Music, instead, is to be understood as a verb: to music. “To music is to take part, in any capacity, in a musical performance, whether by

performing, by listening, by rehearsing or practicing, by providing material for performance (composing), or by dancing" (Small, 1998, p. 9).

Coming back to my original example, I can intuitively argue that I was, indeed, musicking with *Super Mario Bros*. Given the definition offered by Small, it is irrelevant if in that specific case I was being mischievous or critical, appropriate or inept, meaningful or nonsensical. I was nonetheless taking part in a performance with some sort of musical element, and that renders my actions as "to music". However, I was not strictly adhering to the list of musical participation forms provided by Small in his definition of musicking. That list, however, can potentially be expanded and substantiated in innumerable ways, as Small specifies that to music can happen "in any capacity".

If that is the case, in what capacity do players of digital games take part in musical performances? Are they simply replicating instances of musicking in a new context, or does their participation amount to something unprecedented and different? This dissertation aims to provide a detailed answer to this question, situating it within the ongoing academic debate concerned with the study of music in relation to digital games.

3. Musicking with digital games

By applying Small's framework, it follows that a study of musicking within digital games should not focus on the material qualities of these objects or the musical content they include, but rather it should prioritise the study of musical forms of participation that are actualised during engagement with digital games. In other words, the study needs to focus on the various means that players tend *to music* with digital games. In fact, players

music in digital games that are ostensibly musical, either mimicking conventional musical forms, or engaging in seemingly novel activities. Players music in digital games with sparse, sporadic musical elements, by directly controlling musical sounds. Players music in digital games that involve them in systems that dynamically modulate compositions according to game events, connecting in-game operations to music.

Musicking with digital games will be described as a contemporary, modern form of musicking, capable of deconstructing established musical roles and juxtaposing their prerogatives in original fashion. Composing, improvising, dancing, playing, or otherwise performing: all these practices are explored and available within digital games.

Musicking with digital games, however, is not just a mixture of previous musical forms. By analysing the specific nature of this medium, I will detail how it rather constitutes a unique form of musicking, only available to digital games. Thanks to their particular structural qualities, digital games have provided music with an unprecedented platform, rendering a new form of musical participation possible. This modality will be theoretically identified, and ideally placed alongside the different musical forms previously listed by Small.

To do so, and to answer the research question enunciated in the previous section, this dissertation will discuss theories and paradigms from Game Studies, musicology, and the subfield ideally located at the intersection of these two, ludomusicology, or game music studies. This dissertation aims to balance musical analysis of digital games with the study of the many diverse forms of musical participation made possible by them.

Digital games will be considered as part of a larger group of media with cybernetic qualities (Aarseth & Calleja, 2009). This line of research regards digital games as objects that can be traversed and reconfigured by means of ergodic effort (Aarseth, 1997). Ergodicity will be considered as the paradigmatic effort undertaken by digital game players in order to engage with the medium. The intersection of ergodic effort and musicking practices manifested in digital games will be described as a new musicking form: *ergodic musicking*.

Ergodic musicking will be understood as the new musical modality of digital games and will be set as the paradigm for a renewed musicology of digital games.

4. Plan of the dissertation

This dissertation is divided into nine chapters, including the introduction and the conclusion.

Following this introduction, the second chapter broaches topics from Game Studies that are propaedeutic for the musical analysis of the ensuing dissertation. The paradigm of the cybertext (Aarseth, 1997) and its roots within cybernetic theory (Wiener, 1961) are introduced, detailing the "textual" nature of these artefacts. Aspects related to the problematic nature of "play" (in the ludic sense of the word) are debated, with a focus on Huizinga's contextualisation of play within music (Huizinga, 1949, p. 42; 158). Finally, ergodic effort is addressed in relation to notions of playfulness (Malaby, 2009; Sicart, 2014; Stenros, 2015): while ergodicity will be understood as one of the primary

theoretical tools of this dissertation, this section clarifies that ergodic efforts are not opposed to ludic activities but can instead include a playful predisposition.

The third chapter tackles the different theoretical approaches that have been implemented within the relevant literature tackling the study of music in relation to digital games. The chapter will critically address how "game music" analysis has been understood as the study of musical compositions in digital games. This perspective is described as necessary and productive, but it is limited to a specific aspect of musicking with digital games. Nonetheless, aspects related to the dynamic nature of music compositions are detailed (Kaae, 2008; Collins, 2009). The chapter discusses studies focused on performative aspects related to music in digital games, specifically Miller's notion of "schizophonic performances" (Miller, 2012, p. 15). Aspects related with the analysis of auditory displays and sonification in relation to digital games are also considered (Grimshaw, 2007, p. 120-121; Jørgensen, 2008).

The fourth chapter provides a contextualisation of musicking within compatible musicological resources. Methodological discussions from ethnomusicology (Blacking, 1973; 1987) are presented as foundational for the development of the original musicking framework. Musicological takes on performance are considered: as far back as 1982, American musicologist Richard Taruskin noted the growing interest that performance practice was earning among musicological institutions (1982, p. 338). Musicking is presented as a perspective compatible with the characteristics of the "drastic" traced by Abbate (2004), and situated within the performance-centred musicological paradigm set by Nicholas Cook (2001). Processes of formation of musical

meaning (Frith, 1996; DeNora, 2000; Kramer, 2002) are also considered. Musicking is presented for its productiveness in including analyses of improvisational modalities (Bailey, 1993). "Indeterminate" compositions are also addressed for their ability to "generate multiple outcomes" (Gottschalk, 2016, p. 9) and for the renewed musicking possibilities offered to performers of such works. Finally, indeterminate compositions will be reconsidered as "open works", a larger class of aesthetic objects defined by Italian semiotician Umberto Eco (1989).

In Chapter 5, the theories introduced thus far are applied to the most pressing topic of musicking: the so-called "music games". The genre is understood in a broad sense since it is not formally defined by Game Studies. *Taiko no Tatsujin* (Namco, 2001), is presented as an example of a music game in which musical pertinence is not given by the compositions included, but rather by the musicking context and gestures referred to, stressing the relevance of the musicking framework. The game is juxtaposed with examples such as *Guitar Hero* and *Rock Band* for their "simulative" aspect, as they all refer to recognisable musical situations. Other music games such as *BIT.TRIP RUNNER* (Gaijin Games, 2010) and *Thumper* (Drool, 2016), however, are discussed for their contrary nature, presenting novel musical situations that do not attempt to remediate existing ones. The elusive "music game" cannot therefore be formally maintained and is understood as a heterogeneous category. Relevant literature, however, understands music games as defined not by the content of the medium, but rather by the available interactions. Different takes on this aspect are critically compared (Kassabian & Jarman, 2016; Miller, 2017), underlining the specificities of each account.

The critical points raised in the fifth chapter are addressed in the following one, where ergodic musicking is defined as a form of musicking, in which the participation in a

musical performance involves exerting ergodic effort. The concept is compared with the paradigm of ludomusicology, here understood as "[a domain of research] broadly concerned with the relationship between music and play" (Kamp, Summers, & Sweeney, 2016, p. 1). Since ludomusical features can be located "at the manifold intersections between music, toys, and games" (Moseley & Saiki, 2014), the discipline can be applicable to different objects unrelated to ergodic musicking, such as toys. The chapter discusses how ergodic musicking contributes to the discipline.

Since ergodic musicking stands as both a mode of exerting ergodic effort and a musicking modality, the theory is contextualised between both theoretical discourses. Ergodic musicking is therefore established as the form of participation adopted by digital game players in musical situations.

Chapter 7 presents an extensive case study of ergodic musicking in digital games designed by Toshio Iwai. Primarily known as a media artist, from 1987 to 2006 he developed four digital games that have pioneered and redefined the parameters of what is expected from musical performances in digital games. *Otocky* (SEDIC, 1987) is widely considered as an innovator in the field of procedurally generated music (Collins, 2009 ; Moseley & Saiki, 2014). However, this perspective will be contested, re-contextualising *Otocky* for his unique improvisational form of ergodic musicking. *Sound Fantasy* and *SimTunes* (Maxis, 1996) develop improvisational modalities, merging them with audiovisual composition. Finally, *Electroplankton*, the "miniature museum" (Huhtamo, 2016, p. 92) containing several artworks by Iwai, is presented as a compendium of the ergodic musicking style created by the author. Different musicking modalities are explored, mixed and conflated, creating a brand of ergodic musicking that is at once archetypal and idiosyncratic.

Chapter 8 enlarges the theoretical frame of ergodic musicking, including examples of digital games that are not ostensibly musical. Ergodic musicking is discussed in relation to examples that feature sparse and occasional musical content, arguing that ergodic musicking is however in place. An "experimental" modality of ergodic musicking is detailed, adopting theoretical aspects drawn from indeterminate musical forms discussed in Chapter 4. The implications of adaptive and generative musical systems are also considered, for they augment the possibilities of ergodic musicking to manifest in digital games of different genres. Finally, ergodic musicking is situated within the larger form of modern, technological musicking defined by Borgo as transmusicking (2007; 2013). In this regard, ergodic musicking is considered as a present manifestation of the futuristic possibilities envisioned by Borgo, realising the potential of digital and networked technologies in an unexpected cultural scenario

Chapter 2

Game Studies, Play Studies: propaedeutics for a musical analysis

1. Introduction

In this chapter, I will analyse theoretical tools that are relevant throughout the thesis, specifically tackling central discussions in the field of Game Studies. If the study of sound in digital games can be considered a subfield of the larger Game Studies discipline, it is necessary to look into the latter, highlighting topics that intersect with issues of an acoustic nature later in the dissertation.

Reflecting on the specific requirements of my research, section 2 and 3 of this chapter will deal with references concerned with two main topics.

First, I shall discuss research that is concerned with understanding digital games as objects. Games can be considered a kind of artistic work, a multimedia vessel filled with varying content. Heterogeneous in nature, the building blocks of the digital game medium could be described by utilising components such as graphics, sounds, and the underlining code that governs the functionalities of the object. A deeper analysis might start unveiling the characteristic of this non-ephemeral content: we might find

narratives, music compositions, game rules, and so on. For this reason, the analysis of these components can arguably fall within the scope of a variety of different disciplines: from musicology to computer science, and visual art studies to narratology - they can all be applied to this complex object.

This dissertation largely regards games as cybermedia, "a more general class of phenomena to which games belong" (Aarseth & Calleja, 2015), and is focused on explaining how musical participation occurs during engagement with cybermedia. In order to identify these processes, it will be necessary to first present cybertexts (Aarseth, 1997), a theoretical concept introduced by Aarseth that preceded cybermedia. In fact, the cybertext paradigm has an academic history of its own, and presents distinct peculiarities. In this chapter, I will therefore address the question of what kind of object digital games are within the conceptual frame of the "text", and return to cybermedia in Chapter 6.

Section 2 of this chapter will introduce cybernetic theory, the discipline defined by Norbert Wiener as "control and communication in the animal and the machine". The interactivity between humans and non-humans as elaborated by Wiener is considered as a base for cybertext theory, and will subsequently be developed in Section 3. Even if the textual paradigm provides a focus on the formal analysis of the object, the nature of games as "text" remains problematic. Theoretically, it is still compatible with the scope of different academic disciplines, most notably literature studies and semiotics. The contextualisation, however, will outline how Game Studies established a "text paradigm" for game analysis. Later in the dissertation, this paradigm will be taken into account concerning its reflexes within the sub-field of game sound studies. In different accounts, game sound studies operate in a similar fashion, identifying musical texts within the

digital game container to be analysed. This perspective will be challenged in order to address aspects of musicking with digital games from Chapter 5 onward.

Section 4 and 5 will deal with ergodic effort, defined by Aarseth as "nontrivial effort required to allow the reader to traverse the [cyber] text" (Aarseth, 1997, p. 1). Standing as "an invaluable tool for investigating games […], the ergodic signifies the general principle of having to work with the materiality of a text" (Klevjer, 2002). Multiple perspectives on ergodicity will be considered, and the subject will be expanded further in relation to Actor-Network-Theory, by considering the work of Bruno Latour. The ecological approach established by Latour will be considered by addressing "nonhuman elements in a game system rather than human control over, or communication through, the system" (Giddings, 2006, p. 180-181).

Sections 6, 7, and 8 of this chapter will analyse the supposedly quintessential action of the game player: to play. The research concerned with play has a rich and varied history, interjecting analysis of human activities and behaviours with formal understandings of game characteristics. Digital game players are put in "a cybernetic feedback loop between human mind and machine" (Calleja, 2011, p. 135), during which they are able to provide active input during the session. The cybernetic situation structured by digital games is a topic largely without precedent in the examples often targeted by media studies. The study of this modality, however, is most definitely not solely connected with digital media. Not only do we play analog games, such as board games or sports, we also deploy playful approaches towards non-game situations. "Play is an activity, while playfulness is an attitude" (Sicart, 2014, p. 22). If the two are tightly connected, they also present specifics that will be considered throughout this research. Having established

playfulness as an attitude, or a mental state adopted by players, section 8 will also consider the mindset of players. The distinction of telic and paratelic will be considered, with telic being "a goal-driven, serious mindset" and paratelic a "playful state" (Stenros, 2015, p. 66). Both mindsets will be connected with ergodicity in section 9.

2. Before the cybertext: cybernetics

Before introducing the cybertext, it will be useful to explore its roots within cybernetic theory. Aarseth introduces the term "cybertext" by mentioning Norbert Wiener and his research:

> "*Cybertext* is neologism derived from Norbert Wiener's book (and discipline) called *Cybernetics*, and subtitled *Control and Communication in the Animal and the Machine* (1948). Wiener laid an important foundation for the development of digital computers, but his scope is not limited to the mechanical world of transistors and, later, of microchips. As the subtitle indicates, Wiener's perspective includes both organic and inorganic systems" (1997, p. 1)

Wiener, in fact, places technological innovation on a chronological parallel with evolution, intended in its biological sense. The passing of time in biological evolution is considered by Bergson, which "emphasizes […] the irreversible time of evolution and biology, in which there is always something new". (Wiener, 1961, p. 38)

In 1948, at the time of the initial publication of *Cybernetics*, coeval technological innovations were having a dramatic impact on our bodily functions, inducing a renewed understanding of our body and its evolutionary capabilities:

> "Today we are coming to realize that the body is very far from a conservative system, and that its component parts work in an environment where the available power is much less limited than we have taken it to be […]. We are beginning to see that such important elements as the neurons, the atoms of the nervous complex of our body, do their work under much the same conditions as vacuum tubes" (1961, p. 42).

The new automata are not "the dream of the sensationalist […]. They already exist as thermostats, automatic gyrocompass ship-steering systems, self-propelled missiles […] and the like. (Wiener, 1961, p. 43) These contemporary automata are "coupled to the outside world both for the reception of impressions and for the performance of actions" (1961, p. 43), and are equipped with communication systems for the transfer of information, be it between other automata or humans alike. As such, "they lend themselves very well to description in physiological terms" (1961, p. 43). The study of the automata is therefore contextualised within the inevitability of evolution, as described by Bergson:

> "The modern automaton exists in the same sort of Bergsonian time as the living organism; and hence there is no reason in Bergson's considerations why the essential mode of functioning of the living organism should not be the same as that of the automaton of this type" (1961, p. 44).

Within these examples of automata, computing machines have special relevance. During operation, in fact, a computing machine should ideally be as independent as possible, and capable of completing its task without human interference. Once data has been inputted, the machine should be solely guided by its own internal logic. "The computing machine must be a logical machine as well as an arithmetic machine and must combine contingencies in accordance with a systematic algorithm" (1961, p. 118). The computing machine is therefore a logical machine, and in this sense it is associated with the human brain, by virtue of them both being "logical machines".

"We thus see that the logic of the machine resembles human logic, and, following Turing, we may employ to throw light on human logic" (1961, p. 126). The logic of computing

machines, Wiener argues, can allow them to also learn (1961, p. 170). In order to prove this point, Wiener reverts to games as an example and an application, emphasising the competitive nature of game-related activities. He considers a competitive game of tennis, involving professional players, where the means of gaining advantages and ultimately winning the match are not just found within the ability to hit the ball efficiently, as far as every single stroke is considered; "the strategy is rather to force the opponent into a series of returns which put him progressively in a worse position until there is no way he can return the ball safely" (Wiener, 1961, p. 175). In this case, Wiener observes a human logic applied to a given problem; such logic is no different from the one used by "learning machines": "both have the same element of learning in terms of experience of the opponent's habits as well as one's own" (1961, p. 175).

Given these aspects, machines and automata as described by Wiener are to be understood as agents, involved in a technological communication exchange that sees participation by both humans and machines. It is within this perspective that the cybertext concept is introduced, as Aarseth identifies examples of verbal, literal text based on unique mechanical organisation.

3. The problem of text

One can identify the birth of the contemporary Game Studies discipline with the publication of *Cybertext* by Espen Aarseth (1997). A seminal title in many ways, it posed the basis for a discipline that has grown exponentially to this day.

In identifying the cybertext, Aarseth discusses cybernetic properties of a category of objects. In this section, however, I will initially focus on problems related with "texts", and in understanding digital games as pieces of work.

While being regarded as a seminal text within the field of game studies, *Cybertext* is mainly focused on the analysis of adventure games, MUDs, and hypertexts. Games in general, or digital games pertaining to different genres are not necessarily tackled within it; yet, it became a fundamental staple in research concerned with digital games at large.

> "Espen Aarseth has been one of the main architects of an approach to video games that accounts for their resemblances to games as well as to literary forms. In Cybertext, one of the founding documents of game studies, Aarseth argues that the interactive experience common to video games can be found in other kinds of texts as well" (Wesp & Hayot, 2004, p. 405).

The texts identified by Aarseth are objects with new characteristics that seem to resist conventional analytical tools. For example, *Adventure* (Crowther & Woods, 1976) is a game that only communicates with the player via written text. Inspired by spelunking, it gives the player the role of an explorer, visiting the inner depths of a mysterious cave. The player can type in relatively simple commands in the form of phrases, indicating directions to go or other actions to perform. Similarly, the game output is constituted by verbal descriptions of the locations and occurrences relative to the game. The format introduced by *Adventure*, based on textual communication, would eventually name the entire *adventure game* genre. This kind of game would generally embed the idea of having a "playable story"; narrative content is consistently central to the overall experience, and the players' efforts are generally directed toward the progression of the narrative plot at hand.

Part of the relevance of this example is to be found in the modalities that led to its creation. The authors collaborated via the Internet ancestor ARPANET, asynchronously and without ever actually meeting. Rather, Woods reached out to Crowther, obtaining the source code of an early version of *Adventure* (called *Adventures*) and independently programmed a new version of it.

The production and distribution modalities of *Adventure* are therefore, to some extent, unprecedented and definitely peculiar. There is no defined single author, nor a cohesive team, but rather a distributed approach, where fragments get independently developed. Which discipline is fit to perform a structural analysis for something so atypical? Crucially, Aarseth understands *Adventure* and (other similar examples) as texts. "A text […] is any object with the primary function to relay verbal information" (Aarseth, 1997, p. 62). The examples provided are therefore texts, as "they produce verbal structures" (p. 3). The idea of text, in this regard, is quite specifically outlined; it is an object that employs a verbal structure, and through a verbal modality, relays information. In a later work, Aarseth would be more explicit regarding the relation-status of text and games: "Are games texts (…)? Games are not "textual" or at least not primarily textual: where is the text in chess?" (Aarseth, 2004).

Throughout these examples, the "textuality" that interests Aarseth is therefore related with verbal communication; chess does not include written text, ergo it is not a text. However clear in this example, the word "text" is certainly loaded with meaning, assuming different implications in different contexts and disciplines. Specifically, in semiotics, a text is commonly understood as a man-made object made up of different signs, without necessarily including verbal communication. When writing about text

interpretation, Eco specifies: “To read a text means to manoeuvre coded and overcoded semantic information […]; such an instruction-like format is not limited to verbal texts, but is rather typical of every sign-system” (Eco, 1981). Hence, in Eco’s understanding, a text is a system of interrelated signs, while a verbal text would be a specific example of the latter. We therefore “read” a verbal text as we do with different kind of texts.

With that in mind, there are of course many different examples of verbal texts. Eco mentions road signals: a stop sign is equally understood regardless of the eventual verbal content. Aarseth, however, is referring to examples that are more structured and extensive than a road sign, specifically the literary text. He argues: “a controversy rages over the relevance of narratology for game aesthetics […]. One crucial aspect of this debate is whether games can be said to be “texts,” and thereby subject to a textual-hermeneutic approach” (Aarseth, 2004). Narratology, in this context, would be one of the main tools to analyse these (supposedly) narrative, literary texts. As detailed previously, Aarseth strongly argues against such a textual reading of digital games. The text-like qualities of digital games, instead, are identified in one single aspect: the semiotic system that games embed. Its importance is however incidental:

> “Any game consists of three aspects: (1) rules, (2) a material/semiotic system (a gameworld), and (3) gameplay (the events resulting from application of the rules to the gameworld). Of these three, the semiotic system is the most coincidental to the game. […] The dimensions of Lara Croft’s body, already analysed to death by film theorists, are irrelevant to me as a player, because a different-looking body would not make me play differently. When I play, I don’t even see her body, but see through it and past it.” (Aarseth, 2004).

This model would be revisited in a later work, adding the player as an element in the model (Aarseth & Calleja, 2009). This expansion and re-contextualisation will be discussed further in Chapter 6.

Representational issues, as opposed to game functions, or (if you will) game mechanics, are therefore of secondary importance and should not be considered as the principal subject of digital game research. The core meanings of digital games would be lost, if one decided to focus on textual-like qualities such as representation, or narrative elements (characters, plot, etc.).

To sum up, the controversy surrounding textual understanding of digital games is therefore not only caused by the formal properties of these rather complex objects, but also by the history, practices and evolution of the disciplines that study them.

However, what kind of object is a digital game? As mentioned, not only it is possible to discuss the semantic and verbal structures employed by digital games, but also the elements that are used to build these media objects:

> "These [digital] games, unlike traditional games or sports, consist of non-ephemeral, artistic content (stored words, sounds and images), which places the games much closer to the ideal object of the Humanities, the work of art. Thus, they become visible and textualizable for the aesthetic observer, in a way the previous phenomena were not" (Aarseth, 2003).

In this regard, Aarseth identifies a different but contiguous trope in digital game analysis. Regardless of their narrative content (or lack thereof), games can now be analysed as pieces of work. This research operation, or focus, could be described as content analysis, and renders these objects "textualisable" to us.

The status of digital games as art is peripheral to the scope of this dissertation. For now, it will suffice to say that content in games, including their audio content, has been considered artistic in nature. The idea of "content" itself, however, is certainly not devoid of implications.

> "Content" is a tricky word. When used it usually signals the importance of something other than that it refers to, usually the container. Those who actually focus on the "content" – say, a professor of literature or visual art, would never use the word to describe their object; the "content of Shakespeare" or "the content of Botticelli" (Aarseth, 2006).

There are different ways to address the reification of the digital game. Semiotic texts, or media containers filled with artistic non-ephemeral content, are two tropes that will be further analysed in the next chapter, specifically with regards to audio content.

These characterisations, however, could also refer to other audiovisual media. For example, a film could be addressed as a semiotic text, or as a container. What is the specific nature of the digital game media?

4. Ergodicity: reading the cybertext

As mentioned, *Cybertext* is a widely cited resource in Game Studies – and yet, it is focused on a specific and arguably liminal selection of specific examples. Having previously presented critical elements regarding the question of text and textuality, I will now tackle its possible cybernetic qualities.

> "The concept of cybertext focuses on the mechanical organization of the text, by positing the intricacies of the medium as an integral part of the literary exchange. However, it also centres attention on the consumer, or user, of the text, as a more integrated figure than even reader-response theorists would claim. The performance of their reader takes place all in his head, while the user of cybertext also performs in an extranoematic sense." (Aarseth, 1997, p. 1)

Since the (verbal) text is now mechanically organised, new properties are found. A cybertext such as *Adventure* must be explored in an actual, non-metaphorical sense. Parts of the text are only accessible to the user/player if specific input is provided. The

text therefore is able to reconfigure itself, based on the user's actions. However, every actualisation of the text in a given session is to be considered a valid manifestation of the object's potentialities. This means that an analysis of *Adventure* that would not consider it a self-standing text, but rather a machine that assembles actual texts, would fail to address its qualities as a coherent verbal structure. In fact, Aarseth laments analysis of *Adventure* for lacking a basic historical setting or failing to attribute authorship (1997, p. 107), thus apparently neglecting its nature as a human authored work, while stressing its machine-like properties.

The cybertext, however, requires from the reader a new form of effort, which Aarseth calls "ergodic". The term has its roots in mathematics and physics.

The original ergodic hypothesis was hailed by Wiener as "one of the greatest triumphs of recent mathematics in America" (Wiener N. , 1938), and it referred to probability calculations (Hayles, 1999, p. 88). The ergodic hypothesis was introduced by William Gibbs, and later reported by Wiener: "an ensemble of dynamic systems in some way traces in the course of time a distribution of parameters which is identical with the distribution of parameters of all systems at a given time." (Wiener N. , 1938). While primarily referring to physics, ergodic conditions have been applied in mathematics as well. With reference to games (and irrespective of the digital or non-digital nature of such games), Akian et al. have defined what are the ergodic conditions of a specific set of examples with given characteristics, specifically two-players zero-sum games, which they describe as dynamic systems of possibilities (Akian, Gaubert, & Hochart, 2014).

The ergodic objects analysed by Aarseth are instead not necessarily games, and his research is not based in mathematics or physics either; rather, he is interested in verbal and literary examples: "in ergodic literature, nontrivial effort is required to allow the

reader to traverse the text" (Aarseth, 1997, p. 1). This is contrasted to non-ergodic literature, in which actions such as turning the page of a book or sitting down while watching a film are considered to be trivial efforts. Much more important, in these cases, is the interpretative endeavour applied by the reader (or the viewer) – an interpretative effort that is, of course, also present in ergodic literature. Eco's remarks in this regard are of fundamental importance:

> Here we must eliminate a possible misunderstanding straight away: the practical intervention of a "performer" (the instrumentals who plays a piece of music or the actor who recites a passage) is different from that of an interpreter in the sense of consumer (somebody who looks at a picture, silently reads a poem, or listens to a musical composition performed by somebody else). For the purpose of aesthetic analysis, however, both can be seen as different manifestations of the same interpretative attitude. Every "reading, "contemplation", or "enjoyment" of a work of art represents a tacit or private form of "performance" (Eco, 1981, p. 251).

In Eco's theorisation, the cognitive activity associated with experiencing a work of art constitutes the manifestation of that work's potentialities. This interpretative attitude is shared by performers and audiences alike. With a cybertext, the user is now also involved in degrees of practical intervention. This dual level of engagement is also noted by Apperley: "the player interacts with the videogame on two levels – […] the ergodic, and the interpretive" (2010).

Aarseth's terminology has been subject to debate. What actually constitutes "trivial" and "nontrivial" effort in this context? As mentioned, interpretative and cognitive efforts are by no means disregarded as "trivial". Klevjer clarifies what constitutes as "ergodic work":

> "Through his concept of the *ergodic* Aarseth has provided an invaluable tool for investigating games as a unique form of expression, a distinct category of cultural activity not reducible to other and more established categories. The ergodic signifies the general principle of having to work with the materiality of a text, the need to participate in the construction of its material structure […]. This means that the user is basically involved as a player (doing ergodic work on the materiality of the text), not as a reader (interpreting on a semantic level)" (Klevjer, 2002).

Soderman aims to offer further explanation regarding the meanings of this terminology, by turning to their mathematical meanings.

> "I believe that Aarseth uses nontrivial and trivial according to their mathematical definitions. In mathematics the trivial indicates an absence of interest, a zero remainder. For example, if something can be said of every particular in a set then that something is trivial; it means nothing, it does not further our knowledge because of its commonality. The nontrivial thus indicates significance, a divergence from the common attributes of a set. Thus, trivial effort to read a text – such as the simple movement of the eyes and flipping of the page – means that for a vast majority of texts the work needed to navigate its medium is insignificant; that is, in a set of texts such a modicum of effort is identical to each member of the set – the differences between them are reduced to zero. Nontrivial effort in the traversal of cybertexts – throwing the yarrow sticks for a reading of the *I Ching*, exploring a world and solving puzzles in the graphic, interactive fiction *Myst* […] – means that for these texts the work needed to traverse their structures is significant and meaningful to the structure and interpretation of the texts […]. Such is Aarseth's category of ergodic literature (or cybertexts) where the work required of the user to traverse textual space is significant as compared to the rest of a set where such work remains negligible. Thus the nontrivial for Aarseth indicates that the user's effort to traverse the medium of the text (coupled with various ways that the medium exhibits its structure to the user) is significant in the overall structure and interpretation of the literary object" (Soderman, 2004).

Soderman's contribution clarifies the nature of the terminology employed, situating it within its mathematic roots.

The new ergodic aspects are connected with the properties introduced by the cybertext, understood as "a material machine, a device capable of manipulating itself as well as the reader" (Aarseth, 1997, p. 24). In turn, the reader manipulates, or reconfigures, the

cybertext, an activity that is not necessarily a linear traversal of the text at hand, eventually leading to a conclusion. The ergodic effort, therefore, is not necessarily intended as a positive input oriented toward reaching a successful state. Simple recombination of the cybertext amounts to ergodic effort, and it should not be equated to a successful or satisfactory input from the user.

The latter aspect of cybertexts has direct implications in Game Studies, where the concept has been adapted and applied to fit a unique example: digital games. The interrelation of aspects between ergodic effort and ludic activities will be further debated later in this chapter. However, it is in Game Studies, that concepts related to ergodicity have found their most widespread applications, and the productiveness of this analytical tool has been debated in order to understand its possible application to a broader range of examples. For example, while comparing ergodic and non-ergodic properties, Calleja applies the term to other media as well, crucially non-verbal ones, such as painting (Calleja, 2011, p. 18), alongside literature and film. All these media are non-ergodic, as opposed to cybertexts. In fact, the cybertext paradigm has been expanded to the larger frame of cybermedia (Aarseth & Calleja, 2009), which will be debated further in Chapter 6 of this dissertation. However, I will consider ergodicity as one of the paradigms of game analysis in order to describe the activities of game players.

James Newman (2002) questions the validity of the concept of ergodicity in digital games:

> "Quite simply, videogames are not interactive, or even ergodic. While they may contain interactive or ergodic elements, it is a mistake to consider that they present only one type of experience and foster only one type of engagement. Play sequences, from where the idea of the interactivity or ergodicity of videogames derives, are framed and punctuated by movie sequences, map screens, score or lap-time feedback screens and so on". (Newman, 2002)

Newman identifies, in engagement with digital games, phases or moments that are non-ergodic, or at least where ergodicity is lower. He considers ergodicity as a continuum, with "movie sequences, map screens, scores" and the like placed at one end, and moments of manifested interaction at the other. Segments that do not require direct input are in fact commonplace, and they constitute an important element of digital games. Newman's understanding of ergodicity has however generated a debate within Game Studies; Calleja argues:

> "[Newman's] critique of ergodicity is based on the existence of game segments that lack direct input from the player. Newman equates nontrivial effort with this form of input and, therefore, activities that do not involve direct input like checking in-game maps, formulating plans, or waiting for a particular event are not seen as forms of ergodic activity. But, the effort implicit in the ergodic is first and foremost a disposition and readiness to act, not simply the actual pressing of a button or pulling of a joystick" (2007)

Calleja directly applies ergodic concepts to digital games, stressing aspects related to cognitive efforts. Moments during gameplay in which players are contemplating their next move, or applying strategies that involve waiting, result in non-tangible action on screen. In these moments, however, ergodic effort takes place in the cognitive sphere of the players, which are as such deeply involved within the game. Ergodic actions are therefore also to be considered as mental operations occuring during gameplay. In this regard, Calleja proposes examples of ergodic engagement in strategy and FPS digital games. In strategy games, players will have to formulate long-term plans and carefully conceive their next move. While these considerably long periods of seeming inactivity do not generate tangible input, they involve deep cognitive activity and are fundamental to engaging with strategy games. A similar phenomenon can be also observed in FPS digital games:

> "This inconsistency is also applicable to action games. In a first-person shooter (FPS) game, for example, a player is lying on the third floor of a ruined building covering a street with a sniper rifle. There are no enemies in sight, but the sniper expects them to emerge in the near future as the street leads to one of the main game objectives on the map. Long minutes of inactivity result from such a wait, yet the sniper's job is often defined by this sort of patient waiting. Now, following Newman's logic, these minutes spent waiting are not a form of ergodic involvement as they do not require input from the player, who is just watching the screen. This misses the obvious point that at any second, someone might emerge around that street corner, and the sniper must be ready to deal with them or the fruits of the player's labor will go to waste" (Calleja, 2007).

Here, ergodic engagement with digital games is discussed as including cognitive involvement, and gameplay is understood as a type of ergodic engagement. Before delving into the topic of play further, it will be necessary to situate this ergodic framework within the ecological approach introduced by Latour: Actor-Network-Theory.

5. Actor-Network-Theory and Game Studies

So far in this chapter, I have introduced the cybertext concept, as presented by Aarseth, by also mentioning its origins through Wiener and cybernetics. Ergodicity has also been described, starting with the ergodic condition set by Gibbs and Wiener, and its adaptation as "ergodic effort" (with reference to engagement with cybertexts) as introduced by Aarseth. Ergodic engagement is also considered and debated within Game Studies, representing a fundamental theoretical tool for the discipline.

As previously mentioned, within cybernetics, Wiener attributed agency to non-human participants in a communication exchange. This point has been significantly expanded in Bruno Latour's Actor-Network-Theory (abbreviated as ANT). In *Reassembling the Social*, Latour inscribes this point within a much wider scope:

> "The argument of this book can be stated very simply: when social scientists add the adjective 'social' to some phenomenon, they designate a stabilized state of affairs, a bundle of ties that, later, may be mobilized to account for some other phenomenon […]. Problems arise, however, when 'social' begins to mean a type of material, as if the adjective was roughly comparable to other terms like 'wooden', 'steely', 'biological', 'economical', 'mental', 'organizational', or 'linguistic'. At that point, the meaning of the word breaks down since it now designates two entirely different things: first, a movement during a process of assembling; and second, a specific type of ingredient that is supposed to differ from other materials […]. What I want to do is to redefine the notion of social by going back to its original meaning and making it able to trace connections again" (Latour, 2005, p. 1).

The "social" element that Latour is interested in, is a dynamic, unstable network of connections; "social, for ANT, is the name of a type of momentary association which is characterised by the way it gathers together into new shapes" (Latour, 2005, p. 65) rather than "the precise ingredients that are entering into the composition of the social domain" (Latour, 2005, p. 1). The refocused meaning and importance given to the social also influences the role of objects in the social process:

> "The main reason why objects had no chance to play any role before was not only due to the definition of the social used by sociologists, but also to the very definition of actors and agencies most often chosen. If action is limited a priori to what 'intentional', 'meaningful' humans do, it is hard to see how a hammer, a basket, a door closer, a cat, a rug, a mug, a list, or a tag could act […]. By contrast, if we stick to our decision to start from the controversies about actors and agencies, then any thing that does modify a state of affairs by making a difference is an actor—or, if it has no figuration yet, an actant. Thus, the questions to ask about any agent are simply the following: Does it make a difference in the course of some other agent's action or not?" (Latour, 2005, p. 71)

Agents (or actants) in this context, is a term that should not only refer to human participants in the social network, but also to technological artefacts involved in shaping and configuring it. "Who are sociologists to decide the real and final shape (morphos) of humans (anthropos) [...]? You discriminate between the human and the inhuman. I do

not hold this bias (this one at least) and see only actors—some human, some nonhuman, some skilled, some unskilled—that exchange their properties" (Latour, 1992, p. 160). That does not mean that the social assemblage is indistinguishably made up of humans and non-humans alike; the social assemblage is not "the establishment of some absurd 'symmetry between humans and non-humans'" (Latour, 2005, p. 76). Rather, it details the relevance of objects in social sciences:

> "Things might authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid, and so on. ANT is not the empty claim that objects do things 'instead' of human actors: it simply says that no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored, even though it might mean letting elements in which, for lack of a better term, we would call non-humans" (Latour, 2005, p. 72).

While the implications of Latour's work are understandably wide, the perspective set by ANT has been applied within Game Studies, specifically referencing the relevance of non-human elements within the literary exchange of the adventure game as a cybertext:

> Aarseth's study of adventure games broke new ground in suggesting the complexity of aspects of the relationship between the player and the game. His model […] is predicated on material relationships […]. The adventure game model […] highlights the operations of nonhuman elements in a game system rather than human control over, or communication through, the system […]. It presumably allows for the possibility of an event in which human agency is wholly displaced (Giddings, 2006, p. 180-181).

The assemblage of the cybertext happens within a cybernetic feedback loop, structuring an ecology that includes human and non-human participants. Game systems, as Giddings notes, include non-human operators, which are responsible of the mechanical upholding of the text described by Aarseth.

Widening this ecology, Taylor expands on the subject: "The notion of assemblage is one way to help us understand the range of actors (system, technologies, player, body, community, company, legal structures, etc.), concepts, practices, and relations that make up the play moment" (2009, p. 332). While she acknowledges that she is using the term assemblage "very loosely" (2009, p. 336), the "assemblage of play" described by Taylor includes interrelations found within "the broader culture around us with its conceptual frames and tropes":

> "While looking at a game as it is presented as a boxed product may tell us something about the given structure of the artifact or its imagined player, understanding it as a lived object - as a playful artefact - comes via an attention to the assemblage that constructs our actual games and play" (2009, p. 332).

As also described by Giddings, this assemblage includes non-human elements in game systems. Within digital games, Taylor takes into consideration "how we are interwoven with our technologies and how they may at times come to act as a kind of independent agent we play alongside" (2009, p. 333). She takes as an example CTARaidAssist, a player-produced modification (mod) for *World of Warcraft* (Blizzard Entertainment, 2004). While mods are described as generally "standing in and doing work for us, monitoring our play, automating actions, providing key information, and in general facilitating a range of both mundane and complex action" (2009, p. 333-334), they also participate in collective endeavours (raids) in online group play.

> "Here the mod takes over, it stands alongside the players - sometimes simply facilitating their actions, sometimes acting as a kind of additional member to the group. A ''distribution of competences between humans and nonhumans'' (Latour, 1992, p. 233) is at work here, not only between an individual

> member and their mods but among the competencies of the group as a whole and their collective use of various software" (Taylor, 2009, p. 335).

In this section, I have introduced Actor-Network-Theory and connected it with ergodic engagement, highlighting the relevance of non-human components acting within cybernetic exchanges. Taylor, however, also reflects on the relevance of such assemblages as forms of "play". It is now necessary to properly introduce the term and its application in Game Studies.

6. To play: reading Huizinga

"Play" is an immediately ambiguous term; to start with, the word in English has very diverse meanings. Without delving too deeply into the different facets of the term, this dissertation's main linguistic issue will inevitably be distinguishing between *playing a game* and *playing music*. The proximity between music and game that the verb "play" suggests is fascinating, but these two meanings will inevitably be addressed by considering their differences and similarities.

Such a distinction will be outlined and intersected within the already established notion of play, as discussed within Game Studies. In this sense, by building on the complexities of play, this dissertation alludes that the term "play", when used in relation to digital games, is an all-encompassing, umbrella term for a variety of activities taking place within, and in relation to, digital games. In order to reach these conclusions, I will proceed by presenting relevant aspects of issues relating to play studies.

The history of play studies is rich and varied, and certainly precedes contemporary Game Studies. Huizinga (1949) is concerned, among other things, with identifying

structures of order within which play manifests. “Inside the play-ground an absolute and peculiar order reigns […]. [Play] creates order, *is* order” (Huizinga, 1949, p. 10). Huizinga emphasises the ritualistic nature of play, the fact that play only occurs in spaces where special rules apply - rules that have been decided in advance. In this regard, the idea of the “magic circle” would become a much-contested paradigm within game studies.

> “Just as there is no formal difference between play and ritual, so the "consecrated spot" cannot be formally distinguished from the play-ground. The arena, the card-table, the magic circle, the temple, the stage, the screen, the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e. forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to the performance of an act apart” (Huizinga, 1949, p. 10).

Game Studies has long debated the productiveness of the magic circle concept. For example, it is referenced when describing the closeness of game systems and their ability to create “a new reality” for the players (Salen & Zimmermann, 2004, p. 96), or to address spatio-temporal boundaries of games (Juul, 2005, p. 164). However, as Consalvo notes:

> “We cannot say that games are magic circles, where the ordinary rules of life do not apply. Of course they apply, but in addition to, in competition with, other rules and in relation to multiple contexts, across varying cultures, and into different groups, legal situations, and homes” (Consalvo, 2009).

Calleja (2012) also warns against elevating a “metaphor” such as the magic circle to an actual analytic tool, and considers “play [as] an intractable manifestation of reality” (Calleja, 2011, p. 48). Play is therefore not to be analysed as an alternate modality, or even as an alternate reality.

Contemporary Game Studies have expanded Huizinga’s analysis of play, by also considering play’s ability to intersect contexts and domains. Huizinga associates fun and

play, claiming that it is "the fun-element that characterizes the essence of play" (Huizinga, 1949, p. 3). However, play forms can also appear to be contradictory: most notably, the complexities of play have been described when emphasising the presumed dichotomy between play and labour. The two instances could superficially be understood as polar opposites, however Calleja (2011, p. 51-53), citing Steinkuehler (2005), Taylor (2006), and Yee (2006), points out: "MMOG players often spend extended periods of time engaging willingly in activities which even the players themselves view as tedious or laborious" (2011, p. 52).

The captivating topic of the magic circle is certainly the most hotly debated order structure introduced by Huizinga in relation to play. As discussed, the multifaceted nature of play, and its contradictory aspects, are also notably debated. For the scope of this dissertation, it is productive to highlight some of the least popular pages of Huizinga's seminal work: those that make a direct reference to music and musical elements. These elements of Huizinga's work are perhaps less considered within Game Studies. "[Play] is invested with the noblest qualities we are capable of perceiving in things: rhythm and harmony" (Huizinga, 1949, p. 10). Music, however, does seem to pertain to play:

> "It is quite natural that we should tend to conceive music as lying within the sphere of play […]. Making music bears at the outset all the formal characteristics of play proper: the activity begins and ends within strict limits of time and place, is repeatable, consists essentially in order, rhythm, alternation, transports audience and performers alike out of "ordinary" life into a sphere of gladness and serenity, which makes even sad music a lofty pleasure" (Huizinga, 1949, p. 42).

Huizinga describes music as an activity which involves "audience and performers alike", thus structuring a perspective that is theoretically compatible with the one proposed by this dissertation at large. Huizinga also touches on a variety of musicological topics, discussed further in Chapter 4 of this dissertation. More specifically, Chapter 4 will elaborate on the relevance of contextual elements within musical performances. Huizinga, for example, considers music to be devoid of any element of obligation: "play, we said, lies outside the reasonableness of practical life; has nothing to do with necessity or utility, duty or truth. All this is equally true of music" (Huizinga, 1949, p. 158). Musicological enquiry has, in recent years, debated social situations where music is instead associated with an element of utility; for example, DeNora describes the use of music for functional scopes:

> "The musical materials of airlines safety videos, for example, have been used for centuries to imply - with a quick, relatively loud, tonally centred and upward-sweeping gesture - a message along the lines of 'sit up and pay attention, something important is about to happen'" (2000, p. 13).

Similar points related to the multiplicity of musical situations and meanings, and the manifold applications of music to different social scenarios, are debated in Chapter 4.

7. Rhetorics of play

If on the one hand, Huizinga acknowledges that play seems to permeate different aspects of human activity, including those relating to music, the definition of play he provides has been expanded to address the contradictory nature of certain play scenarios, and examples where labour takes place in play spaces such as MMOG, are only one aspect of play's complex nature.

Rather than focusing on formal definitions of play, Sutton-Smith provides an analysis of the rhetorics of play. "Rhetorics: a persuasive discourse, or an implicit narrative, wittingly or unwittingly adopted by members of a particular affiliation to persuade others of the veracity or worthwhileness of their beliefs" (Sutton-Smith, 1997, p. 8). In a sense, Sutton-Smith's approach is to analyse how play is understood in various semantic discourses or disciplines, and how different orders of knowledge privilege certain aspects of play's diversity. Following Foucault (1970), sciences are "presented as being maintained by rhetorical means" (Sutton-Smith, 1997, p. 8). Traditional understandings of play are considered. For example, the idea of "play as progress" (p. 35-51) is considered in relation to child play and its formative importance. "Play as fate" (p. 52-73), instead, seems to be in direct opposition to the general positivity of child play. This rhetoric is instead to be considered as a pariah: "[The rhetoric of play as fate] enjoys only an underground advocacy in the modern world […], though it remains popular among lower socioeconomic groups" (p. 10).

The multiplicity of aspects surrounding play unsurprisingly renders its general study as inherently interdisciplinary. The methodological merit of Sutton-Smith, however, is in acknowledging the vastly different nuances of play, notwithstanding its binary opposition (previously outlined) with work. Much in line with Sutton Smith, Henricks (2015) notes that play "can include all manners of psychological, bodily, environmental, social, and cultural elements" (p. 22).

Which play rhetorics are concerned with sound and music? The question is rather too broad to offer a straightforward response, thus in order to construct a targeted and constructive answer, attention is mostly placed on one of Sutton-Smith's rhetorics: the

rhetoric of *play as the imaginary*. "Usually applied to playful improvisation of all kinds in literature and elsewhere, idealizes the imagination flexibility and creativity in the animal and human play worlds. This rhetoric is sustained by modern positive attitudes toward creativity and innovation" (Sutton-Smith, 1997, p. 11). Also, "this rhetoric seems not so much concerned with play as an intellectual contest, a competitive bout, or a parade" (p. 128).

The idea of the imaginary as presented by Sutton-Smith is grounded in Romanticism and Enlightenment. "The Enlightenment created the idea of the imagination […]. It became the impelling force in artistic and intellectual life, in literature and philosophy […]. Imagination can free us from a self-centred world" (Engell, 1981, p. 3-10, cited in Sutton Smith, 1997, p. 130). Play is understood as an idealised actualisation of imagination, able to synthesise the dichotomy between "objective and subjective life". This romantic, inherently positive view of play fails to take into account certain negative aspects, such as what Sutton-Smith calls "dark play". Moreover, it conflates imaginative, free expression with play. "Play is a name [many educators] give to a conglomerate of activities that have such other names as exploration, practice, manipulation, experimentation, making music [and many others]" (p. 134).

The warning issued by Sutton-Smith in this regard is clear. Many human activities, all in their own right pertaining to certain categories of knowledge, can fall under the sphere of "play" in this overtly positivistic rhetoric. The *épistème* of Game Studies cannot therefore consist of a self-sufficient play theory, but must theoretically break the meanings surrounding play. In this sense, this dissertation will consider the positive aspects of creative music making and understand their relationship with play.

But how does play interact with an even larger frame of modalities, not only involving aurality? To answer this question, the next section will add the concept of playfulness to this theoretical frame.

8. Playfulness

> "When the work/play distinction is left behind, we see instead in ludic practice a more useful contrast between a cultural form (a game-like activity, no matter how playfully engaged in) and a mode of cultural experience (a playful disposition towards activities no matter how game-like) […]. Thus we may say that a game may prompt a playful disposition, but then again, it may not" (Malaby, 2009).

In this account, Malaby separates play and game, identifying the idea of a playful disposition. According to Sutton-Smith, "playful refers more to a mood of frolicsomeness, lightheartedness, and wit" (Sutton-Smith, 1997, p. 147). If play is referred to "well organised entities" such as children's play, sport, and games, playfulness is instead "disruptive of settled expectations" (p. 148). Playfulness is therefore inscribed in a rhetoric of imagination, and in a sense represents a modality to actualise creative occasions.

The modernity of playfulness is embraced by Sicart. While being very well inscribed in the romantic cultural environment described by Sutton-Smith, he integrates in his own rhetorics contemporary fields of knowledge, such as playful design and performance studies (Sicart, 2014, p. 117). "Playfulness is a way of engaging with particular contexts and objects that is similar to play but respects the purposes and goals of that object or context" (p. 21). In modernising concepts and terminology, Sicart refers to playful as an *attitude* and to play as an *activity*. In that sense, he subscribes to Malaby's view of playful

as a disposition towards activities, "projecting some of the characteristics of play towards nonplay activities" (Sicart, 2014, p. 22).

Crucially, though, it is also possible to be playful in play.

> "Many of the flourishes with which Magic Johnson adorned his basketball game were not practical and goal oriented; they were [...] a way of enjoying the game while playing at the highest stakes. This beautiful playfulness created a stark contrast with the serious context of professional play, making those actions more beautiful and an embodiment of the ideal of the game" (p. 22).

In this sense, playfulness is understood as a form of virtuosity, through which an exceptional professional player embodies the ideal of the game. Magic Johnson disrupts settled expectations towards basketball playing, effectively creating a new paradigm and hence new ideal expectations.

The latter example highlights the creative nature of playfulness, and the positive nature of playfulness rhetoric. Sicart reports on a number of software employing playful design concepts. For example, Siri is an artificial intelligence helper installed in Apple's computers and smartphones. Siri is capable of providing a set of witty answers to mundane or inappropriate questions, thus evading its perceived function as utility software. In this sense, the playful rhetoric of design is well represented in contemporary product design, although this dissertation largely focuses on examples of playful attitudes towards predesigned playthings.

Compatible understandings of playfulness have been detailed in Game Studies literature. Stenros contextualises playfulness from perspectives that include psychological studies, notably Csikszentmihalyi's distinction of telic and paratelic.

"The works of Csikszentmihalyi […] support the notion that there is a phenomenological mental state […] which can be characterised as playful. This personal playfulness is separate from the externally visible (structural) activity of play (or playing)". (Stenros, 2015, p. 68). While the separation between structured play activities and playful mental states is largely compatible with the views of Malaby and Sicart, Stenros elaborates on the telic and paratelic metamotivational mental states.

> "Telic is a goal-driven, serious mindset, where the activity is engaged in for a purpose. It is future-oriented, aiming at the pleasure of achieving a goal at a later moment in time. Long-term ambition is valued, while arousal, risk, and anxiety are avoided. Paratelic is a playful state, and it is characterised by being present-time oriented. The activity is itself the goal (or, as in games, a secondary goal is adopted in the service of the primary activity)" (Stenros, 2015, p. 66).

These mental states are not mutually exclusive; rather, it is possible to oscillate between them. Playfulness is here understood as a paratelic mindset, with "emphasis on immediate gratification, fun, emphasis on process, passion, spontaneity, freedom, willingness to experiment, disposition towards make-believe, and the tendency to prolong the activity if possible" (Stenros, 2015, p. 66-67).

The idea of playfulness completes the ecology of modalities related to game studies delineated by this chapter. Before considering game sound studies, the next section will complete the circle by making connections between playfulness and ergodic action, and

before addressing this ergodic effort, the section will first address playful attitudes toward text and cybertext.

9. Ergodic effort and playfulness

It is relatively easy to find parallels between literary texts and playfulness. Sutton-Smith mentions Boccaccio's novel *The Decameron* as a literary text in which the characters make use of play (1997, p. 138). The protagonists of the novel have in fact retreated to the countryside of Florence to escape the plague of 1348, passing time through playing and telling stories. Through the ambiguity of play, certain inappropriate, licentious situations are presented in an ironic fashion. The trope happens to be proverbial in the Italian language, in which the adjective *boccaccesco* serves precisely to address similar situations. Another example would be "the literature of nonsense and humour" (Sutton-Smith, p. 141), which requires the reader to fill logical gaps through modalities pertaining to the rhetoric of imagination.

All these examples, however, are firmly rooted in the tradition of non-ergodic media. As such, the required or represented playful attitude is to be understood as purely noematic and interpretative. The cybertext presents the positive traits of playfulness described in the rhetoric of imagination, embodying a creative disruption of expectations in subverting the modalities of accessing (reading) and structuring texts. As such, the cybertext can be described as a playful text. The cybertexts do not present the thematic limits described by Sutton-Smith, such as play and nonsense; rather, they invite the user toward an original exploratory attitude, such as in the aforementioned *Adventure*. The cybertext simultaneously embeds and subverts the rhetoric of

imagination: in a sense, the user not only has to interpret and imagine, but also to materially create and provide input, translating the action from the cognitive to the physical.

Ergodic efforts, too, can certainly present traits of playfulness. Thus far, playfulness has been discussed as an attitude or a mindset, compatible with different takes on the subject (Malaby, 2009; Sicart, 2014; Stenros, 2015). It will now be described in terms of how concrete examples of ergodic engagement with digital games can be understood as telic or paratelic. Previously in this chapter, I have specified how ergodicity presupposes a mental disposition to act (Calleja, 2011, p. 41), by providing as an example a gameplay situation typical of FPS digital games. In these games, a player acting as a sniper might wait for a prolonged amount of time in order for one of his enemies to appear in his line of sight, before finally pulling the trigger to hit the target. This engagement with digital games has been described as ergodic effort, and it involves relatively long-term planning in order to achieve a desired objective. The mindset of the player employing this waiting strategy can be also rightfully described as telic, which as mentioned, is a "goal-driven, serious mindset, where the activity is engaged in for a purpose. It is future-oriented, aiming at the pleasure of achieving a goal at a later moment in time" (Stenros, 2015, p. 66). The player engaging with a telic mindset disregards short-term achievements, and is willing to wait to reach a goal.

But within the same play session analysed by Calleja, the player so far described as employing a telic mindset might possibly oscillate toward a paratelic one. For example, the player can abandon a safe sniping position to engage in close combat, which in this context would involve a riskier strategy. The player employing a paratelic mindset would cause emphasis to shift to immediate gratification, as every turn could provide an

enemy to target. The higher risk involved in this case would probably be detrimental to reaching long-term goals, as the reckless player would be frequently exposed to risks, and could possibly be shot down by the enemy team. The paratelic mindset would also involve "spontaneity, freedom, [and] willingness to experiment" (Stenros, 2015, p. 67), as abandoning a successful strategy would require speedy solutions in order to address the higher risks involved.

In this example, gameplay is understood as a form of ergodic engagement compatible with both telic and paratelic mindsets. Emphasis is placed on the fact that ergodicity and playfulness, as discussed in the previous section, are not mutually exclusive. The player employing a paratelic mindset can also employ playful attitudes during ergodic engagement.

10. Conclusions

In this chapter, theoretical tools related to the analysis of digital games and the academic discussions surrounding them have been presented. These concepts have baseline value, and alongside different musicological resources they are necessary in developing the main topic of musicking with digital games in the following chapters.

Fundamental concepts within Game Studies have been addressed in this chapter. In its relatively short span of existence, the discipline has developed a lengthy debate concerning the status of digital games as a form of narrative, among other significant research topics. While the bulk of that debate is not central to the argument of this dissertation, what is arguably one of the main paradigms of Game Studies has been

highlighted: the cybertext. Stemming from cybernetic theory, in its original conception the cybertext is actually a literary kind of text, containing "verbal information" (Aarseth, 1997, p. 62), which however has recombinatory properties. The "problem of the text", as addressed here, is nevertheless not only related to this specific account of digital games scholarship. In the next chapter, attention will be placed on how the Game Studies sub-field concerned with sound and music in digital games has focused its analysis on musical kind of texts, considered as musical compositions employed as content of the digital media.

While issues related to musical texts will be further developed, this chapter has presented a second theoretical concept that will remain of central importance throughout this dissertation: ergodic effort. While the uniqueness of cybertext is to be found in its structural, formal properties, the ergodic concept is instead related to a new kind of effort required by the users of said cybertexts.

Ergodicity is a widely considered paradigm in Game Studies, and has been re-applied and updated significantly to include cognitive and mental aspects of gameplay (Calleja, 2011, p. 18). This dissertation may also be placed within this line of research, further expanding the concept of analysing the interrelations between ergodicity and musical participation. These aspects are extensively developed in Chapter 6, 7, and 8 of this dissertation.

The cybernetic nature of ergodic engagement can be contextualised within ANT; Game Studies have already highlighted the relevance of the "operations of nonhuman elements in a game system" (Giddings, 2006, p. 180-181) during engagement with cybertexts. Furthermore, Taylor has elaborated aspects of ANT to address the "assemblage of play",

understanding a "wide range of actors (system, technologies, player, body, community, company, legal structures, etc.), concepts, practices, and relations that make up the play moment" (2009, p. 332). "Play" though, is a topic that has been analysed under different disciplines. While ergodic effort has also been described by Calleja as a form of engagement undertaken by digital game players (2007; 2011, p. 55), this understanding of player experience can also be connected with topics related to the ludic aspects of playing digital games. Studies related with play have also addressed the dual meaning of "play": its ludic sense ("playing games") and its musical sense ("playing music"). Huizinga's work has been described in that regard (Huizinga, 1949, p. 10) and expanded with more recent musicological takes on similar topics; the multiplicity of musical participation forms will be developed in Chapter 4 of this dissertation.

While the theoretical grounds of play might be slippery in this sense, in recent years the concept of "playfulness" has undergone a theoretical resurgence. While Sutton-Smith refers to playfulness as a "mood" (1997, p. 147), Sicart expands the concept to consider it "a way of engaging with particular contexts and objects" (2014, p. 21). Playfulness can therefore be manifested in a variety of situations, possibly also in instances of ergodic effort. In fact, ergodic effort can certainly be expressed in a playful manner, by employing this modality while manipulating a cybertext. Telic and paratelic mindsets, in this sense, are compatible with ergodic forms of engagement.

This chapter has laid the ground for the development of a theory of musicking with digital games by introducing topics of both general and specific relevance. The next chapter will restrict the theoretical focus by critically addressing an analysis concerned with music in digital games.

Chapter 3

Theoretical Approaches to the Study of Music in Digital Games

1. Introduction

In this chapter, a selection of theoretical tools and methodologies that have been developed to address and study the topic of music in digital games will be presented. Sound in general, regardless of its eventual musical nature, will also be considered.

Thus far, emphasis has been placed on Game Studies by considering authors and theories that are arguably regarded as foundational. Games, as has been shown, have often been analysed by highlighting their cybertextual qualities (Aarseth, 1997; Calleja, 2011), emphasising the importance of the cybernetic feedback loop that is structured with players. In order to traverse a cybertext, non-trivial effort is required. This effort has been defined as ergodic (Aarseth, 1997).

The paradigm of games as texts, either literary or semiotic, resonates throughout Game Studies. Broadly speaking, the field is also notably segmented, with different tropes, topics, and theoretical tools coexisting: "when faced with the rich and varied world of digital games, it is hard to think of a subject or discipline that could not in some way be used to study the field […]. A more or less complete list reads like the A-Z list of subjects from a major university" (Aarseth, 2003). Notwithstanding the variety of approaches,

paradigmatic issues such as the objectual nature of games are able to traverse and influence a range of diverse disciplines.

In this chapter, focus is placed on resources concerned with the analysis of music in digital games - or rather - music *as found* in digital games. For example, Whalen clearly states: “by "videogame music" I generally mean the parts of the soundtrack that are pre-composed and recorded for playback to accompany specific locations or events in the game” (2004). This perspective is certainly not neutral, but rather a specific way to analytically structure the relationship between digital games and music. In fact, starting with Chapter 6 of this dissertation, this approach will be contrasted by proposing an analysis of music *as performed* in digital games.

The perspectives I am going to analyse resonate with the paradigms described by Aarseth and are well-established in the Game Studies discipline, specifically within the idea of understanding games as objects. However, the limits of available theoretical tools will also be highlighted for the purposes of this research.

The analysis of sound and music in digital games can be considered a sub-section of Game Studies, in which different theories from media studies, sound studies, musicology, and others, interact with various paradigms of Game Studies. In essence, this research will largely be situated in the musicological segment, aiming to produce new perspectives and analytical tools regarding the nature of music in digital games. While being situated in musicology, the dissertation aims to address theoretical issues and topics that have also been tackled within the contiguous subjects mentioned above.

How does analysis of sound in games build on the idea that music can be understood as an artefact? To answer this question, the first section of this chapter will focus on resources that consider the nature of the musical work in digital games. A digital game can be considered an audiovisual medium, for which a specific kind of music content is produced; although the disparity between the musical content of other audiovisual media, such as films is distinct. For this reason, relevant references in the game sound studies field have theorised aspects that are specific to digital games, such as dynamic, or adaptive, game music (Collins, 2007; Kaae, 2008). Kaae defined dynamic music in games as "music which is in some way able to react to gameplay, and/or is in some way composed or put together in real time by the computer" (Kaae, 2008). In this sense, digital games seem to include new musical paradigms, as "dynamic music" would be an unprecedented kind of musical composition, albeit ascribable within contemporary forms of music making, such as avant-garde or experimental music. This dissertation, however, aims to provide a different perspective of the concept of "music" that does not solely focus on compositional practices. As such, it will critically engage with the concept of musical work in digital games, including the peculiar "dynamic" quality that has already been the subject of analysis.

The second part of this chapter will instead focus on a relatively new thread of research that is concerned mainly with how digital games remediate and render music available to digital game players in a novel fashion. Miller (2012) emphasises that "playing along" (in the musical sense of the word) with digital media empowers the activity of playing together and renders it accessible. Before the advent of such media, playing along was otherwise "a privilege, and achieving its rewards has historically required time, money, and the development of face-to-face relationships" (Miller, 2012, p. 222). Musical performance in digital games is one of the most relevant topics tackled by this approach;

for example, the interaction modalities structured by the popular music game *Guitar Hero* (Harmonix/RedOctane, 2005) will be discussed. The implications of interacting with sounds in digital games are also considered by Collins (2013) who adapts and expands media theories concerned with the analysis of sound in media. This dissertation's contribution can be situated within this line of research, and this chapter intends to provide theoretical context and contiguous areas of interest. The references have been selected according to their critical takes on the topic of music composition in digital games, and for their contribution to the relatively new field of analysis concerned with musical performances in digital games. In the next chapters, this concept will be reapplied and re-contextualised within the new framework of musicking in digital games. In fact, the concept of musicking will intersect in different ways with the problems already discussed in the available literature.

These developments will be fully tackled from Chapter 5 onward, while the next section will continue the discourse started in the previous chapter by presenting different analytical approaches to musical texts (or musical compositions) in digital games.

2. Game music as composition

The analysis of game sound has not necessarily been solely undertaken within a special subfield, clearly partitioned from other areas of research. After all, if digital games are both *audio* and *visual*, practically every take on game analysis will inevitably come across issues related with the aural component of the equation. A brief look into resources that are not primarily focused on aural analysis will serve to identify how larger analytical frameworks take into account sound and music in digital games.

Many of the selected approaches are based on the concept that "music in games" is actually largely identifiable as a pre-composed musical work found in a given game. As previously alluded to, in this regard, music in games constitutes an example of "non-ephemeral, artistic content" (Aarseth, 2003) stored in the game container. The following thread of game analysis is hence concerned with understanding the peculiarities of such content.

In *Understanding Digital Games* (Egenfeldt-Nielsen, Smith, & Tosca, 2008), the authors categorise the different aural elements that are part of the "sound landscape" (p. 125) of digital games. Music, which is found among other components, is considered "the soundtrack to the game. Music is usually used to add to the atmosphere of the game (or set the mood) but can also be directly tied to the game world" (p. 125). The terminology used here – specifically, the term "soundtrack" – is clearly derived from film sound practice and is thus contiguous with concepts from media studies. In a sense, music is understood as being on a track: a sort of pre-composed linear path. However, digital games are considered to differ from films in that "videogame designers typically want the music to adapt to present circumstances of the game" (p. 125). This can be obtained by modifying certain tunes to reflect in-game situations. Other options are also viable: "certain music files may be split into various sections and looped for various periods of time" (p. 127). Composing musical works for digital games is therefore a peculiar job. Similar to any other audiovisual media, composers realise and record pieces by whatever means possible. In a film, the director would typically oversee and edit such recordings, finally realising a linear audio track that proceeds concurrently with the visual one. In digital games, different "dynamic" techniques are commonly used. Chunks

of music files can therefore be triggered by the game engine in response to player input: an unprecedented occurrence in audiovisual media.

Nitsche identifies similarities and differences within films and digital games. “Like films, video game titles use specially composed and produced soundtracks to support the setting and evocative narrative elements” (Nitsche, 2008, p. 133). Music is hence considered a supportive tool to the overall *mise-en-scène*. If this aspect of game music is practically identical to film music, specific game genres seem to offer different possibilities. “Some games depend on a combination of music and interaction: rhythm games let players participate in the event on the acoustic layer. In this very successful genre the order is reversed […] the player has to follow the music” (Nitsche, 2008, p. 124). As similarly described by Egenfeldt-Nielsen, Smith & Tosca, the player participates in acoustic events, triggering musical elements in a different fashion. But the “soundtrack” trope remains consistent: the music is a given, substantially non-modifiable content that the player has to follow in order to traverse the game text. Although a similar kind of musical situation is present in certain games, it remains a limited paradigm, inherently applicable only to a specific set of examples within digital games. Moreover, throughout this dissertation, the musical meanings available to players are not always immediately attributable to a soundtrack but are rather the result of a musical form of expression.

A different example is instead given by audio engines such as Microsoft’s DirectMusic and LucasArt’s iMuse, which Nitsche considers both “generative” and “adaptive audio” systems. For example, “a change in the background music of *Star Wars: Tie Fighter* (1994) […] becomes a signal for growing danger immediately before the enemies will start another attack” (2008, p. 136). In this regard, game music references the tropes of

film sound in foreshadowing or accompanying events. Such events are however not entirely predetermined, but rather caused by the player's actions and by the potential occurrences of the given game.

As shown throughout this section, music content in digital games is influenced by the tropes, techniques and concepts established by the study and practice of film sound. However, the diversity of games seems to create a divergence from this *prima facie* parallelism. According to Nitsche, rhythm games are distinctively different in this sense, reversing the relationship of importance between music and visuals and differentiating this relationship from that found in the film paradigm. Finally, aspects of dynamic activity attributed to music compositions are commonly discussed in digital game analysis, and technologies such as game audio engines are taken into account. The next section will focus on a more detailed analysis of the implications of dynamic music compositions for digital games.

3. Dynamic game music compositions: ergodic implications

In the previous section, basic concepts related to dynamic music compositions in digital games were introduced. Technologies such as the iMuse have made it feasible for game developers to deploy sound files in digital games in a non-linear fashion that accommodate gameplay events. However, digital games implemented modalities of non-linear music reproduction well before the advent of dedicated game sound engines. Even in *Space Invaders* (1978) the menacing bass line that accompanies the aliens' descent speeds up (roughly doubles) as they get close to Earth. This is an example of

non-linearity in musical composition: this eventuality may not manifest itself, providing the player is good enough at destroying the invaders before they get too close.

What follows is that non-linear aspects of game music compositions not only are not new, but also are a rather long-lasting characteristic of the medium. Game sound studies have theorised different approaches to pin down what constitutes "non-linear" in relation to sound and music, clarifying a terminology imported from audio design and composition.

According to Collins, "video game sound is often referred to in a vague manner as "interactive", "adaptive" or "dynamic" (2007). Moreover, "the non-linear aspects of games audio, along with the different relationship the audio has with its audience, poses interesting theoretical problems and issues. Being an audio-visual form consumed on screen, it may seem at first logical in researching games audio to draw upon film and television theory; however, there are very distinct differences between these media for which new terminology and new theoretical approaches must be considered" (Collins, 2007). In this regard, the author identifies with the term "dynamic audio", acoustic properties that arguably cannot be found within previously available audiovisual media. "Dynamic audio is audio which reacts to changes in the gameplay environment or in response to a user" (Collins, 2007). Subsequently, Collins further divides dynamic audio into two categories of game audio.

The first is interactive audio: "sound events occurring in reaction to gameplay, which can respond to the player directly" (Collins, 2007). For example, if the player pushes a button, the character on screen performs a given action such as swinging a sword and

producing a “swoosh” sound, which is considered to be an interactive sound effect by Collins.

The second example is adaptive audio: sounds that changes not in reaction to some direct user input, but to changes in the game environment. “An example is Super Mario Bros (1985), where the music plays at a steady tempo until the time begins to run out, at which point the tempo doubles” (Collins, 2007).

However, both interactive and adaptive audio are grouped under the definition of dynamic audio by Collins: “audio which reacts to changes in the gameplay environment or in response to a user” (2007). This terminology therefore identifies with both interactive and adaptive audio aspects of dynamic activity.

If this account considers audio in general, without necessarily discerning between the traditional dichotomy of music and sound effects, Kaae focuses “on the compositional requirements of dynamic music” (2008). Providing materials for musical content of digital games problematises the traditional conventions of “linear film music” composition. Once again, the issue of non-linearity is identified as fundamental in game music analysis and production. This is understood as a challenge for the composition of substantial, presumably lengthy, and relatively complex musical pieces to be used as content for digital games. Kaae refers to “linearity” in music as a series of possible musical structures commonly used in compositional practices, which generate archetypal forms and repetitions. Specifically, “cyclic form often takes place at many levels in the music, from the overall form of the musical piece down to each individual phrase” (Kaae, 2008). A composer willing to use cycling forms in musical works for

digital games has to take into account that such cycles might be broken by various kinds of game occurrences (player action, an in-game event, etc.), as previously described.

Interestingly, Kaae proposes the hypertext format as an example of a multi-linear structure, comparing it to dynamic music composition. In a hypertext, different nodes can cause an alternate assemblage whenever the user intervenes. Once the node is accessed, the text in that node must be read in a linear fashion, before proceeding to the next node.

For Kaae, it is possible to use a similar structure to compose dynamic music: "a piece of music can be split into smaller pieces, for example a verse and a refrain […]. It should also now be easy to see the correspondence between phrases, verses, refrains and so on in music and the nodes in a hypertext, and this is exactly how dynamic music is often build […]. Small pieces of music are put together to form a hyperstructure." (Kaae, 2008)

In this account, the paradigm of the text – and of the hypertext – is explicitly referenced. Musical compositions in digital games are understood as "musical hypertexts," so to speak. However, applying the hypertext paradigm to digital games and their content, specifically with regards to how this content is organised, can be problematic. In fact, the hypertexts' functionalities can be said to be generally insufficient to describe digital games; arguably, the concept of cybertext illustrated in the previous chapter is based on the identification of a new class of texts, different from the hypertexts due to their ergodic properties. Understanding musical composition in digital games as musical hypertexts prevents an analysis of the cybernetic feedback loop they are part of: the players' participation is effectively excluded.

In fact, Kaae is considering the "listener," rather than the digital game player: "No matter how the music is organised, it will always appear to be linear to the listener in a structural sense, but this is not necessarily the case to the composer or the practising musician, as the manuscript for this music may very well be non-linear". (author reference?)

This description underlines the importance of the "manuscript" as the primary musical object to be produced and analysed, rather than its manifestation in a given performative situation. In the case of a digital game, the player will not just be a listener, such as a spectator sitting in a concert hall or enjoying a record at home. In the cybertext, participants exert ergodic actions to traverse the text, and their ability to listen and react to musical cues structures the final musical output. The player, therefore, is not only involved cognitively in interpreting and understanding music but actively reconfigures its sections.

The implications of dynamic music within the frame of digital games are substantial and multifaceted. The concept of dynamic music will be considered in multiple ways throughout this dissertation, and the full discussion regarding the relationship between musicking and dynamic music will be concluded in Chapter 8.

4. Schizophonic performances

Framing digital game music as a composition, or as a musical hypertext, is a perspective that refers to its material aspects, although music in digital games is of course not just produced and stored on a medium; it also gets experienced in various different ways.

Even with a superficial analysis, it is apparent that players of digital games understand, interpret, react to, trigger, structure, and perform game music. The game players are at the centre of a cybernetic loop that involves them cognitively and physically. Music is intertwined with that process and is one of the key aspects of play experience. Studies of digital game sound and music propose different approaches to unravel this problematic knot.

Particularly apt examples that are worthy of focus regarding the aural implications of digital game experiences are the popular music-based digital games *Guitar Hero* (Harmonix/RedOctane, 2005) and *Rock Band* (Harmonix, 2007). These titles started highly successful franchises, spawning numerous iterations and selling in excess of 46 millions units worldwide (Miller, 2012, p. 14). The original *Guitar Hero* (2005) contains re-recorded versions of popular rock, punk, and metal songs, in which the player is responsible for the linear progress of the guitar track. The game is played with a special "guitar" controller: by pushing the right fret button at the right moment, in conjunction with the strum bar, the player triggers a short section of the guitar track. Failing to do so will inhibit the playback of a segment of the recording. The acoustic output of a flawless game session will instead consist of a faithful rendition of the song. Furthermore, a number of other sounds, such as in-game crowd reactions and other feedback sounds, are added.

Miller inscribes the musical interaction of *Guitar Hero* and *Rock Band* to a long history of technological consumption, started by the widespread diffusion of audio recording and playback technologies. "Ever since it became possible to reproduce recorded performances in domestic setting, people have been engaging in musical practices that fall between the poles of passive listening (if there is such a thing) and musica practica" (Miller, 2012, p. 13). An example of this is music-minus-one recordings, commonly used as practice tools for different instruments and music genres. Karaoke, which also subtracts one performer from a recorded musical piece, applies a similar technique, albeit in a different context. In this sense, Miller structures a media archaeology of *Guitar Hero* and *Rock Band*, examining previous forms under which similar cultural modalities were expressed and satisfied (Huhtamo, 2005).

These games have instigated a new phenomenon: "[The games] let players put the performance back in recorded music, reanimating them with their physical engagement and adrenaline. Players become live performers of pre-recorded songs, a phenomenon I refer to as "schizophonic performance" (Miller, 2012, p. 15).

"Schizophonia" is a term introduced by Schafer to indicate "the split between an original sound and its electroacoustic reproduction [...]" (1994, p. 273). It originally implies a negative connotation, as it serves to "dramatize the aberrational effect of this twentieth-century development" (1994, p. 273). Never before could an alternate rendition of a sound event be stored on a medium and reproduced in completely different contexts.

In *Guitar Hero* and *Rock Band*, players "serve as gatekeepers for *someone else's* musical performance" (Miller, 2012, p. 93). Schizophonia is, however, an incredibly pervasive

phenomenon, and its implications have been augmented by the cultural implications of digital technologies on the soundscape (Truax, 2001, p. 153). As such, it is possible to think of other examples that could arguably be considered schizophonic performances. The wider impact of schizophonia within musical performance is a vast area, and exploring it thoroughly is impossible within the confines of this dissertation. Examples of performances that could possibly be considered as schizophonic will nevertheless be provided, according to the description outlined by Miller.

One of the most popular and recognisable examples of the impact of schizophonia on musical performance is provided by DJ-ing. Many elements of DJ-ing practices relate to performing in a live setting, with recordings originally produced and possibly made popular and recognisable by other artists. This is commonly obtained by modifying certain elements, for instance adding audio effects, samples extracted from other audio sources, simply juxtaposing different tracks, or even "mashing" and overlapping different recorded tracks to create a new mix.

Also, the techniques mentioned with regard to DJ-ing have largely found their way out of that specific musical practice and are now commonly considered and used as techniques for musical production. Specifically, the practice of sampling has developed into a different field that can be investigated to find examples of schizophonic musical performances. While it is possible to find different understandings of sampling, the following definition can be used: "the term sampling generally describes the practice of playing excerpts of pre-recorded sound and arranging them in a new musical context" (Weissenbrunner, 2017, p. 273). Instances of sampling fitting this definition abound, and it is not uncommon to access previously sampled sound banks and apply them to a new performance from a different musician. For example, dedicated drum sampling software

can contain extensive, high quality recordings of professional drummers, and render discrete parts of these recordings available for studio manipulation. Such technology is used in a number of applications: for instance, an electronic drum kit can be mapped to the software and each element of the kit assigned to a sampled sound, schizophonically re-channelling the original performance in a new musical setting.

If these examples fit the general definition of schizophonic performance, by contrast, the schizophonic performances of *Guitar Hero* and *Rock Band* appear to be more self-contained: rather than producing new renditions or combinations of existing tracks, the games mostly use these tracks as non-ephemeral content for a digital game. These performances are hence peculiar in that they are characterised as ergodic performances: the player must exert non-trivial effort in order to reconfigure the object.

The ergodic element in *Guitar Hero* and *Rock Band* can therefore be understood as the unique variable that differentiates these performances from other examples of schizophonic performances. Unlike DJs, players are in fact traversing an artefact that has already been pre-composed; thanks to their effort, they will be able to access other parts of that artefact. In *Guitar Hero*, for instance, the players have to proceed through a song: failing to do that would preclude access to other parts of the game, such as new levels, tracks, and other forms of content. This is not the case for a DJ set: the performative practices mentioned are not intended as an effort to access or manifest different reconfigurations of a given artefact (or fail to do so).

5. Synchresis in digital games

The idea of schizophonic performances show a possible modality through which digital game players interact with musical elements. It constitutes an example that further problematises aspects of dynamic music in digital games, showing how different examples might be tackled by unravelling their specific cultural implications. In *Guitar Hero* and *Rock Band*, Miller (2009; 2012) identifies instances of specific, creative musical modality within the boundaries of the media object. If the vast area of modders and hackers is traditionally understood as eminently creative or even subversive, Miller's analysis is situated within the concept of "playing along": "working within the constraints of game rules, commercial platforms, and existing repertoires" (2012, p. 226).

Guitar Hero and *Rock Band* are games in which music is prominently featured, but the aural content of nearly any contemporary digital game includes assemblages of sounds that could be understood using different terminologies. As mentioned, one way to look at the audio content of digital games is to rely on the dichotomy of music and sound effects, where the latter would be considered to possess no musical qualities. Such a clear-cut distinction, when used to address digital games, can however be problematic: "the overall sonic texture of games can often create an interesting interplay between music and sound effects that blurs the distinction between the two" (Collins, 2013, p. 3). The discussion regarding the nature of music as opposed to that of "sound effects" is an ongoing topic within the following chapters of this dissertation. For now it will suffice to mention that the assignment of "extramusical" (Kahn, 1999, p. 103) status (as in, outside-of music) to certain sounds is to be situated within specific contexts, artistic practices, or theoretical frameworks. In the case of digital games, Collins understands it

as “game sound […] all of the sonic aspects of a game – discrete sound effects, ambient sound beds, dialog, music, and interface sounds” (Collins, 2013, p. 3). Within “game sound”, however, even “discrete sound effects” are commonly characterised by musical qualities. One example is Mario’s jump in the original *Super Mario Bros.* (1985), which, as mentioned in Chapter 1, is “accompanied by an ascending chromatic glissando or slide” (Whalen, 2004). The tonal component, in this case, can be addressed as a musical quality of this sound. Similar instances of sounds with musical qualities used as “effects” have already been identified in film studies. In his analysis of Warner Bros. early cartoons, Curtis mentions: “one character slaps another on the head and we hear a cymbal sound. This would normally be called a “sound effect” even if an instrument from the orchestra created the sound” (1992). This practice is commonly known as “mickey-mousing”.

The interplay and hybridisation between music and sound effects, as well as Curtis’ analysis of the subject, will be discussed further in Chapter 5 of this dissertation. However, what is important to note at this stage is that Collins identifies performative aspects of game sound, as similarly discussed by Miller, in widely different game examples, and not necessarily primarily based on musical content. The sonic interactivity of digital games is considered in relation to the players’ intervention, when considering a participant that interacts with sound rather than just listening to it.

These shifts in perspective require the adaptation of key theories in media and film studies to the different premises of digital games. I already mentioned that listeners or spectators of linear media perform cognitive actions. Perhaps one of the main cognitive procedures applied when experiencing audiovisual media has been identified by Chion. “*Synchresis* (a word I have forged by combining *synchronism* and *synthesis*) is the

spontaneous and irresistible weld produced between a particular auditory phenomenon and visual phenomenon when they occur at the same time" (Chion, 1994, p. 63). The agglomeration of sound and vision happens in our perception, producing meaningful, intelligible experiences out of procedures such as "dubbing, postsynchronization, and sound effect mixing" (1994, p. 63). By using our synchretic ability, film directors are able to juxtapose visual and acoustic events that originally might have little in common.

It could be argued that, as an audiovisual media, the same happens in the case of digital games. A further layer is at stake when players make sense of digital games sessions: "interactive sound in games is kinesonically synchretic: sounds are fused not to image but to action" (Collins, 2013, p. 32). The three modalities of "image, sound and action" are involved in generating new possible meanings. The example of Mario jumping would be a player-generated event as the interactive sound is directly controlled by the player. Similarly, events might be caused by "the game's algorithms, such as the control of a nonplaying character, a timer-related action, and so on" (Collins, 2013, p. 32). In both cases, however, the player would use kinesonic synchresis to weld the audio and visual dimensions together with a performed action.

It could be argued that the "irresistible weld" explained by Chion is even augmented when the sound event is directly triggered by the push of a button in a digital game – a further reinforcement of a perceived univocal phenomenon. In fact, "synchresis does not function in an all-or-nothing way. There are degrees of synchronism, […] particularly in the case of lip-synch" (Chion, 1994, p. 64). According to Chion, these variations are found in different cultural contexts and filmic styles: "the French are accustomed to a tight and narrow synchronization, [while] Italian films synch more loosely, taking into consideration the totality of the speaking body, particularly gestures" (1994, p. 65).

Similarly, digital games may tap into various degrees of synchresis, from a looser to a tighter connection. A comparable aspect has been addressed by Collins, who situates them within the kinesonic synchresis concept. In fact, Collins notes that there can be varying degrees of congruity between a player's action and the sound being emitted.

> "[While] sound in film can be congruent, incongruent, or neutral in relation to the image […], in games […] there is the added modality of the players' events, meaning that sound may be congruent with the image or may be congruent with the action of the player" (Collins, 2013, p. 35).

"Congruity" in this context not only refers to the relationship between sound and image, but also between sound and player activity. For example, Collins mentions the sound/action relationship in the digital game *Heavy Rain* (Quantic Dream, 2010), as described by its sound designer Kenny Young:

> "The dynamic interactions aren't scored effectively with sound. For example, the sliding door in the bedroom does not adapt to the speed that I move it at, there is silence and then a one-shot sound event plays. If I'm moving the door slowly then the result is the sound finishing a second before the door actually closes. […] I appreciate that getting this right is a bit more work, but given the importance of these mechanics to the game (reinforcing the sense of 'mundane normality') I think this is a bit of a let-down." (Young, 2010)

In this case, sound is incongruous with the player's actions, and incongruity is consistently understood as problematic: the sound designer would prefer congruous sonic feedback from the game mechanics, as this would provide certain desired results. Within this particular example, however, it seems that positive value has been attributed to consistent, dynamic sonic feedback, and a certain "realism" of the sonic output. Different digital games might pursue other desired stylistic or functional choices.

These aspects can be reconsidered in relation to a second example presented by Collins: the tennis mini-game contained in *Wii Sports* (Nintendo , 2006), where players are required to actually swing a controller much like they would a real tennis racket.

> "If I exaggerate my Wii tennis racket swing, emphatically swing it to the greatest of my strength, but hear only a light tennis ball "pop", […] that sound does not map into my action […]. Do I then adjust my action to account for the lack of sonic feedback […]?" (2013, p. 36)

Collins mentions that the question remains unanswered, but I would argue that, in this second specific case, consistent and congruous kinesonic synchresis should be attributed different importance. In fact, in *Wii Sports*, the lack of detailed acoustic output, mapping for instance ample or strong movements, might be a form of design constraint, employed by the sound designers in order to guide and direct the players toward a desired form of input. Through tutorials and safety warnings, *Wii Sports* contains explicit messages asking players not to exaggerate movements, while also suggesting they maintain awareness of their immediate surroundings, in order to avoid bumping into furniture or other objects. In this sense, including a sound that actually specifically wards a player away from an undesired occurrence might be counterproductive, somewhat rewarding an action that game designers would prefer not to happen. In other words, what seemed to be desirable for the sound designer of *Heavy Rain* is instead undesired for that of *Wii Sports*.

Moreover, it is possible to have a different understanding of the value of kinesonic congruity by confronting these examples with the different degrees of synchresis originally described by Chion. Incongruous kinesonic synchresis, in fact, might arise when a loose synchresis is employed. Chion, however, does not associate a consistent negative connotation to this occurrence, but rather connects it with two different (but

both legitimate) filmic styles. Different audiences seem to accept looser or tighter synchreses, depending on different cultural habits and contexts. Similarly, tighter or looser kinesonic synchronisation might be appropriate or congruous depending on the example at hand, and of the desired overall experience intended by the sound and game designers.

With that said, the next section will propose a different paradigm to the implications of synchresis within digital games, including within the discussion ergodic aspects of the phenomenon.

6. Ergodic synchresis

As debated within this chapter, Chion has introduced synchresis within film studies. The specific adaptation to the concept of synchresis adopted by Collins is of a "kinesonic" aspect. According to van Elferen, "kinesonic conflates the kinetic and the sonic and is therefore an apt description of the effect of game music" (van Elferen, 2011). While the kinetic aspect of digital games is relevant, it is important to encapsulate the vast heterogeneity and complexity of digital game interaction. In general, throughout this dissertation, the ergodic paradigm has been referred to as the primary effort that theoretically contains the multiple layers of players' interactions. For this reason, the concept of ergodic synchresis is proposed, referring to the weld between the audiovisual component of digital games and the ergodic effort that is required in order to navigate and reconfigure the cybermedium.

While kinesonic synchresis steadfastly refers to the cognitive activity rendering game operation and audiovisual feedback intelligible, ergodic synchresis does not presuppose tangible action by the players, like for instance pushing a button and triggering a given sound. Thus, ergodic synchresis is not necessarily only applied when a sound is directly triggered, but also in moments in which ergodic effort is purely cognitive. As mentioned, ergodic effort is not limited to a game operation, but is also a mental activity and a disposition to action (Calleja, 2011, p. 41).

Therefore, synchresis in audiovisual ergodic media remains largely cognitive, and in that regard it does not differ from the phenomena described by Chion (1994, p. 63-65): viewers perceptually join together audio and video feeds. There are, however, a number of occurrences that could be mentioned in order to describe how digital game players manifest and utilise audiovisual cues to reconfigure the ergodic text at hand.

The functionalities of game audio are of course multiple, as described in the first part of the chapter. In relation to an analysis of player interaction, or of interactive sounds, Collins understands certain sounds to be "self-produced" (2013, p. 43-44).

"Self-produced sounds can be defined as sounds produced by one's own body or bodily movement" (Ballas 2007 in Collins 2013, p. 43). "Teeth grinding, finger snapping, and coughing" are examples of sounds produced by our own body, while "footsteps, clothing sound, and chewing of food" are produced by our bodily movements (Ballas, 2007). These sound are implicated in different cognitive functions, and are fundamental in specifying the perceived self.

In digital games, through ergodic synchresis, players may cognitively identify with sound events that they directly initiated. An in-game character, or an avatar, is synchretically welded with the player through this process and this reinforces the phenomena of immersion and incorporation (Calleja, 2011). According to Collins, "self-produced sound […] is one important agent through which [players] extend the body into the virtual world […]. In this way, a player can become the character, or a character can become the player" (2013, p. 44).

There are cases of digital games that do not prominently feature a character to be associated with, for example, *Tetris* (Pajitnov, 1984). In this case, ergodic synchresis arguably works differently and includes different implications. The player's cognitive activity is not directed towards identifying with a character, but rather processes any other kind of sound-producing event in the digital game session.

Self-produced sounds can therefore be found in games where a representation of the self is not immediately evident. Also, it can be relevant in digital games in which a digital environment does not have the semantic aspects that would characterise it as a fully-fledged "virtual world," with the implications that the metaphor suggests. Further inquiry is needed in relation to the idea of "production of sound", especially in relation to musical forms of activity.

7. Auditory displays

In the previous section, references are made to how self-produced sounds are involved in processes of synchresis. On a similar topic, Jørgensen considers player-generated

sounds: “a sound generated by the player is a sound caused by player action […]. Note that the player's avatar in many cases is the source of player generated sounds due to the inevitable link between player and avatar in the game” (Jørgensen, 2008). In such cases, the player establishes an audiovisual connection between the sound event in question and the avatar being directly controlled.

Digital games, however, can also be analysed for their ability to structure a complex web of sounds: “*context* is a keyword in this respect, and I will argue that a specific sound cannot be comprehended in isolation, but that the situation in which it is heard always decides the interpretation of the informative content of the sound signal” (Jørgensen, 2008). Sound signals in digital game environments and their interpretation is highly contextual: “in order to understand what a specific auditory signal indicates, the player must understand the specific game situation as a whole” (Jørgensen, 2008). The context mentioned by the author is not merely constituted by the fictional scenario in which the digital game may be set, but also includes interface elements, which are used to operate the digital artefact. In this sense, sound should be designed to be congruous on both levels, in order to facilitate interpretation. Within the study of auditory displays, which focuses on “the use of non-speech sound to communicate information to a listener […], from alarms to complex sonifications” (Walker & Kramer, 2004, p. 1), such signals have been theorised as auditory icons:

> Auditory icons […] are brief sounds that have been introduced into the computer interface to represent objects, functions, and actions to the user via the auditory modality. Gaver suggests that, “Objects in the computer world should be represented by the objects involved in sound-producing events; actions by the interactions that cause sound; and attributes of the system environment... by attributes of the sonic environment” (Gaver, 1989, p. 75-76)” (Walker & Kramer, 2004, p. 4).

The auditory icons are intended to "evoke the sound of an object or an action" (Walker & Kramer, 2004, p. 4), but the directness of such references can vary. The use of auditory icons might be difficult in modern interfaces, which often involve "many objects and actions for which there is no natural or even iconic sound" (Walker & Kramer, 2004, p. 4). This occurrence is also typical of digital games: "in fantasy or science fiction settings with magic or futuristic equipment, although this kind of replication is not always possible. In such cases it is common to use what auditory display studies calls earcons (Walker & Kramer, 2004)" (Jørgensen, 2008).

> "Earcons are sounds in an interface that represent a full range of "messages and functions, as well as states and labels" (Blattner, Sumikawa, & Greenberg, 1989). Earcons often employ a simple, hierarchical language of sounds and are often musical in nature. The relationship between the earcon and the action is, at most, metaphorical" (Walker & Kramer, 2004, p. 4).

Earcons in digital games can compound different sonic materials, merging foley sounds with synthesised sounds, while also involving musical connotations. Jørgensen considers an example from *World of Warcraft* (Blizzard Entertainment, 2004).

> "An example is a mage casting a fire spell: the sound starts with the crackling sound of fire, and ends in a whoosh that moves from a high-pitch tone to a lower. Here we also see how the audio designers have utilized metaphorical relations by utilizing movement in pitch that suggests some kind of transition, or movement in space (Keller & Stevens, 2004; Wilhelmsson, 2001)" (Jørgensen, 2008)

Research on auditory display is part of a relatively recent field, in which "terms such as sonification, auditory display, auralization, audification have been used without a precise definition" (Hermann, 2008). Applications of auditory display systems that are contiguous with digital games are for example virtual auditory displays, here

understood as synthesised (as opposed to recorded) binaural sounds, which can be deployed in VR settings to various applications (Zhong & Xie, 2014). Sonification, specifically, is understood as "an integral component within an auditory display system which addresses the actual rendering of sound signals" (Hermann, 2008). Hermann argues: "a technique that uses data as input, and generates sound signals (eventually in response to optional additional excitation or triggering) may be called sonification" (Hermann, 2008). Since earcons and auditory icons represent data in an organised fashion, they should be understood as sonification techniques. Sonification, however, is considered to be a subset of functional sounds: the scope of sonification techniques in this context should be that of rendering sounds that fulfils a tangible function, "be it communication of information (signals & alarms), the monitoring of processes, or to support better understanding of structure in data under analysis" (Hermann, 2008).

Grimshaw analyses the acoustic functionalities of a FPS game engine as a sonification system:

> "It may be possible to analyze components of the FPS game acoustic ecology as forming a sonification system […]. FPS run and gun games typically use hundreds of [audio] samples which may be pre-synthesized or may be recordings of real-world events such as samples of various weapon shots or reloading sounds as used in the game. Because these audio samples are not sounds but are representations of the original sound stored as bits on the game medium (either removable media or computer hard drives), in order to be heard they must be passed through the sound generators that are part of the game system hardware; this is the process of audification or 0th order sonification" (Grimshaw, 2007, p. 120-121).

In this example, the software and hardware components designated to handle acoustic processes are understood as a sonification system, providing dynamic audio functionalities to a digital game environment during gameplay.

Understanding earcons and auditory icons as organised sounds, makes it possible to group them together with music: "music is without question a complex structured signal, organised on various levels, from the acoustic signal to its temporal organisation in bars, motifs, parts, layers" (Hermann, 2008). Music, according to Hermann, can also serve a function, too; in this sense, the two sets of "music" and "functionals sounds" can possibly overlap. This discussion, however, should not be understood as an attempt to define music. A discussion on the nature of music will be the subject of the following chapters, and will be employed in the critical perspective of this dissertation.

8. Conclusions

In this chapter, a review of theoretical tools situated within Game Studies, and that was initiated in Chapter 2, has been completed.

The first major critical point that has been outlined concerns the objectives and scopes of musicological analysis of digital games. While resources concerned with the analysis of sound (as opposed to music) has been addressed, digital game musicology should not only consider the analysis of musical compositions as found in digital games. The idea of theoretically delimiting the formal properties of the object of enquiry is central to Game Studies and is similarly reflected in the sub-field of "game music" studies. Multiple resources (Collins, 2007; Kaae, 2008), in fact, have defined the uniqueness of these

"musical texts", which present characteristics that render them significantly different from the compositions included in other audiovisual media.

For this reason, it is important to reiterate that the analysis of musical works remains a productive form of musicology; it is however necessary to rethink the full extent of musicological enquiry, and to expand its theoretical frame to include performative aspects.

The theoretical tools that shall be proposed in the next chapter are specifically selected to obtain this result. Throughout this dissertation, references will continue to be made to the peculiarity of musical compositions found in digital games, as described in this chapter. Specifically, aspects related to dynamic characteristics will remain central to the discussion.

The second part of this chapter addressed the relevant available literature that has already included in its enquiry the experiential, cognitive component of playing digital games (Miller, 2009; 2012). Specifically, consideration has been given to how schizophonic performances (Miller, 2009; 2012) and kinesonic synchresis (Collins, 2013, p. 32-38) are considered to take place in digital games. In both cases, the theoretical concepts that have been hybridised are critiqued in order to synthesise new tools specific for digital games. In fact, both concepts draw from different, previously available research, adapting it to digital game analysis.

"Schizophonic performance" is a concept that adapts the schizophonic phenomenon introduced by Schafer within Soundscape Studies (1994) to detail the nature of performances in digital games such as *Guitar Hero* and *Rock Band*. It is worth noting that

schizophonia is a pervasive, massively diffused phenomenon, indicating "the split between an original sound and its electroacoustic reproduction […]" (Schafer, 1994, p. 273). While performances with *Guitar Hero* and *Rock Band* can legitimately be considered as schizophonic, the definition does not exclude a potentially large number of examples, including musical practices such as DJ-ing and sampling. These examples are schizophonic in nature, but present clear differences from the performances of digital games players. Starting from Chapter 6 of this dissertation, the ergodic paradigm will be used to present an overarching theory capable of solving this issue, detailing the exact connotation and theoretical placement of musical performances with digital games.

Similarly, kinesonic synchresis has been referenced, criticising aspects of the kinesonic paradigm. The kinesonic aspect has been introduced as it "conflates the kinetic and the sonic and is therefore an apt description of the effect of game music" (van Elferen, 2011); however, I argue that players' efforts in digital games are not only "kinetic". Rather, a vast cognitive aspect is at stake within ergodic involvement. For this reason, while it is maintained that direct movement and input are part of the ergodic process, they should not, it is argued, be operationalised and reduced to the pressing of a button, or to the active use of an input device. For this reason, synchresis in digital games is regarded as ergodic, referring to the weld between the audiovisual component of digital games and the ergodic effort that is required in order reconfigure the cybermedium.

Within this discussion, self-produced or player generated sounds have been addressed. While identification of sound sources from the game environment occurs by means of synchresis, specific sounds are also part of a general system of signification employed by digital games. Different auditory signals and earcons can be identified.

Throughout this chapter, numerous references have been made to the ergodic paradigm in order to update various theoretical tools related to the analysis of experiential aspects connected with playing digital games. The ergodic paradigm as described by Aarseth (1997) and elaborated by Aarseth and Calleja (2015) are not intended to be applied to the analysis of music or sound in digital games. Taken in isolation, it is therefore insufficient to achieve the intended results: re-centring the objective and scopes of musicological analysis of digital games. In order to perform this operation, the next chapter will focus on the concept of musicking, and its critical rewriting of the confines of musicology and ethnomusicology.

Chapter 4

Musicking: musical works and performances

1. Introduction

In this chapter, the pervading methodological perspective of musical analysis used throughout this dissertation will be presented, i.e. that of "musicking". Small introduced neologism musicking, defining it as follows: "to music is to take part, in any capacity, in a musical performance, whether by performing, by listening, by rehearsing or practicing, by providing material for performance (composing), or by dancing" (Small, 1998, p. 9). The musicking concept was conceived by Small as a criticism of one of the theoretical focuses of musicology: according to Small, coeval musical studies were limited to the study of musical works and texts, ignoring the multiplicity of musical participation. Criticising the focus of enquiry of coeval musicology, Small argued that "the word *music* becomes equated with works of music in the Western tradition" (Small, 1998, p. 3).

Small's theoretical focus on the performative aspects of music making intersects with current musicological topics in numerous ways. For example, other authors have approached music as performance in contemporary musicology; Taruskin (1995), Frith (1996), Cook (2001; 2013), Abbate (2004), are notable examples that will be discussed in this chapter. Key methodological issues related to this topic will be introduced, in order to subsequently compare them with the musicological practices of game sound

studies. This will serve as a critical lens through which to understand the foundation of game sound studies and propose new paths of enquiry: if music is not an object, what does it mean "to music" in digital games? Consequently, what is the actual subject of musical analysis of digital games? To answer these questions, this chapter will present a range of musicological topics that will serve as the basis for a new theory of musicking with digital games, which will be outlined in the following chapters. Musicking is in fact not a ready-made tool for analysis of digital games, as the topic is thoroughly distinct from all other examples considered by Small. It will therefore be necessary to discuss the concept of musicking, re-situating it alongside the state-of-the-art of Game Studies enquiry.

To construct the basis of this theoretical operation, this chapter will address the theoretical surroundings of musicking. In fact, by considering music not as a musical object, such as a musical work or text, but rather as a human activity, Small has contributed to the innovation of musical enquiry. Small's line of research, however, was not conceived in a vacuum, as it was originally situated in a theoretical space created between musicology and ethnomusicology. The connection has already been underlined by Abbate, who considers *Musicking* as an "ethnography of music making" (Abbate, 2004, p. 505). Further, ethnomusicologist John Blacking introduced compatible starting points, proposing the analysis of "the musical situation" and its diverse participants as the primary topic of any form of musical enquiry (1973; 1987). Blacking's contribution will be addressed, emphasising the inherently multidisciplinary nature of musicking's foundation.

Following that, I will situate Small's contribution within musicological enquiry, focusing on the topic of music as performance and the construction of musical meaning. As

mentioned, Richard Taruskin had already analysed performative aspects within musicological enquiry during the 1980s. While other aforementioned authors do regard music as performance art, it is within this thread of research that processes of producing musical meanings have been clarified. Musical meanings are not embedded in textual qualities, but are rather constructed through sociocultural processes and their interactions with kernel elements of musical artefacts. This is of fundamental importance to understanding the relevance of different forms of musical participation, emphasising the creative nature of musicking roles that do not involve active performance.

Following this, one of the most overlooked, yet common, musical modalities shall be placed under the microscope: improvisation (Bailey, 1993). This musical modality is the quintessential example to prove the relevance of the musicking paradigm: in fact, this musical form can exist without, at any point, using notation forms. Yet, improvisation is a primary, powerful musical modality. Albeit to different degrees, its use is similarly widespread among both dilettantes and highly specialised musicians. Improvisational tactics will be analysed without considering them to be a means to an end, such as a composition, but rather as a foundational practice of musicking.

Improvisation is not necessarily mutually exclusive of notated music; for example, different experimental musical practices have elaborated instances of indeterminacy in musical compositions. Composers of musical works involving indeterminate components have relinquished portions of control over the performance of the musical text. The performers have therefore been requested to actively participate in putting together an actualisation of the diverse possibilities of the musical text: an indeterminate composition, when performed, affords “multiple outcomes” (Gottschalk,

2016, p. 9). Aspects of indeterminacy can be theoretically connected with the properties of dynamic music compositions previously presented in Chapter 3. In later chapters, this account of indeterminacy will serve as the basis to discuss the role of players in relation to dynamic music systems. The innovative role taken by performers of indeterminate compositions will be re-contextualised within the musicking framework, addressing the musical roles of digital-game players.

Finally, the work of Umberto Eco (1989) will be considered in relation to the popular concept of "open work". In his seminal text, Eco inscribes indeterminate musical works within a larger class of semiotic objects. These open works are characterised by their use of indeterminate techniques, creating what Eco calls a new "poetic". Eco's contextualisation is understood as fundamental to making sense of indeterminacy in musical compositions, and will serve to complete the theoretical overview of topics related to musicking, in order to properly address the new musical poetics available in digital game musicking.

2. Musicking: between musicology and ethnomusicology

In this section, aspects of ethnomusicological research that are contiguous to the musicking concept will be presented. While the intention is not to produce *tout court* an ethnomusicological study of digital games, focus here will be placed on John Blacking's contribution regarding the confines, relationships and scopes of musicology and ethnomusicology. It was in fact within this fruitful academic discussion that the musicking concept was eventually produced, standing as a theoretical advancement for

both disciplines. This discussion will therefore serve to situate the theoretical framework that will be outlined in Chapter 5.

Fundamentally, ethnomusicology applies theories and findings of musicology to the musical practices of different human groups. As far back as the 1970s, this disciplinary distinction and outline was problematised, starting from its core structure and premises. John Blacking is widely regarded as a critical scholar within ethnomusicology itself, and he extensively debated the relationship between musicology and ethnomusicology (1973; 1987).

"Ethnomusicology is a comparatively new word which is widely used to refer to the study of the different musical systems of the world" (Blacking, 1973, p. 3). As such, ethnomusicology is faced with the daunting task of studying a plethora of musical systems, which arguably are intertwined with countless practices, histories, and in general cultural implications of whichever human ethnic group.

Blacking positively notes the introduction of different subsets of musical education, which are now differentiating, for example, between "Ethnomusicology, Ethnic Music, and Black Music" (1973, p. 3). In doing so, the relationship between ethnomusicology and musicology is, to an extent, reversed. In fact, as previously mentioned, ethnomusicology supposedly studies all the musical cultures that are not necessarily the subject of musicology. Stemming from this differentiation of disciplines, "music" is implicitly now "more modestly redefined as a system of musical theory and practice that emerged and developed during a certain period of European history" (Blacking, 1973, p. 3), anticipating similar concerns which will be raised by Small. This is essentially a criticism of the theoretic structure of musicology itself: according to Blacking, the

emergence of various different facets of music studies highlights the particular focus of coeval musicological research. Blacking situates musicological practice in a specific geographic and historical context - that of European music - with its own specific and certainly rich cultural context, academic background, methodologies, and objectives. With this criticism, as previously mentioned, Blacking effectively reverses the concept that ethnomusicology is a branch of musicology: if every musicological enquiry refers to a specific musical culture and context, i.e. European music, musicology becomes an example of ethnomusicology – to an extent, musicology is the ethnomusicology of a certain European musical group.

With this clarification, Blacking builds an argument to further problematise the foundations of ethnomusicology. Within ethnomusicological enquiry, in fact, the prominence given to the "ethnic" element is structurally problematic. "People's musicality and musical interests are not entirely determined by their environments and social background (…). The widely used label of "ethnic" music implicitly denies the existence of the individual creative impulse" (Blacking, 1987, p. 2). With this in mind, Blacking searches for a theoretical foundation to construct common ground – a "common-sense view" – for an intercultural or supra-cultural understanding of music. As such, he emphasises the individual over sociocultural characterisations. Ethnomusicology is, however, not dismissed, but rather re-contextualised: "I regard ethnomusicology as a method, rather than an area of study (…). It is an approach to understanding all musics and music-making in the context of performance and of the ideas and skills that composers, performers and listeners bring to what they define as musical situations" (Blacking, 1987, p. 3). The "musical situation" is at the centre of the enquiry, alongside the different participants of the performance.

Blacking therefore contributes to a renewed dialectic between ethnomusicology and musicology, proposing a methodological perspective that can be applied in all areas of music studies. Composers, performers and listeners all contribute to defining what the musical situation is. Even in the context of digital games, it is possible and unproblematic to describe musical situations, perhaps by mentioning explicitly musical digital games such as *Guitar Hero* (Harmonix/RedOctane, 2005), *Rock Band* (Harmonix, 2007), or many others. However, it seems that players of these digital games do not always fit within the musical roles described by Blacking. For a proper musicological enquiry of these roles and performances, it is necessary to look into different compatible resources, focusing on the musicological side of the debate.

3. Musicking

The relationships, differences, and similarities between musicology and ethnomusicology are multi-faceted. The disciplines identify territories of analysis, segmenting topics, and in turn, redefine the subjects being researched. This is especially relevant in the works of Christopher Small, who criticises musicological practice by identifying its structural limits while pursuing a deeper understanding of music.

In *Musicking* (1998), Small shares some of the concerns presented by Blacking: redefining the objective of musicology and of music itself.

"Musicology is, almost by definition, concerned with Western classical music, while other musics, including even Westerns popular musics, are dealt under the rubric of ethnomusicology" (Small, 1998, p. 3). The distinctions are therefore not only related to

the geographic origin of certain music, but also to their status of classic or popular. The cultural intricacies of popular (or folk) music are not necessarily the subject of musicological enquiry. According to Small, this is to be considered as a hindrance in using musicology to answer questions that relate to "every member of the human species" (Small, 1998, p. 2). Similar to Blacking, the scope is to find meaning and answers that are somewhat supra-cultural and that have value outside the cultural sphere of origin.

The musicological enquiry criticised by Small is understood to have only a partial worth in this regard, being situated in the specific cultural scenario of European classical music. This creates a methodological conundrum: musicology claims to study music, but continuously refers to "music" as only a segment of musical expression. The consequences are that "the word *music* becomes equated with works of music in the Western tradition" (Small, 1998, p. 3).

This is a crucial passage, because the boundaries of enquiry are not solely determined by geographic, historic, or ethnic limits. Similar to discussions with regard to the problems of text and objectification of digital games in Chapter 2 of this dissertation, Small identifies problems of reification in musicological enquiry. For Small, the object of musicological research, quite literally, has therefore become an actual tangible text: the musical text. As seems self-explanatory, "musical text" should not be equated with "music". It could rather be understood as a subset or a component of a larger group of possible musickings.

What is understood as a "musical work", in this context, is largely a musical score: a complete, finished composition, which has been notated in order to be performed.

Small's critique, therefore, is based on musicological accounts where the focus is on musical texts, identified as the primary subject of research. The distinction between "musical works" and "composition" has already been addressed by Lewis, who is critical of the account given by German theorist Carl Dahlhaus.

> "In his essay exploring improvisation, the theorist Carl Dahlhaus provides us with five defining characteristics of a musical work that, in his view, must be present for the work to be considered a composition […]. According to Dahlhaus, a composition is, first, an individually complete structure in itself ("ein in sich geschlossenes, individuelles Gebilde"). Second, this structure must be fully worked-out ("ausgear-beitet"). Third and fourth, it is fixed in written form ("schriftlich fixiert") in order to be performed ("um aufgefiihrt zu werden"). Finally, what is worked-out and notated must constitute the essential part of the aesthetic object that is constituted in the consciousness of the listener' ((Dahlhaus, 1979, p. 10-11) […]. Compositions that are worked-out without being notated, in Dahlhaus's view, are neither compositions nor improvisations" (Lewis, 1996).

This description effectively delimits the subject of study to musical texts, also excluding from its domain compositions that have not been notated. This latter musical form is confined to a theoretical limbo, since it cannot be grouped under the large theoretical tropes of composition or of improvisation. Lewis inscribes his criticism of this definition in relation to contemporary composers and to improvisational practices; both topics will be further debated later on in this chapter.

However, Lewis also considers this definition of composition to be "particularistic" and "prototypically Eurological" (1996), as it effectively excludes large portions of non-European music. Small, however, is perhaps even more critical regarding the relevance of musical scores, since he argues that even "classical" European musicking prominently includes non-literate performances, devoid of musical scores.

> "Neither J. S. Bach, Mozart, Beethoven, nor in fact any of the musicians who are today known as The Great Composers ("Mozart to Mahler"), was totally

> dependent on notation, either for composition or for performance […]. Their frequent nonliterate performances were, to judge from often wildly enthusiastic contemporary accounts […], exciting and moving, and even inspired" (Small, 1998, p. 111).

This account of musical scores in European culture reinstates the importance that Small gives to musical scores:

> "A score, of course, is not a musical work. It is not even the representation of it. It is a set of coded instructions that, when properly carried out, will enable performers not only to make sounds in a specific combination, called a musical work, but also to repeat that combination as many times as they desire" (Small, 1998, p. 112).

Small contests the implicit assumption that "musical meaning resides uniquely in music objects" (Small, 1998, p. 5). He argues that the relationship between composition and performance should be reversed and is adamant in stating that "*performance does not exist in order to present musical works, but rather, musical works exist in order to give performers something to perform*" (Small, 1998, p. 8).

This reshaping of the importance of the relationship between the different facets of musicking is predominantly used to erode established axioms in musicological enquiry. An ethnomusicology of Western classical music sounds like a theoretical oxymoron, but it is essentially what Small performs while deconstructing common tropes. The concert hall structure, its tradition and desired function, is brought forward and read as a pertinent example.

Within a modern concert hall environment, the spectator is, of course, expected to remain silent, as it is a place in which a simple acoustic communication model has been implemented. "The auditorium's design not only discourages communication among members of the audience, but also emphasises that they are there to listen and not

respond verbally. The performance is a spectacle for them to contemplate, and they have nothing to contribute to its course" (Small, 1998, p. 27). The communication process is therefore designed to take place strictly from the stage and address the audience, while social activities are to be carried out in the foyer. In this scenario, a musical performance is thought of as a "one-way system of communication, running from composer to individual listener through the medium of the performer" (Small, 1998, p. 6). In this context, the performance is a secondary process, whereas composition is primary. Small, instead, reverses this idea: "*performance is the primary process of musicking*" (Small, 1998, p. 113).

The musical performance, the vast web of relationships that it shapes, is at the centre of Small's musicology, as opposed to the analysis of the musical text alone. However, if "to music" is to participate in a musical performance, it is also of fundamental importance to understand how diverse participation really can be.

"Participation" is used here as an umbrella term, covering a number of activities that are not necessarily concurrent to the performance itself. In fact, stretching this term might result in the inclusion of activities that appear mundane or quite separated from the moment in which the performance takes place, such as cleaning an auditorium, or producing promotional materials for an event. Legitimately, all of those activities include a component of musicking, as they facilitate the realisation of the performance.

However, throughout his research, Small restricts the analysis of musicking to "performing, listening, rehearsing or practicing, providing material for performance (composing), or dancing" (Small, 1998, p. 9). Small is arguably interested in particular topics of musicking, specifically those related to specific musicking practices in the

Western world. In fact, the list provided is merely descriptive of the core concepts of musicking, and does not theoretically exclude other interrelations that are not immediately aligned with Small's core interests. This aspect will become crucial in the following chapters, in which a theory of musicking with digital games is proposed, arguing that digital games have actually taken centre stage in contemporary musicking processes.

This operation, to be undertaken in the next chapters of this dissertation, is theoretically compatible with the flexibility of the musicking concept. In fact, when tackling such a broad range of musical participation forms, Small neither aims to build a hierarchy of importance, nor to exclude some forms of musicking in favour of others.

> "The verb *to music* is […] *des*criptive, not *pre*scriptive. It covers all participations in a musical performance, whether it takes place actively or passively, whether we like the way it happens or whether we do not, whether we consider it interesting or boring, constructive or destructive, sympathetic or antipathetic. The word will remain useful only for so long as we keep our own value judgments clear of it" (Small, 1998, p. 9).

It is within this "descriptive", open frame, that musicking with digital games will be considered. In this current section, however, some prominent issues in musicological enquiry as preparation for the investigation of how these issues have influenced the musical analysis of digital games have been highlighted, the full extent of which will be debated in the following chapter. Since the musicking concept is ostensibly wide, multi-faceted, and sometimes provocative, further contextualisation is necessary to establish its relevance both in the contemporary musicological discourse and in its subsequent applications within digital game analysis. To do that, the next section will discuss

contiguous theories and authors which have prominently orientated current musicological focus.

4. Music as Performance

In the previous section, elements within Small's musicological approach that connected musicological enquiry and performance practice were discussed, and emphasis has been placed on Small's critical take on coeval musicological studies. In the current section, compatible musicological resources that corroborate and expand on the topic shall be presented.

As far back as 1982, American musicologist Richard Taruskin remarked on the growing interest that performance practice was earning among musicological institutions: "Things are going well […]. Historical performance practice is now a recognized subdiscipline both of academic musicology and of conservatory curricula" (1982, p. 338). While praising such developments, he understands musicological takes on the nature of musical performances, and their relationship with musical texts, as a contested field.

> "It seems to me that much of what I will make bold to characterize as the "musicological" attitude toward performance is based on consulting the oracle in an even more spurious, because roundabout, way. We tend to assume that if we can recreate all the external conditions that obtained in the original performance of a piece we will thus recreate the composer's inner experience of the piece and thus allow him to speak for himself" (Taruskin, 1982, p. 341).

Taruskin's perspective regards every performance of a musical work as a creative act, culturally situated within its own historical context; this is the case of the historical performance practice that Taruskin is most interested in. The performance of notated

works is not intended as an exercise in actualising the intentions of the composer's intentions, but remains an event with specific ontological meanings.

> "Even at their best and most successful – or especially at their best and most successful – historical reconstructionist performances are in no sense recreations of the past. They are quintessentially modern performances, modernist performances in fact, the product of an aesthetic wholly of our own era, no less time-bound than the performance styles they would supplant" (Taruskin, 1982, p. 246)

Expanding on this topic, Taruskin also predates Small's view of the relevance and impact of the introduction of musical notation on the nature of music itself.

> "In the beginning, music was something you did (or that others did while you did something else), not something you gazed at or bought and sold. A lot of music (we call it "folk") is still like that. But some music has been objectified as art" (Taruskin, 1995, p. 353)

The status of music as art, Taruskin argues, can also have highly controversial implications.

> "There is something even more troubling, though, about modern reification and sacralization of texts […]. When I try to account for the persistence of anti-Semitism in our culture […], I cannot shake the notion that one reason must be the the reinforcement anti-Semitism receives in so much art that is the product of Christian doctrine, bearing traces of its darker as well as its radiant aspects. The list of musical "classics" that fall into this category is long, from Bach's St. John Passion to Stravinsky's *Cantata*. To regard such works as inviolable, not for their status as doctrine, but merely for their status as art, is an antihumanitarian blasphemy" (1995, p. 357-358).

Taruskin advocates that musical works in the Christian tradition containing explicitly anti-Semitic references can be reasonably performed by excising offensive verses from the texts. "One can vocalize. One can bowdlerize […]. Or one could substitute another text altogether. That would be what Renaissance poets and musicians called *contrafactum*, and they did it every day" (1995, p. 357).

While Taruskin contextualises historical performance practices, and the nuanced relations performers establish with musical works, Abbate sets out to critically elaborate on musicological takes on performed music.

> "What does it mean to write about performed music […]? Shouldn't this be what we do, since we love music for its reality, for voices and sounds that linger long after they are no longer there […]? And would musicology - which generally bypasses performance, seeking meanings or formal designs in the immortal musical work itself - find itself a wallflower at the ball?" (Abbate, 2004, p. 505).

Abbate expands on the argument set out by philosopher and musicologist Vladimir Jankélévitch (2003), arguing that "real music is music that exists in time, the material acoustic phenomenon", as opposed to "the abstraction of the work" (Abbate, 2004, p. 505). Jankélévitch asks: "Composing music, playing it, and singing it; or even hearing it in recreating it - are these not three modes of doing, three attitudes that are drastic, not gnostic, not of the hermeneutic order of knowledge?" (as cited in Abbate, 2004, p. 505).

Jankélévitch's focus on the drastic as a mode of doing in relation to music can be reasonably positioned close to Small's focus; as already mentioned in this chapter, Abbate notes that "a similar emphasis on doing [also] characterizes Christopher Small's ethnography of music making, *Musicking* (1998)" (2004, p. 505). But the distinction between drastic and gnostic dispositions also includes different aspects:

> "Jankélévitch's distinction between drastic and gnostic involves more than a conventional opposition between music in practice and music in theory because drastic connotes physicality, but also desperation and peril, involving a category of knowledge that flows from drastic actions or experiences and not from verbally mediated reasoning. Gnostic as its antithesis implies not just knowledge per se but making the opaque

> transparent, knowledge based on semiosis and disclosed secrets, reserved for the elite and hidden from others […]. In Jankélévitch's terms, fixing upon actual live performances would mean embracing the drastic, a radical step." (Abbate, 2004, p. 509-510).

In this sense, the musicking perspective "embraces the drastic", being fixed upon music as a form of participation, but it does not necessarily emphasise the same characteristics of the drastic traced by Abbate. Such drastic qualities of musical performances have also been summarised by Cook: "strangeness, uncanniness, and defiance of the rational" (2013, p. 348).

British musicologist Nicholas Cook has prominently voiced theoretical concerns compatible to Small's perspective, focusing on the nature of music and of musicological enquiry. The opening statement of Cook's 2001 paper *Between Process and Product: Music and/as Performance* is particularly eloquent in this regard: "The text-based orientation of traditional musicology and theory hampers thinking about music as a performance art" (2001, p. 1).

Cook's musicological practice emphasises the nature of music as a performance art, connecting authors such as Small, Chion, and Taruskin.

> In Small's almost evangelical words, […] in a more inclusive and creative society there shall be "no such thing as a musical work, [but] only the activities of singing, playing, listening [and] dancing (1998, p. 11)". Indeed, for Michel Chion the "new sound reality" has already arrived, bringing with it a now "standard form of listening […] that is no longer perceived as a reproduction, as an image (with all this usually implies in terms of loss and distortion of reality), but as a more direct and immediate contact with the event (1994, p. 103)". In this brave new world there is in Small's terminology not music but musicking, in Taruskin's not things but acts, in short, not product but process. (Cook, 2001, p. 3)

Criticising the perspectives hereby synthesised, Cook aims to create a balanced framework, which is able to contextualise the relevance of composition within a performance-centred paradigm, proposing a view of music as "tandem art: there is the art of the composer, and there is the art of the performer" (2001, p. 4). To do this, he proposes that the concept of "musical text" be overcome altogether.

> "The term "text" (with its connotations of New Critical autonomy and structuralism) is perhaps less helpful than a more distinctively theatrical word, "script." Whereas to think of a Mozart quartet as a "text" is to construe it as a half-sonic, half-ideal object reproduced in performance, to think of it as a "script" is to see it as choreographing a series of real-time, social interactions between players: a series of mutual acts of listening and communal gestures that enact a particular vision of human society" (2001, p. 5)

"Scripts", in this sense, should not be read as a devaluation of the composers' contribution toward the overall musicking at hand, but as a perspective that allows for the positioning of the performance to be of primary relevance.

> "At the same time, to construe music as performance in this manner, rather than as the reproduction through performance of some kind of imaginary object, is not to devalue works […]. In fact I would argue the opposite. That music is a performing art is self-evident as soon as you say it; it is only the literary orientation of musicology that makes us need to say it in the first place" (2001, p. 6)

5. Musical meanings and mixed media

In the previous section, different resources have been aligned in order to further position musicking within musicological enquiry. The theoretical relationship between musical works and performances, and the shift toward analyses of music as performance, expand Small's contribution, as presented earlier in this chapter. In this

section, focus will be placed on aspects related to musical meanings – a well-documented topic in musicology. As mentioned, Cook has contextualised music as a performing art; however, musicking is also concerned with forms of participation in musical performances that do not involve the active role of a performer, such as listening and spectating. Listening to music is an experience situated in a social, shared, and hence cultural dimension, and is a fundamental mode of musicking. The question of musical meaning becomes central to investigate musicking further.

> "In its modern form, the problem of meaning arose with the development of European music as something to be listened to "for itself" as art or entertainment rather than as something mixed in with social occasion, drama, or ritual […]. Yet although both this repertoire and the modes of listening it fostered encouraged a sense of aesthetic self-sufficiency and an idealized, unitary concept of music, a variety of exceptions and variants proliferated right alongside them to challenge the emergent model. This process […] has encouraged the development of both analytical devices for understanding music as autonomous art and interpretive strategies for understanding music as meaningfully engaged with language, imagery, and the wider world" (Kramer, 2002, p. 1)

Contemporary musicology, as understood by Kramer, is therefore also concerned with understanding music's engagement with the "wider world". Within this section, musicological theories regarding the placement of music within societal contexts will be explored.

The processes described by Kramer involve a social component that is the subject of socio-musical studies. DeNora aims to situate the study of music in relation to sociological concerns, "highlighting music's active role in social life", also "moving beyond theoretical conundrums concerning whether music's affect is 'immanent' or 'attributed'" (DeNora, 2000, p. xi). DeNora elaborates that music actively contributes to create meaning within "social scenarios":

> "Music is active in defining situations because, like all devices or technologies, it is often linked, through convention, to social scenarios, often according to the social uses for which it was initially produced – waltz music for dancing, march music for marching and so on" (DeNora, 2000, p. 11).

While specific genres or tropes (waltz music, march music) have been originally produced for specific forms of musicking, the links between musical compositions with specific genre tropes and forms of musical participation are established by social conventions. As such, music's semiotic function is confirmed as not inherently embedded in its structural characteristics, but rather negotiated - and established through "consumption practice and patterns over time" (DeNora, 2000, p. 45) - during social processes: "[music's] affect upon hearing cannot be fully specified in advance of actual reception" (DeNora, 2000, p. 33). It is only after reception that musical affect is manifested, and effectively constructed. The production of musical meaning is configured as a social process, in which an active role is partaken by the "recipients" of music; those that are engaging in musicking practices revolving around given performing contexts during which "reception" materially happens.

> The point is that it is music's recipients who make […] connection's manifest, who come to fill the predicates […]. Non-musical materials, such as situations, biographical matters, patterns of attention, assumptions, are all implicated in the clarification of music's semiotic force. Conversely, though, and simultaneously, music is used to clarify the very things that are used to clarify it. (DeNora, 2000, p. 45)

The formation of musical meanings happens by processes of feedback in a societal context. Frith is perhaps even more explicit about the relevance of these processes: "From a sociological perspective, then, music listening can only occur in music cultures.

To hear combinations of sounds as music, it is necessary to know something about the conventional meanings of agreed musical elements" (Frith, 1996, p. 109). Frith also elaborates that musical meanings have to be situated within cultural processes, rather than supposedly stable psychological connections.

> "From an ethnomusicological perspective […] there is no obvious relationship between human experience and musical sounds, between what we all feel as humans and how we express and evoke those feelings as members of particular societies […]. If music is meaningful in emotional terms it is therefore largely as an effect of cultural rather than psychological conditions" (Frith, 1996, p. 102-103).

The culture context Frith is most interested in is that of popular music, including rock, pop, metal, and so on. Even in this context, the "meaning" of music describes, in short, not just an interpretive but a social process: "musical meaning is not inherent (however "ambiguously") in the text" (Frith, 1996, p. 250). The recipients of popular music are quite able to produce musical meaning, similarly to what has been described so far in this chapter:

> "Someone could describe a piece of music perfectly accurately in technical terms while being quite unable to appreciate it; while someone quite unable to read music can perfectly well convince us that they've "understood" a work: they make sense of our own experience of it through their figurative description. This is the job of the rock critic, for example […]. Music does not have a content - it can't be translated - but this does not mean that it is not 'an object of the understanding'" (Frith, 1996, p. 263-264).

The two different receptions, and subsequent productions of musical meaning, illustrated in this example, testify how processes of understanding are actively involved in shaping musicking contexts. Different forms of knowledge, competencies, and cultural contexts, generate different understandings of music. The musicking role of the critic

(such as the "rock critic" mentioned by Frith) is positioned alongside musicking participants:

> "Different musical activities (listening, playing, performing, dancing) produce different aesthetic objects. In particular, as Nicholas Cook has argued so effectively, the music produced by the composer must be distinguished from the music produced by the listener (with performers, critics, and analysts occupying uneasy positions between the two)" (Frith, 1996, p. 267).

Compatible studies related with the production of musical meaning also understand music not only as an autonomous medium, but also as an element involved in meaning-making within mixed media. Kramer understands the *imagetext* as forms of media that use text and images; more specifically, "either […] specific juxtapositions of text and image or […] the general condition of their interrelatedness" (Kramer, 2002, p. 146). While the original conceptualisation of the imagetext (Mitchell, 1994, p. 83-107) does not mention music, Kramer argues that their connection is actually common and extremely significant:

> [The] separation of music and the imagetext is a historical construction prominent especially since the mid-eighteenth century, and […] it has been misused to isolate music from meaning and from the real-world contingencies in which meaning is embedded […]. Music and the imagetext are, as a matter of historical record, more partners than Others […]. This is most obvious from the phenomenon of mixed media, which is actually the primary form of music both historically and epistemologically; purely instrumental music is the exception, not the rule, notwithstanding the conceptual tendency (dating from the early nineteenth century) to take it as the paradigm for music as such (Kramer, 2002, p. 146-147)

Within mixed media, understood as contiguous to the imagetext, music is of course involved in creating meaning. For example, Francis Ford Coppola's film Apocalypse Now (1979) famously features Wagner's "Ride of the Valkyries" during a scene featuring attack helicopters in Vietnam. In this scene, the helicopters "become travesty Valkyries

courtesy of the music on the soundtrack […]. The armored choppers seem to look and move differently than they would otherwise, to be both more terrifying and more grotesque" (Kramer, 2002, p. 152). The different elements of mixed media are involved in a synergy; "musical meaning in mixed media […] runs on a loop. The music seems to emit a meaning that it actually returns, and what it returns, it enriches and transforms" (Kramer, 2002, p. 152). In this example, through mutual appropriation, music gives meaning to visual components; but in turn, it gains new signification within the experience of the viewer/listener, thanks to its juxtaposition with visual elements. "In sum: musical meaning consists of a specific, mutual interplay between musical experience and its contexts (Kramer, 2002, p. 5).

The processes of creation of musical meaning, therefore, are not different from those of meaning in general; since we produce sense "only amid a dense network of social, cultural, and historical forces, musical meaning inevitably bears the traces, and sometimes the blazons, of those forces" (Kramer, 2002, p. 163). Musical meaning is in this sense not self-standing; processes of meaning making are intertwined with contextual elements which can be fairly detached from a given musical artefact or phenomenon. Kramer clarifies that musical meaning is manifested through an "interplay":

> "Meaning does not come directly from something "in" the music, but from an interplay between ascribing a kernel of meaning to the music and unfolding the possibilities of experiencing the music - hearing it, performing it, describing it, imagining it - with that ascription as a guide" (Kramer, 2002, p. 163-164).

Hearing, performing, describing, and imagining: these musicking modalities revolving around musical experiencing create, in constant feedback with a musical kernel, musical

meanings. Sociocultural processes determine musical meaning making; this phenomenon is also reflected, according to Frith, in mixed media.

> "Film composers certainly draw on opera writing conventions, in at least two important respects. The first is the way in which musical meaning is constructed as structurally internal to a work. In film as in opera, for example, a musical sign may be attributed to a character, and this is what the sign (whether it is a fully developed leitmotif or simply the use of a particular instrument) means […].
> Second, musical meaning in film, as in opera, may be constructed symbolically; the musical element (whether instrument, melody, key, or harmonic principle) is used to stand for or symbolize an aspect of the plot (good or evil, male or female, class, ethnicity, character, culture or nature) in a way that is not necessarily coherent in terms of the soundtrack's overall musical structure" (Frith, 1996, p. 113)

Audiovisual culture is capable of constructing musical meaning thanks to practices that are no longer "purely" musical, or that are primarily related with aural components. Musical meanings sit on a continuum that is not just related with musical structures, but also with operatic or filmic conventions:

> "In short, from the scorer's perspective, the "meaning" of the music in a film is clearly a "musical meaning," derives from the organization of a musical structure, is an effect of the relations between notes, but now a "correct" reading is grounded not in a musical knowledge of that structure (in a study of the score) but in the accompanying organization on screen of the dramatic narrative. And, at the same time (which is what makes film scoring so interesting a challenge to musicians), our understanding of that dramatic narrative is determined by what we hear - is an effect of the musical process. This double process [is] given by the mutuality of musical structure and dramatic narrative" (Frith, 1996, p. 114).

6. Improvisation

During the first part of this chapter, an overview of the musicking concept, and how it has been co-opted by traditional musicology to expand the remit of that field beyond the musical text, was presented. However, the discussion within musicological enquiry of the extent of musicking is not yet complete with regards to this thesis. The second part of this chapter focused on expanding the theoretical framework to include musicological issues that are closely connected to musicking. The next section furthers this expansion, by tackling a specific musicking form, related to performance practice: musical improvisation. Improvising, in its various forms, will prove to be one of the key modalities available to digital game musicking.

How does improvisation relate to musicking? As an object of study, it shares similar methodological challenges. Initially, improvisation is immediately understood as a non-object, an aspect that seems to prevent formal theoretical framings of this musical practice. In fact, musical improvisation tends, by its nature, not to necessarily produce tangible, manifested artefacts that are subsequently observable, shared, or even commodified. While several methods of documenting musical improvisation are possible, the congenital resistance to reification that improvisation displays, makes it an ideal example of musicking.

Bailey (1993) expresses concern towards the lack of understanding and importance that seems to be devoted to improvisation. “Improvisation enjoys the curious distinction of being both the most widely practiced of all musical activities and the least acknowledged and understood”. Improvisation is described as a difficult subject to study, “too elusive for analysis and precise description: essentially non-academic” (Bailey, 1993, p. IX).

Bailey effectively seems to criticise the academic method altogether – as if the job of the academic was not to precisely tackle subjects that might be elusive in nature. In fact, his research is primarily conducted by means of ground -up research, interviewing different practitioners about their work, with the idea of tackling improvisational practices in various different musical and cultural contexts. The critical aspects highlighted by Bailey with regards to the difficulties of performing formal analysis of improvisation can be productively read within the musicking framework. Improvisation is in fact presented as a musical modality that largely exists without ever actualising itself in a musical text, or in any kind of musical object.

The most radical example of this phenomenon is so-called "free improvisation". In certain musical practices, free improvisation is employed as the only creative modality; this is not to be confused with better-known practices such as the improvisation of jazz standards. Definitions for musical performance modalities that do not incorporate composition abound: "freely improvised music […], total improvisation, open improvisation, free music, improvised music" (Bailey, 1993, p. 83). These definitions, however akin to each other, imply different meanings as they roughly pertain to the practices of different musical contexts. For instance, free improvisation can be associated with the jazz-influenced practice of The Music Improvisation Company (Bailey, 1993, p. 94-97) (which notably featured saxophonist Evan Parker and Bailey himself) or, more broadly, to experimental and avant-garde music. Free improvisation, therefore, seems to exist without being relegated to one single musical genre or idiom.

Moreover, the examples provided so far, all relate to highly skilled and literate musicians, but free improvisation is also employed within the activities of the casual dilettante, or in musically non-literate contexts. This is possibly thanks to the fact that

this form of musical expression is able to encompass a multitude of factors: “it can be an activity of enormous complexity and sophistication, or the simplest and most direct expression” (p. 83, 84). Frith clarifies how improvisation, and jazz improvisation specifically, has historically been superficially identified as a musical form which only deals with instinctiveness, a form of expression with a somewhat limited awareness of itself: “as late as 1938 Winthrop Sergeant could write that “those who create [jazz] are the ones who know the least about its abstract structure. The Negro, like all folk musicians, expresses himself intuitively” (1938).” (Frith, 1996, p. 128)

Improvisation is instead a form of musicking that sits alongside other forms of musicking, such as composition, for its range of possible applications.

“All music-making is about the mind-in-the-body; the “immediacy” of improvisation no more makes unscored music “mindless” than the immediacy of talking makes unscripted speech somehow without thought. Whatever the differences between African and European-derived musics, they cannot be explained in terms of African (or African-American) musicians’ lack of formal training, their ignorance of technical issues, their simple intuition” (Frith, 1996, p. 128).

In his examination, Bailey notes that the activity is arguably as old as music itself: “mankind’s first musical performance couldn’t have been anything other than a free improvisation” (p. 83). In this regard, Bailey’s account is compatible with Small’s, identifying in the performative aspect the primary modality of music. As noted, free improvisation has, at times been historicised and contextualised, as the emergence of free improvisation as “a cohesive movement in the early sixties” demonstrates. But free improvisation is not to be understood as a specific musical genre, or a modality only

available to experienced, professional musicians; rather, it is a foundational practice for any kind of musicking.

Free improvisation is one of the best possible examples of the relevance of the musicking concept in a general sense, since it is a musical activity that does not revolve around a previously prepared composition. While this thesis has thus far only considered so called "free" improvisation - a form of musical activity devoid of a designated composer - many other examples of improvisational practices do exist. Within certain musical idioms, improvisation builds different relationship with pre-composed musical works – jazz music being the most obvious example.

> "There is no doubt the single most important contribution to the revitalization of improvisation in Western music in the 20th century is jazz […]. For the western musician, its greater service was to revive something almost extinct in Occidental music: it reminded him that performing music and creating music are not necessarily separate activities" (Bailey, 1993, p. 48).

The distinction between performing and "creating" (here presumably understood by Bailey as "composing"), intended as separate compartments, seems to originate in Western musical practice.

> "Obsessed with its geniuses and their timeless masterpieces […], the world of classical music provides an unlikely setting for improvisation [it is however noteworthy to mention the exceptions of baroque music (p. 19 -28) or organ improvisation (p. 29 - 38)]." (Bailey, 1993, p. 19).

Again, Bailey's account is compatible with Small's; in this case, both authors find, even in the European music tradition, aspects of musical performing that are not directly related to musical texts.

Cook expands on this topic, exploring the relationship between improvisation and notated works, and argues that degrees of improvisation are actually present in every performance of musical works.

> "Ed Sarath concurs: 'even interpretive performance of repertory', he writes, 'might be considered as a species of improvisation. For even in works entirely composed, performers will have some degree of creative options through volume dynamics, inflection, tempo, frequency of vibrato and other expressive nuances' (Sarath, 1996). [These] audible nuances […] do not register on the scale of aesthetic theory based on textualist assumptions about works and their identity. Yet while we may be able to see the potential for a certain narrative of interpersonal transactions in a score, it is only in performance that this potential is transformed into reality" (Cook, 2013, p. 238)

Cook therefore argues for performances to be considered as the actualisation of "interpersonal transactions" between composer and performer, including this occurrence as a form of improvisational practice.

Throughout this section, improvisation has been described as a creative musical practice, readily available to disparate musical participants, be they consummate practitioners in various different genres or dilettantes with little to no prior musical education. This heterogeneity will render it a valid modality to be identified within digital game musicking in the following chapters. As mentioned, improvisation is at times elusive, which explains why there has been so little research on the topic within game sound studies. The discussion on improvisational modalities related to musicking with digital games will be of central importance in Chapter 7, where it will be reapplied to discuss the musicking modalities pioneered by Japanese media artist and game designer Toshio Iwai.

7. Indeterminate compositions

Thus far, examples that specifically strive to achieve a clear-cut separation between improvisation and composition have been selected. Such is the case of free improvisation, or on the other side of the spectrum, Western classical music at large.

However, composers and performers have experimented at length with different permutations of this rather formulaic dichotomy. In this section, some liminal cases and the practices that revolve around them shall be discussed. These examples will provide useful means by which to discuss the musical relationships created or facilitated by digital games in later chapters.

Bailey mentions how free improvisation is sometimes erroneously identified purely as experimental or avant-garde music (1993, p. 83). It is in these fields, though, that musicians have devised new systems of musical exchanges between composers and performers, augmenting the confines of the musical work. Such is the case of music composition that employs "indeterminate" techniques.

In every performance of a piece of musical work, in every actualisation of the possible spectrum of a score, a vast degree of indeterminacy naturally exists: "the technique of the performer(s), their work with the piece, the properties of the instrument, the performance space, the attentiveness of the audience, and more" (Gottschalk, 2016, p. 8) – all these variables contribute to an outcome that is to an extent unpredictable. In other words, every actualisation of a musical text results in a unique event. In compositions that are specifically considered and designed as indeterminate, "the composer deliberately relinquishes control of any element of the composition" (Bailey, 1993, p.

60). Therefore, an indeterminate composition, when performed, affords "multiple outcomes" (Gottschalk, 2016, p. 9): substantially different actualisations are possible, mostly depending on the performer's agency upon the musical text.

Once again, as with improvisation, certain features of musical practices that could possibly be as old as music itself happen to have been historicised and contextualised only relatively recently. Musical notation, as described by Small, has not always been (or intended to be) precise and clinical, but originally largely served as a more or less detailed aide memoire for the performer. Moreover, using musical notation in such a way is a rather common contemporary practice within music of different genres. Examples abound; within certain jazz musical practice, scores for drums written for big band arrangements, for instance, often feature only the structure of the song and a few relevant accented notes. The big band conductor, in these cases, is presumably expecting the drummer to fill in the gaps, so to speak, by providing actual beats, fills, and so on. An example of this can be found in *Vienna Big Band Machine – Minus Drums* (Grassman, 2014), a rather popular book with drum practitioners. The musical notation included in the book is presented in two different versions: a detailed, note-by-note rendition, and a more open, sketchy version. Both are considered by the author to be educationally relevant for the drum student.

With that said, even if musical scores of any kind provide certain degrees of indeterminacy, composers such as John Cage specifically used this element to create conceptually new musical works. Gottschalk provides an example of this, by describing the properties and functions of a composition from the John Cage repertoire: "In a number of examples from *Two* (1987), the flutist can begin at any point within a span of forty-five seconds, and end the note within a different forty-five seconds span that

overlaps with the first. It is therefore possible to play nothing or to play for well over a minute" (Gottschalk, 2016, p. 9, 10). In this sense, the written score does not prescribe relevant parts of the performance, which are instead left to the performer's discretion.

The relationship between improvisation and indeterminacy is deep and contested. "In regular usage, it is understood that improvisation tends to involve the agency of one or more musicians, while indeterminacy can often be more prescriptive" (Gottschalk, 2016, p. 189). There are of course, different variations of this "prescriptiveness". Composer Earl Browne, as early as 1952, "gave almost a blank page to the musicians, [in order to] investigate performance procedures" (Bailey, 1993, p. 70). Karlheinz Stockhausen famously employed various degrees of indeterminacy, sometimes asking performers to improvise. Bailey collected an account on the subject by Antony Pay, a member of the London Sinfonietta that has worked with Stockhausen on different pieces: "One sort of improvisation that we can be called upon to do […] is a thing called box technique. […] What happens is that you're given a box in which there are a number of notes, and you're asked to improvise upon those particular notes. The unfortunate thing about that is that it does tend to always sound pretty much the same" (Bailey, 1993, p. 70). From the "almost blank page" to the "box technique", these accounts serve as examples of the different degrees of improvisation that indeterminate compositions incorporate.

However, the idea that indeterminism can actually be understood as a separate modality from improvisation has been contested. Composer and instrumentalist Anthony Braxton identifies a brand-new line of criticism: "indeterminism [is] a word which has been coined […] to bypass the word improvisation and as such the influence of non-white sensibility" (Gottschalk, 2016, p. 189). In this regard, Braxton dismisses the innovation

that indeterminate compositions actually carry, also contextualising improvisational forms as the by-product of a sensibility that is explicitly referred to as “non-white”.

Composer John Cage, instead, “considered his indeterminate works to be composed, rather than improvised” (Gottschalk, 2016, p. 189), and did not consider improvisation as pertaining to indeterminate compositions.

Whether indeterminism could be included as an improvisational modality or not, it is however relatively safe to say that the idea of structurally incorporating such elements in musical works created a new kind of text. While in the previous section, the nature of improvisation and its foundational nature in all musical practices was discussed, this section has now explored its role in creating indeterminism in musical texts.

Dynamic compositions in digital games, as described in the previous chapter, can be said to incorporate elements of indeterminacy: the actualisation process of the potentialities of these pieces can in fact generate multiple possible outcomes. While a full comparative analysis of the formal properties of indeterminate compositions in relation to dynamic digital game music is beyond the scope of this dissertation, I will however specifically focus on the role of the digital game player within the new musical situation generated by dynamic digital game music. The musickings initiated within indeterminate compositions have in fact expanded the role of the performer; similarly, musicking with digital games has made new musical performative practices available to different participants. This phenomenon will be inscribed into a new theoretical framework of musicking with digital games in the next chapter, while its full extent will be discussed in Chapter 8.

The next section will delve into the line of research that has likely contributed most in contextualising the nature of indeterminate composition, defining the new kind of poetics generated by this movement: the poetic of the open work.

8. Indeterminate compositions as "open works"

As shown above, indeterminism in musical texts has formal similarities with improvisational practices, overlapping in different ways. However, indeterminism sits within the framework structured here as an example of the creative possibilities found at the intersection of compositional and performative practices. If focus was previously placed on the non-textual characteristics of musicking, this section intends to reflect more closely on texts, showing how the indeterminism – or "openness" – of texts created what Umberto Eco calls a new kind of "poetic" (1989). This thread of compositional practices brings us to the consideration of different kinds of texts, not only musical ones, and will therefore be useful when what has been discussed thus far is applied to the main object of research: digital games.

When analysing musical pieces with elements of indeterminism, Eco is quick to clarify the role of the performer:

> "A number of recent pieces of instrumental music are linked by a common feature: the considerable autonomy left to the individual performer in the way he chooses to play the work. Thus, he is not merely free to interpret the composer's instructions following his own discretion (which in fact happens in traditional music), but he must impose his judgment on the form of the piece, as when he decides how long to hold a note or in what order to group the sounds: all this amounts to an act of improvised creation" (Eco, 1989, p. 1).

In this regard, Eco takes as examples, pieces such as Karlheinz Stockhausen's *Klavierstücke XI* (1952), Luciano Berio's *Sequence for Solo Flute* (1958), or Henri Pousseur's *Scambi* (1957). These compositions all present elements of indeterminism: in *Klavierstücke XI*, for instance, Stockhausen allows the performers to select different fragments and juxtapose them according to a set of procedures during the performance. The piece has different recombinatory possibilities, potentially generating a great number of different actualisations of the work. The performer's interpretation of *Klavierstücke XI* is thus arguably similar to that of any given "traditional" piece of music. "Nonetheless, it is obvious that works like those of Berio, Pousseur and Stockhausen are "open" in a far more tangible sense. In primitive terms we can say that they are quite literally "unfinished": the author seems to hand them on to the performer more or less like the components of a construction kit" (Eco, 1989, p. 4). This apparently chaotic situation is, in reality, finely regulated:

> "The "work in movement" is the possibility of numerous different personal interventions, but it is not an amorphous invitation to indiscriminate participation. The invitation offers the performer the opportunity for an oriented insertion into something which always remains the world intended by the author" (Eco, 1989, p. 19).

The roles commonly found in these forms of musicking are therefore only partially subverted: the author remains the "creator", while the performer is afforded agency within limited parameters. Fundamentally, with regards to the open work, we are talking about new structures: "the main objective of this new music is the creation of new discursive structures that will remain open to all sorts of possible conclusions" (Eco, 1989, p. 62).

The example of the open work as described and analysed by Eco is a liminal case of textual analysis; it identifies a text that requires improvisation, rather than trying to

limit it. The pieces taken as examples by Eco constitute a specific kind of musicking in which the pre-composed text strives to incorporate different musicking modalities. Similarly to improvisation, indeterminism challenges the reification of music.

> "Talking of a composition which is indeterminate of its performance, Cage says that a recording of such a work has 'no more value than a postcard'; it provides a knowledge of something that happened, whereas the action was a non-knowledge of something that had not yet happened" (Nyman, 1999).

Cage's remark regarding the value of the recording of an indeterminate work clearly alludes to the notion that any rendition of the work is only momentary and does not constitute a conclusive or better version of it: the open work is not simply a work that remains incomplete.

Consequently, as indicated by Eco, the open work also limits improvisation to an "act of improvised creation" that is confined within the space, however ample, that the composer left. At the same time, though, the improvisational modality seems to be the primary innovation implemented in these works. If we are to analyse these works by using the aforementioned criticisms suggested by Braxton, we could agree that the more radical experimental practices of - for example - free jazz are here confined to obtain a more predictable result. It is, however, a musicking practice that brought about the creation of a new kind of improvisational idiom previously largely absent from Western contemporary aesthetics.

Once again, as this example shows, analysing music by focusing on textual analysis tends to narrow the range of observation for musicking and musical practices - with improvisation and its foundational nature most notably overlooked by Eco. In fact, the improvisational modality seems to be the primary innovation implemented in these

examples of open/indeterminate works. This aspect contrasts with Small and Bailey, who describe fundamentally creative improvisational modalities that are outside the scope or the frame of the compositional model. In other words, "creating" music does not equal "composing" music.

In this section, the connection between open works of the musical kind and improvisational modalities has been structured; although in this context, improvisation allows the performer to explore the confines of a musical structure. In other words, within the musical open work, improvisation can be understood as the required modality by which the text is traversed.

In the next chapters, musicking with digital games will be addressed in terms of its capability to reshuffle conventional musicking tropes, assigning new and augmented roles to participants in musical performances. The concepts introduced by the open work will be applied to digital game-playing examples that are arguably theoretically based on comparable principles of openness and expectations to perform.

For the sake of this dissertation, it is important to clarify the distinction between indeterminate composition, as contextualised within Eco's open work theory, and the cybertexts described by Aarseth. If we once again consider *Klavierstücke XI* by Stockhausen, the performer of the piece is awarded considerable autonomy, and is free to choose which fragments of the work to play at will. Different performances of the piece will therefore generate widely differing actualisations of the multiple potentialities of the work. These characteristics are similar to those illustrated with regards to cybertexts, although one key feature is absent. The performer of *Klavierstücke XI* does not physically and materially reconfigure or recombine the medium, which in this case is

a sheet of notated music. While different fragments are juxtaposed during the performance of the piece, the actual medium naturally remains the same. The sheet of notated music does not have cybertextual characteristics, as it does not employ mechanical methods to materially reconfigure. As mentioned in Chapter 2, “the concept of cybertext focuses on the mechanical organization of the text, by positing the intricacies of the medium as an integral part of the literary exchange” (Aarseth, 1997, p. 1). When such mechanical organisation of the text is not present, there cannot be a cybertext. Moreover, while discussing literary cybertexts, Cayley elaborates: “any aleatory or "chance operation" aspect of such works is only fully realized in a publication medium which actually displays immediate results of the aleatory procedure(s)”. The concept of “publication medium” is relevant in this context; the aleatory procedure employed needs to be manifested in tangible fashion within a physical medium of sorts.

With this clarification, however, I am not excluding all of indeterminate techniques a possibly having cybertextual features; for example, in this chapter, an account of the “box technique” used by Stockhausen and reported by Bayley is mentioned. In this case, an actual object is being materially reconfigured to generate an alternate result. The object seems to present cybertext-like qualities, but it is not a constructed, completed work such as the aforementioned *Klavierstücke XI*; it is described by Bailey simply as an “improvisational technique”. Since indeterminate works can be significantly different from one another, there is no dichotomy between indeterminacy and cybertextuality. In this regard, it is of particular interest to look at a premonition made by composer Henri Pousseur in relation to his aleatoric composition *Scambi* (1957):

> "It is not out of question that we conceive these formal notations as a marketable product; if they were tape-recorded and the purchaser had a sufficiently sophisticated reception apparatus, then the general public would be in a position to develop a private musical construct of its own and a new collective sensibility in matter of musical presentation and duration could emerge" (Pousseur H. , 1958).

Here, the composer is effectively imagining a "general public" that is more involved with the work than a traditional spectator would be, predating some of the characteristics of ergodic engagement.

9. Conclusions

In this chapter, the musicological theoretical tools have been presented, which, together with those presented in the previous chapters, are necessary to build a theory of musicking with digital games.

The bulk of this chapter though, is thoroughly constituted by the musicking paradigm itself. The studies of Blacking and Small have included the performative aspects of music within musicological enquiry. The paradigm of musicking asserts that music is not to be understood as a noun indicating musical objects, but rather as a verb, indicating musical participation. The area of musicology identified by Small and Blacking is participation in musical situations.

As discussed, Small lists canonical forms of participation: "performing, listening, rehearsing or practicing, providing material for performance (composing), or dancing" (Small, 1998, p. 9). This description of musical roles is informal, and not intended as a finite list of permitted forms. It does facilitate certain activities, such as dancing, that could be excluded by a superficial analysis, as they are not related to direct production

of musical sounds or notations. This aspect will be broached in Chapter 6, where focus will be placed on a specific section concerning musicking with dance in digital games. The confines of musicking roles are lively, dynamic, and evolving, and the perspective discussed by Small will be employed to bring equally dynamic aspects of musicking with digital games into the fray.

Musicking has been further contextualised within past and present musicological enquiry. Going as far back as the early 1980s, Taruskin positioned performance practice at the centre of musicological enquiry, specifically focusing on historical performance practice. Notably too, Abbate detailed the turn of musicology towards "embracing the drastic", referring to the multiplicity of aspects connected with the actual experience of manifested music, while Cook positioned music "between process and product", emphatically underlining the centrality of the performance dimension to music analysis and conceptualisation. These studies have further deconstructed the social processes that contribute to create musical meaning. These meanings are actively constructed by social actors, and these processes have been identified by Kramer and DeNora. A multiplicity of musicking forms is involved in forming musical meaning, and this musicking sits closely to other forms of musical participation, such as musical performance practice. While focusing on the study of performance and popular music, Frith clarified that "musical meaning is not inherent [...] in the text" (1996, p. 250). Within the discourse related to musical meaning, music in mixed media has been introduced, and as verified by Kramer, music has historically been involved in mixed media. Frith also expands on the topic, presenting the construction of musical meaning within the tropes of film and opera traditions.

The musicking paradigm, however, can also help to address the topic of musical improvisation, considered by Bailey as "essentially non-academic" (Bailey, 1993, p. IX). It is instead a subject that can be contextualised within the musicking paradigm, since it is a musical form of participation of primary importance. Improvisational practices are widespread in musicking; similarly, they are also presented in musicking with digital games. Improvisation, in this new context, maintains its idiosyncratic aspects, and is mostly under-theorised in game music studies. As mentioned, improvisational aspects will be of central importance throughout Chapter 7.

Improvisational modalities are also at the core of the discussion surrounding indeterminate compositional forms. If the indeterminate musical text structurally and purposefully leaves segments of uncertainty, it is through improvisational methods that these segments are actually filled during performance. Within the musicking paradigm, indeterminate compositions are examples of the fluidity of musical roles, subject to reinvention according to the cultural practices at hand. Indeterminate compositions blend and challenge the roles of composers and performers, which are no longer distinctively separated. Both musicking practices sit on a continuum, and both are examples of musical participation.

Indeterminate compositions, understood by Eco as musical forms of open works, created a new poetic. The "work in movement" is an authored frame through which new, creative musickings are possible. These relationships between performer and composer will be recontextualised in relation to dynamic music composition in digital games. In fact, the musicking with digital games framework will include dynamic aspects of digital game compositions as a segment of the musicking opportunities offered; this aspect will be fully developed, in light of a renewed theoretical discussion, in Chapter 8.

With musicking, music is no longer understood as an object. This paradigm has been presented in order to question implied assumptions of game sound and game music studies. A musicology of digital games undertaken using Small's paradigm does not consider music as a musical text contained in digital games, but rather as a form of musical participation made possible by digital games. In the next chapters, this concept will be substantiated by focusing on examples of digital games that are centred on music.

Chapter 5

On Music Games

1. Introduction

It is fair to say that musical elements are commonly found in commercially available contemporary digital games at large. From extensive, elaborate musical works produced by acclaimed composers, to sparse acoustic elements extemporaneously juxtaposed by digital game players in the course of gameplay action, this dissertation has so far touched on a number of occasions worthy of musical consideration, ranging from simple listening to active performing.

This chapter will present and discuss game examples that are arguably closest to the core concept of musicking with digital games. Occasionally they are addressed as "rhythm" games; at other times, they are considered to be "music" games. In general, we can broadly regard them as digital games that are primarily focused on musical interactions. Even if the ontological status of this genre is far from being theoretically established, selected examples will be presented throughout this chapter that are commonly and informally considered to pertain to this category within journalistic and industrial discourse. This will prove to challenge a number of the theoretical tools previously introduced in this dissertation, such as those devoted to the analysis of musical works as found in digital games. Moreover, it will afford the possibility to look closely at different digital playing and musicking practices. The examples will in fact afford different opportunities in this regard, presenting a range of diverse formal

characteristics. To achieve this, examples from different eras of digital games history - originating from different regions and cultural contexts - will be examined.

At times, some contextualisation will be required to proceed with this endeavour. For example, one of the most recognised hubs for digital game musicking can be identified quite concretely. Located in central Tokyo, Akihabara is one of the city's most popular districts, virtually omnipresent in any tourist guide. The district's main street, Chuo Dori, features a range of electronic stores on multiple floors, attracting customers looking for consumer electronics such as cameras and mobile phones. Alongside them, manga and anime shops sell goods related to the world of Japanese comics and animation, an overwhelming variety of merchandise including books, figurines, posters, music CDs, toys, and more. Digital games also have a solid presence in the district. New titles are available, keeping pace with the release schedule of the digital game industry, while specialised retro games shops stock rare and collectible titles, consoles, and merchandise.

Arguably, digital game arcades (or "Game Centers", as they are known) are a staple of the Akihabara landscape. Much like other commercial establishments, arcades occupy a number of floors in buildings, with each section roughly dedicated to one or more distinct genres. Popular staples include crane-operated games, which afford the player the opportunity to win prizes such as a plush toy or some form of electronic gadget. Other floors are dedicated to digital games, ranging from titles focusing on fighting and racing, or old fashioned *shoot'em ups*.

It is often here that rather intense musicking sessions take place. Rhythm/music games occupy a rather large portion of the available space, attracting dedicated players. A

number of popular publishers and game developers are well established in the genre. Konami, ranked as the 19th most profitable digital game company worldwide in 2017 (New Zoo, 2017), has a dedicated and highly regarded development division, Bemani, responsible for franchises such as *Beatmania* (1997/2002) and *GuitarFreaks* (1999/2013). Crucially, these games feature ad hoc input devices, mimicking a DJ control booth or an electric guitar, respectively. Sega, which is also a leading developer and publisher, has in recent times released the popular *Maimai* franchise (2012/2017). The game features a large circular touch screen; the player has to provide input by rhythmically tapping and sliding fingers on the screen, following colourful visual cues. The game includes a generous repertoire of tracks to play, including pop songs or anime themes such as *Gerageraō no Uta* (Creamsoda, 2014), the opening theme for the famous *Yo-kai Watch* anime and mixed media franchise.

The result of an entire floor populated by similar game machines being played at deafening levels is an incredible and exhilarating cacophony of sounds. When discussing sound design for coin operated arcade games, Granner emphasises the importance for machines to blend in with the acoustic environment they might be deployed in. Failing to consider this aspect might lead to drastic measures: "unless the game soundtrack is very carefully designed, the location manager will have the sound turned way down, if not all the way off" (Granner, 1999). The Akihabara soundscape is probably different in this regard, as machines seem to be intentionally set at a rather loud volume. To render listening possible, machines are occasionally fitted with headphones, isolating the player from sounds coming from close machines. Sound cards are therefore modified in order to output simultaneously to both the headphones and speakers.

Similarly, Truax briefly touched upon the topic, recounting the acoustic environment of an arcade room in the 1980s. “What happens, however, when such machines are grouped together in an arcade that is a combination of all of them, besides producing an unimaginable cacophony of acoustic violence, generates a noise level in excess of 80 dB and a completely lo-fi, nonlistening environment. The danger to hearing and socialization is probably no worse than the typical bar or lounge with amplified music, but also no better” (2001, p. 157). Truax was obviously talking about coeval arcade games, which had widely differing sound design standards, mostly (if not entirely) relying on means of sound synthesis that today have largely become outdated. But to an extent, this description does seem to fit the Akihabara model, as an environment such as this could arguably be a danger to hearing capabilities. Also, the kind of acoustic community that this situation caters for, and ultimately fosters, is not one based on verbal conversation occuring in close proximity. Rather, even with a superficial observation, players are quite engaged in whatever kind of gameplay activity the machine affords. Undoubtably, these activities occupy a large chunk of cognitive attention, involving vision as well as listening capabilities.

Collins shares compatible considerations with regards to the aural atmosphere of arcade spaces in the 1980s. “Competing [arcade] machines had to be loud, with short, simple, but exciting sounds that would attract players [...]. The likely reason for this was a combination of the arcade’s atmosphere and the difficulty in programming music” (Collins, 2008, p. 15). Would this description fit our contemporary Akihabara example? The arcade atmosphere is perhaps similar: machines still have to attract players, as the business model of arcade rooms is substantially unvaried. Players walk close to a number of cabinets and decide where to invest their coins. Most probably, though, even if the sounds coming from these machines presumably strive to be as “exciting” as

possible, their complexity is dramatically augmented. The times when programming music was a daunting task, with musical compositions set to compete against visuals for the limited ROM available on the game circuit board, are long gone. As mentioned, games such as *Maimai* store hours of high quality recordings of popular songs. The hardware is also notably different, with arcade machines being equipped with dedicated, powerful speakers, often strategically placed on the cabinet to reach a desired acoustic effect, although it is not only the amount of available content or the power of the hardware that has been enormously augmented. Most importantly, musicking practices have multiplied.

Dancing, singing, tapping, drumming and strumming are distinct musical gestures that game developers have harnessed and creatively incorporated in a variety of different games. The development of the sub-genre of music games represents a worldwide ludic phenomenon, a creative and lively example of musicking. Throughout this chapter, different examples will be presented that focus on the musicking aspects that are not directly related to the analyses of these examples of musical works. As such, Small's ethos regarding the analysis of musically rich digital game examples will be applied.

Initially, the following section will address a game that has been popularised in the same Japanese arcade environment described above: the drumming game *Taiko no Tatsujin* (Bandai Namco Games, 2001/2018).

2. Drumming with *Taiko no Tatsujin*

Few games have captured the collective imagination and subsequently shaped the musicking possibilities of the Japanese arcade scenario like the *Taiko no Tatsujin* franchise, known in its single US release as *Taiko: Drum Master* (Namco, 2004). The series boasts more than 50 entries, mostly arcade machines, although it is to be found on platforms such as PS4, Ps Vita, Nintendo Wii, Android mobiles, and others. In its arcade iterations, the game features two large input devices, shaped like drums. Comparably large mallets are available to the player, inviting the immediate possibility of hard-hitting the drumheads. The colour, shape, and general look of the input devices mimic those of a traditional Japanese *taiko*, although the musical compositions included in the game appear to be far less influenced by tradition. In fact, they might be more familiar to fans of digital games, j-pop or anime. The first game in the series, simply called *Taiko no Tatsujin* (Namco, 2001), featured theme songs from popular anime such as *Doraemon* and *Ampanman*; tracks from other Namco game franchises; and original compositions in diverse genres, from ska to heavy rock.

This is not the repertoire that would generally be associated with taiko. What then is a taiko drum, and what are the practices associated to it? A fully detailed answer to this question is beyond the scope of this dissertation; nonetheless, a general introduction to the meanings of taiko practice is necessary to appreciate the musicking inherent in *Taiko no Tatsujin*.

In general, a taiko is a wooden drum shaped like a barrel. It can be used as the centrepiece for various kinds of musical performances, involving one or more taikos of different sizes, alongside different musical instruments such as flutes and *shamisens*, and

vocal and dance performances. In recent years, taiko events have become increasingly popular, taking centre stage at international venues. Formed in 1981, Kodo is arguably the most prominent and well-known taiko ensemble to ever operate. In the year of its formation, Kodo made its international debut, performing in Berlin and touring Italy, West Germany and Japan (Kodo, 2015). Ideally, this milestone can be considered as the start of the contemporary international popularity of taiko performances, commonly referred to as the "taiko boom". Taiko exhibitions, in fact, were staged at the Nagano Winter Olympics in 1998 and the FIFA World Cup, co-hosted by Korea and Japan in 2002 (Bender, 2012, p. 3). Taiko no Tatsujin seems to be regarded as proof of the popularity of taiko performances:

> "Building on this popular appeal, [taiko] has even been converted into a video game. In "Taiko no Tatsujin", an arcade game created by the Japanese company Namco, players use wooden mallets to tap along with a mixture of festival and pop music on an electronic drum shaped like a taiko. The company has released software and hardware home console versions of "Taiko Master", along the line of the "Guitar Hero" and "Rock Band" series of video games. Clearly popular domestically, taiko drumming has arguably become Japan's most globally successful performing art" (Bender, 2012, p. 4).

The previous quote is noteworthy for at least a couple of reasons. On the one hand, it would be fair to say that being the subject of a digital game is a testament to the popularity of a certain phenomenon. Gone are the days in which a digital game could be superficially dismissed as an automatic trivialisation or belittling of certain cultural aspects. Apart from considerations related to the cultural status awarded to the medium of digital games in this context, more questions do arise.

In his overall analysis, Bender does not focus on the compositions being played – the musical scores that taiko players would eventually perform. Rather, in his analysis, taiko practice is considered from the ground up as a performing art: a perspective that

necessarily includes various aspects of anthropological value. Specifically, taiko practice is understood as a form of "new folk performing arts", a definition that intends to "centre attention on performance culture that is presumed to be a communal possession, expressive of that community, transmitted orally within it, managed by it, and owned by no one of the community members more than another" (Bender, 2012, p. 11). The horizontal perspective traced by this definition seems to be typical of informal musical setups, differing with musicking forms that are structured in a more vertical or hierarchical fashion. The latter structures are ideally exemplified by the clear-cut roles established within Western classical music practice, as mentioned and critically addressed by Small and Blacking.

More generally, the new folk performing art seems to be a form of expression ascribable to oral traditions. The latter is a crucial notion: examples of musical forms that do not rely on written notation have been documented by Blacking (1973). As discussed in the previous chapter, Blacking highlighted the numerous, unique musical meanings of the Venda people, and used it as the key example for his general contextualisation of ethnomusicological practice. As such, Bender has adopted a similar modus operandi in order to pin down musical characteristics of taiko culture. While the complexity of taiko performance culture is a vast subject, extrapolating from Bender's work is intended to provide meanings that will be useful for an in-depth musical analysis of *Taiko no Tatsujin*.

In fact, the intention is to situate *Taiko no Tatsujin* within the larger frame of contemporary, shifting meanings surrounding Japanese festivals, or *matsuri*. According to the author, "the common English translation of the Japanese matsuri as "festival" lacks the nuance of the Japanese term" (Bender, 2012, p. 106). The key difference lies in

the religious nature of the term. Even if sometimes used to indicate a religious gathering, in the West the term "festival" tends to indicate a secular and often large event, such as a musical or theatrical festival, while in Japanese, the original meaning of "matsuri" is a strictly religious one. In recent times, however, the term has been adopted to indicate completely secularised events, incorporating the meanings of the English term. This shift is particularly common within urban matsuri, such as those taking place in the large metropolitan areas of cities such as Tokyo and Osaka. Contemporary taiko groups seem to increasingly "base membership on residence, regardless […] of shrine affiliation" (Bender, 2012, p. 108). The communal aspect is therefore still strong, however shrine affiliation is no longer a fundamental discriminating factor, as corroborated by the author, who in July 2016, participated in one such festival, the Akasaka Jodoji Bon Odori, held in the ward of Minato, Tokyo. Appropriately, a large taiko drum took centre stage on that occasion, with alternating performers sharing the instrument and playing a repertoire of pre-recorded musical tracks, occasionally accompanied by crotal bells. The event was explicitly intended to cater for people external to the neighbourhood, with members of the organisation offering refreshments to tourists and inviting them to join the *bon odori* dance.

Taiko musicking is therefore an example of contemporary oral tradition, rapidly evolving in the wake of new phenomena surrounding its practice. The musicking afforded by *Taiko no Tatsujin* can be situated in the cultural discourse thus far introduced. Devoid of religious implications, the game joyfully celebrates matsuri and taiko in exuberant fashion, juxtaposing them with meaning derived from a mishmash of digital game and anime culture. In doing so, the game actually created a mixture of musicking practices, generating an ironic, caricaturistic effect. Through the design of its input devices, the game encourages gestures that are comparable with typical

techniques associated with playing a large taiko, considered an intense physical performance that requires strength and stamina. The timbre of the taiko, the characteristic deep thud, is also prominently featured, alongside the highly pitched rim shot. As the game mechanics guide the player towards hitting the centre or the rim of the drum, the object itself provides organic, non-schizophonic acoustic feedback. However, any similarity to elements that are more strictly musical and borrowed from taiko culture, practically end here.

The game, in fact, constitutes a rare case of music-focused digital game that features musical content based on oral traditions. It does not necessarily create its authenticity or credibility by featuring clearly recognisable musical compositions ascribable to a specific genre, but rather by tapping into the larger musicking frame associated with taiko culture. These aspects, however, are not peripheral to taiko practice: rather, they can be considered its centre.

As such, there are practically no taiko-specific musical works featured in *Taiko no Tatsujin*. For this reason, it has been necessary throughout this section to uncover other forms of musicking. This explains how a performing art such as taiko performance can serve as the basis for a digital game. Specifically, this operation clarifies how mimicry can be understood in this context, by presenting the various forms of musicking that have been simulated.

3. Situating the genre of music games within Game Studies

Taiko no Tatsujin is a valid example of what has been referred to as "music games". As mentioned, the nomenclature has hitherto been used informally throughout this dissertation, and so far the meanings associated with it have not been subject to scrutiny. Rather, its use has been accepted as it is understood within the context and culture of digital games at large, outside academic enquiry; such context includes, but is not limited to, journalism, marketing, fan paratexts, and so on. In those contiguous discourses, boundaries and content of topics such as game genres are constantly re-negotiated, in order to accommodate new developments, trends, or marketing strategies.

Relevant resources, however, have tackled the notion of game genre under an academic, critical lens. For instance, Apperley argues that canonical game genres, as they have been made popular within digital game culture, "obscure the new medium's crucial defining feature, by dividing them into categories (loosely) organized by their similarities to prior forms of mediation" (2006). As such, the author establishes a different paradigm to base categorisation upon, here based on "the specific attribute of the video game medium […]: *interactivity* - the way in which the game is played, rather than watched" (Apperley, 2006).

The author emphasises the word "interactivity", but in the context of this dissertation, reader attention is rather directed to the word "watched". If it is certainly the case that most canonical categorisations are based on the visual aspect, some other popular genres such as rhythm or music games are instead based on the aural component, although that particular occurrence is not contemplated in this discussion. Apperley

specifies that the issue is focused on representational aspects: "conventional video game genres rely overmuch on games representational characteristics. Representational in this case refers to the visual aesthetics of the games" (Apperley, 2006). Without delving deeply into the matter, it is possible to argue that the aesthetics of digital games, as discussed in this case, should consider not only the visual component. "Audiovisual aesthetics", if you will, could be a more apt umbrella term to address visual and acoustic representation, and the possible interactions between the two. Such a discussion would necessarily involve references on the concept of synchresis, as introduced by Chion (1994) and discussed further below. Again, an articulated debate on aesthetics is outside the context of this dissertation, but the means by which the acoustic aspect has been excluded in this context is worthy of note.

Applying Apperley's theoretical framework and his criticism of the conventional video game genre to examples referred to as "rhythm games" or "music games" seems therefore to be a stretch. In fact, even if Apperley does not directly mention "music games", he identifies visual components as defining characteristics of any genre. However, music games are certainly not grouped together because of their coherent visual aesthetics, but rather for their acoustic properties. For this reason, a category such as "music games" would probably not exist at all by applying Apperley's framework. This is however problematic, as the acoustic properties of digital games are not necessarily secondary to the visual ones.

Of course, it is possible to argue that certain visual tropes within "music games" are present, perhaps set by popular titles such as *Guitar Hero* or the aforementioned *Taiko no Tatsujin*; or, perhaps these titles have simply imported such tropes from elsewhere, eventually contributing to their canonisation. This brings to mind the cartoonish

approach to rock music visual aesthetics reiterated by the *Guitar Hero* and the *Rock Band* franchises through a number of releases as an example of that. However, the defining components that have been extrapolated from these game examples in order to formulate the informal definition of music/rhythm game is definitely within their acoustic and musical aspect. It has been noted, in fact, that the "musical game genre [features] an intimate and reactive musical bond" (Grimshaw, Tan, & Lipscomb, 2013), where "a key factor is direct engagement with musical sounds as a primary element of gameplay" (Kassabian & Jarman, 2016).

The genre grouping proposed by Apperley is made up of four broad categories: simulation, action, strategy and role-playing. As such, it seems that games such as *Taiko no Tatsujin* or *Guitar Hero* could be placed within the genre of simulation. In fact, "[the simulation] genre includes video games that simulate sports, flying and driving, and games that simulate the dynamics of towns, cities, and small communities […]. What is particular about the conventional genre of simulation games is that they clearly remediate a "real" world activity" (Apperley, 2006). By applying this understanding to the cases that have been considered, it follows that playing a guitar or a taiko drum can be considered a "real world activity", subsequently remediated in digital games. Even if *Taiko no Tatsujin* and *Guitar Hero* arguably do this in a cartoonish fashion, with different degrees of verisimilitude, they still quite reasonably fall in that category.

As Apperley acknowledges, digital games are hardly, if ever, a consistent medium; in fact, even in this case, there exist many instances of games that are generically understood as "musical" without being conducible to any immediate and concrete "real world", external activity. In other words, certain digital games that are considered as "music games" do not try to remediate an already existing musical situation. *BIT.TRIP*

RUNNER (Gaijin Games, 2010) is a valid example of this: the game presents a rather abstract situation, while potentially affording even greater abstract forms of musical action. As the game title implies, it features a character that is constantly running, with the player only able to intervene using evasion manoeuvres such as jumping or crouching. Each course in the game features a different set of obstacles for the player to avoid. This "running-focused" game mechanic has become a design trend in recent years; it has arguably been made popular by the indie game *Canabalt* (Saltsman, 2009), but it has also been adopted by the Super Mario franchise with the game *Super Mario Run* (Nintendo, 2016), the first game in the Mario series to be published for the iOS and Android mobile platforms.

In his analysis of musical games, Beverburg Reale (2014) refers to the *BIT.TRIP RUNNER* genre as a "rail platformer", which is yet another informal genre nomenclature. In this game, however, an attentive or even analytic form of listening to the musical content is required from the player. Such a listening mode reveals that the score contains cues and signals fundamental to traversing the game space. "Aligning the map with the score transcription helps to clarify how obstacles combine to create obstacle motives, how the repetitions of the obstacle motives combine to create obstacle phrases, and how the phrases combine to create larger formal structures, complete with a kind of motivic return and development we might expect in a musical passage" (Beverburg Reale, 2014). In other words, the level design of the game, characterised by repeating patterns of obstacles, is structurally connected with recurring elements of a musical composition; for instance, a sequence of obstacles that requires appropriately timed jumps will result in the player triggering a similarly timed sequence of staccato percussive sounds. Alex Neuse, one of the principal game designers involved in the development of *BIT.TRIP RUNNER*, has also confirmed the close relationship between level design and musical

score during an interview: “Ideally, we would get the music first, and then we would design the levels to basically dance with that music” (Beverburg Reale, 2014).

This production methodology, however, is not unique to digital game development, and has instead been previously identified in a different audiovisual medium. As mentioned in Chapter 3, Curtis notes that in early cartoons by Warner Brothers “the entire shape of a cartoon is complemented and determined by the music” (Curtis, 1992). In this example, musical elements are tightly synchronised with on-screen actions; a use of sound defined as “isomorphic”. “Isomorphic […] refers to the close matching of image and sound – that is, a relationship based on *rhythm* in both the action and the music” (Curtis, 1992). Curtis stresses that analysis of early cartoons, and the importance of their isomorphic features, reveals that the diegetic/extradiegetic compartmentalisation of sound is “simply untenable […]. The relationship between the sound effect and its visual representation is not one of fidelity, but of analogy” (Curtis, 1992). Taking advantage of synchresis, these cartoons can in fact juxtapose orchestral sounds with on-screen action: for example, “the villain pounds his fist on the bar and we hear a cymbal crash and a blare of horns” (Curtis, 1992). The diegetic position of these sounds is impossible to verify: presumably there is no orchestra in the fictional world of the cartoon, yet there is also no faithful, congruous relationship between sound and action.

BIT.TRIP RUNNER falls closely within this line of analysis. Its development methodology exemplifies the varying relationships that digital games can have with audio. In this case, mirroring that which has been described by Curtis, the many sound signals present in the game form part of an overarching musical structure, with a predominantly rhythmic link. The crucial difference, of course, is that in this case the effect of the isomorphism is not solely cognitive, but rather translates into ergodic effort. The players have to

understand musical cues in order to react in a timely fashion. Playing the game is directly connected with an understanding of music rhythm and tempo. Notably, different playing sessions may actualise different renditions of musical possibilities afforded by the game system. Especially in the early stages of the game, the jumps can be timed in a less precise fashion, affording slight oscillations in time. Being significantly ahead or behind the beat is not sanctioned by the game rules, which means that the player is allowed to interpret the musical input in various ways without receiving negative feedback.

The description of *BIT.TRIP RUNNER* set forth previously, put its musical components in line with those of *Guitar Hero* and *Taiko no Tatsujin*. However, crucially for the discussion regarding the nature of the music game genre, *BIT.TRIP RUNNER* does not immediately mimic canonical musical actions, such as playing a guitar or a taiko drum. Digital games may therefore be intensely musical, without explicitly simulating recognisable musical actions. As such, even if a loosely described interactivity seems to be the defining component in all the game examples considered, remediation is not the only modality employed in these cases. Musical games can therefore be analysed for their ability to explore and create novel musicalities, which are only fully understood if connected with their audiovisual, ergodic qualities. The musicking framework, in this regard, exemplifies that music is not to be considered a given or definite, and as a such predictable and identifiable structure. The musical analysis of digital games subsequently needs to observe these possible unprecedented musical occurrences, refraining from limiting itself to simpler cases of remediation of previously identified musical forms. Through this perspective, it is possible to connect examples that remediate specific instrumental practices such as *Guitar Hero* with the more abstract phenomenon detected in *BIT.TRIP RUNNER*.

4. Musical contents: music and "non-music" games, background and foreground music

The game examples presented thus far explore the different modalities by which they have been considered as musical. A deeper analysis reveals that the similarities between these games are less obvious than expected: they are not connected by their representational qualities or by how they remediate external sources. The musical compositions that they contain also reveal different natures. Specifically, *Guitar Hero* heavily features and refers to the classic, defining compositions of the rock music culture. *Taiko no Tatsujin*, instead, remediates a musical culture that is predominantly oral, and as such implements a different strategy, focusing on contextual elements and on the timbral qualities of the prominently featured taiko drum instrument. *BIT.TRIP RUNNER*, instead, does not explicitly refer to a well-delineated music community, although it cites classic video game acoustic tropes and vintage synthetised sounds.

Similar strategies of musical analysis, however, are applicable to examples related to practically any game genre. For example, Miller focused on the plethora of references made by the *Grand Theft Auto* franchise: "In *Grand Theft Auto: San Andreas* (2004) [...] the music consists of licensed tracks spanning genres from country to house to hip-hop, all chosen to match the game's 1992 West Coast setting" (Miller, 2007). Similarly, Summers devotes much attention to the nuanced referencing of music found in racing games: "*Formula One 05* (2005), for example, uses the 2003 song "Butterflies and Hurricanes" by the rock band Muse to accompany an opening montage. The song has

little explicit connection with racing, but as a kinetic, popular and relatively recent piece, it is appropriate for the purpose here" (Summers, 2016, p. 89).

Musical works that are included in digital games can therefore be selected in order to refer to a musical context. By tapping into these sets of meanings, developers form strategies to corroborate the credibility of settings, as in the case of *Grand Theft Auto: San Andreas*, or to give a sense of contemporaneity to annual releases such as *Formula One 05*. The listeners' ability to meaningfully engage with this web of meanings has been described by van Elferen as "musical media literacy": "the fluency in hearing and interpreting television and advertising music through the fact of our frequent exposure to them, and subsequently, our ability to interpret their communication" (van Elferen, 2016, p. 36). Such a phenomenon, according to van Elferen, also occurs in the context of digital games, where it also influences the players by structuring relations between musical compositions and in-game events: "boss fights, for instance, are often accompanied by the high-tempo, brass-heavy, dissonant orchestral scores with syncopated percussion that players recognize from exciting scenes in heroic action movies" (van Elferen, 2016, p. 36).

This musical content may be structured within the game text in various different ways, as analysed by the various authors discussed in Chapter 2 of this dissertation. In the case of the *Grand Theft Auto* example, for instance, the player predominantly uses a car radio to access the licensed tracks, or encounters them when entering commercial establishments such as fast food restaurants, shops, and the like. Open-air in-game locations do not make use of the songs; these are mostly played when a car is stolen (or otherwise obtained) and a radio station is eventually selected. As such, the player has a certain degree of control over the track list playback. Different stations, with different

playlists, can be chosen - or, the radio can simply be muted. The act of selecting a track, or silencing it, is an action with a certain degree of musical value. *Grand Theft Auto: San Andreas* is an ideal example of this occurrence, because it remediates the archetypal controls of the radio as a means of selecting musical content in a schizophonic reality. As commonly pointed out within fields such as communication studies, the availability of radio transistors and the proliferation of the car radio gave the object a nomadic nature, following travellers and creating their own specific ambiance within the private confines of their cars. The contemporary abundance of radio stations to choose from puts the user in control, allowing channels to be quickly switched until something desirable is eventually encountered. Similarly, *Grand Theft Auto* imports this consumer modality in order to put the player in control of a considerably extended playlist, carefully created ad-hoc for the game.

But even if *Grand Theft Auto* is a clear example of how active and participatory music selection in digital games can be, it is also a specific example, which cannot represent the larger field of digital games as a whole. In fact, anything from articulated musical compositions to sparse musical fragments are, of course, present in most contemporary digital games. The fact that music games are defined by their musical nature is essentially ascribable to the specifics of player interaction. As mentioned, it seems that a constant is to be found in players directly controlling or otherwise intervening in substantial portions of musical content. Since the "music game" categorisation is informal, such interventions are not necessarily obviously substantial; the fundamental constituents of such interactions are therefore similarly unspecified. As such, how can certain games be excluded from the music genre if, after all, degrees of music interactions are present in many contemporary digital games? Or, to rephrase this question, what is the extent that player activity needs to reach in order for it to be

considered as pertaining to musicality? The first activity to be analysed in order to delineate the differences between music and non-music games is that of the listening modes employed by the players.

5. Listening

In his analysis of audiovisual media, Chion considers three listening modes: *causal, semantic, and reduced listening* (Chion, 1994, p. 25). These three modalities are not mutually exclusive, and the author clearly indicates that more listening modes might be identified. Causal listening, "the most common, consists of listening to a sound in order to gather information about its cause (or source)" (1994, p. 25). Causal listening takes places on various levels: examples include tapping on a container to determine how full it is, or recognising different individuals from the tone of their respective voices. Causal listening is also used to determine "the general nature of [a] sound's cause; "we may say: That must be something mechanical" (1994, p. 26). Semantic listening refers instead "to a code or language to interpret a message: spoken language […] as well as Morse and other such codes" (1994, p. 27). The third listening mode, reduced listening, is a modality that "focuses on the traits of the sound itself, independent of its cause and of its meaning" (1994, p. 29). This third listening mode is described as being employed in research contexts, as introduced in the experimental practice of French theorist and musician Pierre Schaeffer in *Traité des Objets Musicaux* (Schaeffer, 1966).

Building on Schaeffer and Chion, Smalley restructures the focus of study, by centring on "subject-object listening relationships […] between the listener and sounds, between the

subject who is perceiving, and the objects of perception. The term 'relationships" is preferred to 'modes', as it hints at impermanence and shifts in perception" (Smalley, 1996, p. 81-82). Smalley is mostly interested in music listening, emphasising the importance of the intentionality of the act.

> "If we talk about 'listening' to music we describe an intentional act, but if we talk about 'hearing' music we mean that the music exists outside any act of intention to listen on our part. Thus we can hear a piece of music and as a result decide to listen to it" (1996, p. 78).

Smalley relates the act of listening in a musical context to "the world of experience outside the composition" (1996, p. 83): while the indicative relationship as conceived by Schaeffer considers sound as a message or information, he does not "confine the notion of the indicative relationship to mere messages, events and information but extend it to include a wider frame of references to experience outside and beyond music" (1996, p. 83). Gestures are considered an indicative field; traditionally, a musical gesture would include a physical act on a sounding body, be it "hitting, scrapping, blowing" (1996, p. 84) and the like. While a direct link is evident in traditional instrumental and vocal music, electroacoustic music can opacify this relationship. "The arrival of computers, MIDI-controllers and live signal processing on the concert stage has introduced a new problem related to the gesture and visual focus. There is an increasing ambiguity between what is seen and what is heard" (1996, p. 104). The indicative field of gesture within musical performance has undergone a transformation, in which the performance gesture has turned from the visible to the invisible.

In the context of digital games, listening is to be considered as a cognitive, interpretative operation, influenced by the diverse mindsets the player might have during sessions

with a given digital game. As such, it precedes explicit ergodic effort, but has deep ergodic implications in which it presupposes subsequent in-game activity. As mentioned in the second chapter of this dissertation, the model of ergodicity that is being applied in this context includes "readiness and predisposition to act" (Calleja, 2011, p. 11) toward gameplay, which is a state that clearly includes attentive listening modes.

Within Game Studies, reduced listening modality has been descried as not generally occurring during engagement with digital games. According to Stockburger, "it is quite obvious that a mode of reduced listening will not be achieved when we are playing an audiovisual game, simply because we are drawn to construct relations between the visual and auditory information we are receiving" (Stockburger, 2003). Kamp concurs: "when playing a game we do not naturally take up a reduced listening attitude; we do not listen to the game's soundscape, taking in each and every sound and weighing it against the others; we are trying to win a match" (2014, p. 141). While the listening situations described here refer to a canonical gameplay situation, reduced listening might possibly be employed during different modalities of digital game engagement. Since reduced listening is a scenario that hardly occurs naturally, as Chion specifies (1994, p. 30), nothing stops today's researchers from employing reduced listening in the context of engagement with audiovisual media. For example, in the introduction to this dissertation, the sound of Mario's jump in *Super Mario Bros was analysed*. To gather information about that sound, reduced listening was employed: I wasn't focusing on "the semantic properties of sounds", but instead I tried "to find ways of describing their specific properties and perceptual characteristics" (Stockburger, 2003). Here, it is argued that reduced listening during digital game engagement is possible to achieve, but that the purpose of such a listening attitude is not motivated by the desire to improve in-game performances, but rather for research purposes.

The discourse surrounding reduced listening can also be connected with the ecological approach maintained by Clarke (2005). He contrasts ecology and autonomy: "ecology is the study of *the relationship between* organisms and their environments, and autonomy is the state of independent self-sufficiency" (2005, p. 132). But within an ecological framework, a true state of autonomy is impossible to reach, "as organisms and environments are *always* in a condition of mutual dependence" (2005, p. 132). Gaver, with reference to auditory event perception (Gaver, 1993), differentiates between "musical" and "everyday" listening. According to Clarke, the musical listening modality set by Gaver "equates with an attitude of autonomy – attending to the qualities and properties of sounds in themselves, and their purely sonorous relations with one another" (2005, p. 133). In this sense, the musical listening intended by Gaver shares a few traits with practices of reduced listening, as it tends to eliminate contextual elements from the listener's attention field. Autonomous listening attitudes are also significantly influenced by the "ideological component"

> "The cultural assumption expressed in countless books, magazines, and CD liner notes, radio programs and representations on films and TV, and integrated into formal and informal aspects of music education, that "proper" listening takes a particular form. Stereotyping it, this particular form of listening is silent, stationary, uninterrupted, ear glued to the musical structure and eyes closed. It hardly needs pointing out how uncharacteristic this actually is of most people listening habits" (Clarke, 2005, p. 136)

On the contrary, everyday listening focuses on the "experience of listening to events, rather than sounds" (Gaver 1993, cited in Clarke 2005, p. 133); Gaver takes as an example the experience of listening to the engine of an oncoming car, by focusing on assessing the proximity of potential danger. Listening to digital game environments is most likely to take into account the full ecology of the acoustic environment in question,

and forms of autonomous listening can only occur in special examples, as mentioned in reference to reduced listening.

In the previously mentioned examples that have been considered as "music games", such as *Taiko no Tatsujin*, musical compositions seemed to be situated in the foreground of perceptual listening attention. More often than not, the player focuses on musical elements, as these are of primary importance in order to traverse the game. The listening modality employed most likely includes elements of causal listening. This discourse assumes that in non-music games – that is, any other game genre that is not somewhat directly associated with musical interaction, including the *Grand Theft Auto* example - music would usually be situated in the background of our listening attention, and would not be perceived with a causal listening attitude. According to Kamp, in our everyday experience, we encounter background music "in films, on the television, in video games, in restaurants and shops, and in the work place", and it is "specifically engineered not to attract our attention". (2014, p. 131) In digital games, Kamp takes as an example *StarCraft* (Blizzard Entertainment, 1998), a real-time strategy game set in a science fiction scenario.

> "We can […] consider the musical soundtrack of StarCraft as an auditory ground during a match. Starting out in a building stage, the player is confronted with only sporadic sounds […]. On the other hand, when engaging an opposing army, the music is completely drowned out by the sounds of battle: units shouting order confirmations, the cries of soldiers dying, vehicles exploding, and the almost continuous sounds of gunfire […]. The music, on the other hand, surrounds the totality of diegetic and interface sounds: wherever in the auditory space I turn my attention, I hear music through the noises of gunfire and units. It has this continuity not only spatially, but temporally as well: when the battle ceases and its sounds die out, I hear the music as having been there all along. If there is ever a recurring moment during a [Starcraft] match, however, where the music is not part of a distant, virtually inaudible background, it would be during a building stage, either leading up to, or just after battle situations" (2014, p. 140).

In this account, background music adopts a secondary position within the listening attention of the player. Specifically, "the rhythms of the musical cues do not synchronise in experience with the rhythm of our mouse clicks and movement" (Kamp, 2014, p. 142). This does not mean that there is no cognitive relation between listening and providing input to the digital game system: "if the StarCraft player matches their actions to the music, it must happen on a more "abstract" level: not to the level of individual beats, or even to general tempos of sections, but to an overall kind of "mood" that the music sets" (Kamp, 2014, p. 142).

It is worthy of mention that similar examples of background listening forms have been analysed in various different contexts and fields; for instance, music can be used in order to create a given, desired ambiance in certain commercial premises. As such, its effects have been studied in restaurants (Milliman, 1986), shopping malls (Milliman, 1982), and other establishments (S. Areni & Kim, 1993). Within acoustic ecology, Truax argued that "listening can be consciously controlled, [producing] categories of perceptual immediacy such as "background" and "foreground" (2001, p. 18). The difference is to be found in the attention assigned to the reception of different sound sources. While foreground listening is a modality that commands the full attention from the listener, in "background listening", […] the sound usually remains in the background of our attention" (2001, p. 24). With reference to audiovisual media, Chion analysed the perceptual implications of film spectatorship, establishing cognitive priorities: "the specific cinematic visual unit of the shot remains by far the most salient, and […] the composition of the soundtrack remains subordinate to the shot" (Chion, 1994, p. 45). In other words, the interpretative efforts of the viewer of a film will be directed toward the

visual component, while the acoustic one might reinforce it or contribute to the *mise-en-scène*.

Immediately, though, it is noted that what has been established within film studies is of limited applicability when it comes to digital game analysis. To start with, it is important to mention that, for the most part, the soundtracks of *Guitar Hero* and *Taiko no Tatsujin* were composed well before the digital games were in development, sometimes even decades before. Of course, though, their assemblage in the playlist has to be considered in this case as an act of composition, since the juxtaposition is crucial in order to determine the nature of the digital games in question.

If a comparison is made between the visual unit and the acoustic one, the latter might be rightfully considered as the most "salient" component of the game. The licensed tracks, in fact, are predominantly featured in the games, and are used in order to structure different courses for the player. "Dots" or other forms of visual cue are displayed on the screen, signifying that a note or an otherwise relevant acoustic event ought to be played. In these cases, it seems safe to assume that the visual composition has been subordinated to a predominantly acoustic form of content. The listening modality applied in these examples is in opposition to that which has been said before: while in "background music" listening to "the rhythms of the musical cues do not synchronise in experience with the rhythm of our mouse clicks and movement" (Kamp, 2014, p. 142), this is exactly what happens in these examples. This specific audiovisual relationship is only characteristic of a selection of digital games, of which *Guitar Hero* and *Taiko no Tatsujin* pertain. In different cases, we might find numerous examples of games that are predominantly visual or that do not tightly synchronise music with player input. Again,

digital games should not be considered a coherent medium (or as a single medium at all).

As illustrated thus far, musical tracks in digital games can have varying degrees of meaning, and work with their visual counterpart according to different hierarchies. It might be natural to assume that the musical content and the tracks selected for digital games with a salient visual component might be radically different than game examples that focus on the acoustic one. This is however not the case. As a matter of fact, the *Guitar Hero* and *Grand Theft Auto* franchises have, more often than not, shared the same musical tracks. A full list has been produced by fans of the game, which also observes how at first they didn't notice that the songs were the same (SryXanE, 2008).

Performer	**Song title**	**Digital Games**
Lynyrd Skynyrd	*Freebird*	*2/SA*
Ozzy Osbourne	*Bark at the Moon*	*1/VC*
Slayer	*Raining Blood*	*3/VC*
Anthrax	*Madhouse*	*2/VC*
Judas Priest	*You've Got Another Thing Comin'*	*1/VC*
A Flock of Seagulls	*I Ran (So Far Away)*	*80s/VC*
Heart	*Barracuda*	*3/SA*
Kiss	*Strutter*	*2/SA*
Foghat	*Slow Ride*	*3/SA*
Helmet	*Unsung*	*1/SA*
Living Colour	*Cult of Personality*	*3/SA*
Danzig	*Mother*	*2/SA*
Guns N' Roses	*Welcome to the Jungle*	*3/SA*
Alice in Chains	*Them Bones*	*2/SA*
Dio	*Holy Diver*	*80s/VCS*
Scorpions	*Rock You Like A Hurricane*	*3/VCS*
Judas Priest	*Electric Eye*	*80s/VCS*
Quiet Riot	*Metal Health (Band Your Head)*	*80s/VCS*

Ratt	*Round and Round*	*80s/VCS*

1 = Guitar Hero 1
2 = Guitar Hero 2
3 = Guitar Hero 3
80s = Guitar Hero Encore: Rocks the 80s
VC = GTA: Vice City
SA = GTA: San Andreas
VCS = GTA: Vice City Stories

As this example demonstrates, a relevant number of tracks have been used in different contexts, either as "background" or "foreground". For this reason, conceptualisations of soundtracks as subordinate within digital games cannot be based on the sole analysis of the musical works that have been included in a given digital game. It is their usage and context that makes them a form of "background" – as opposed to formal components or compositional methods. Although it is possible to discern common features of background music, it is perhaps by investigating components such as rhythmic patterns, harmonic progressions, melodies and so on, that those same features can certainly be found in non-background music.

6. New musicalities: music games interactions

As alluded to throughout this chapter, identifying musicking instances in music games requires a wide range of theoretical tools, due to the numerous possible manifestations of musicking. Contextualisations of musical cultures that digital games may be ascribable to, or may refer to, reveal nuanced referencing systems. Different aspects of musicking, such as performative practices, recognisable musical instrumentation, or known compositions, are used in different ways to signify or suggest a musical affinity.

For this reason, categorising music games by focusing on the qualities and characteristics of the musical compositions they include, remediate, or otherwise feature, is essentially an operation that can only yield limited results.

With that said, as previously mentioned, the musical works featured in music games can be said to have two different origins. Such works could either have been previously available and known to a certain audience, and as such imported from elsewhere, or the compositions could specifically be created for the digital game in question. Of course, a combination of these two modalities within the confines of a specific digital game is also possible. So far, focus has been placed on games that import previously available musical works, such as *Taiko no Tatsujin* and *Guitar Hero*. The aforementioned *BIT.TRIP RUNNER* is instead an example of a game with newly composed musical content. In these cases, in fact, aspects related to remediation of canonical musical activities can be put to one side, and different examples of audiovisual relationship can be introduced. The musical gestures presented here, are not in fact directly inspired by canonical ones, such as strumming a guitar, hitting a drum kit, or in general performing with a musical instrument. These examples are telling in that they explore potentially new musicking practices, which, it is here argued, are exclusive to digital games.

These examples do not generally make direct reference to a complete, detailed, and recognisable musical performance, but rather they generated a small but significant difference in categorisation within the larger discourse on games maintained by fans, industry, and press. In fact, certain digital games are not referred to as "music" games at all, but rather as "rhythm" games.

In general, the difference is based on the focus of player activity. In "rhythm" games, in general, player intervention is not directly tied to harmonic or melodic aspects of musical works. The focus, then, is on rhythmic actions: the interventions are largely percussive, relatively short, and metronomically precise in nature. At this stage, though, it is worthy of reiteration that the terminology relative to "music" or "rhythm" games tackled in this instance has been created in an informal setting, and that is not the intention of the author to provide a formal status to such categorisations. Discussion will therefore not focus, in specific formal terms, on what a music or rhythm game is supposed to contain in order to qualify as such. Rather, focus is placed on the musical activities that these categorisations might imply, and in the meanings that both consumers and developers infer to this terminology. Both categories are in this context part of the same musicking community, constantly exchanging values and participating in meaningful musical expression.

Differentiating between music and rhythm indicates a form of attentive and selective listening, which in turn explicitly performs a brand of analysis of the musicking in action.

The *Rhythm Tengoku* franchise (2006/2015), released in different markets as *Rhythm Heaven* or *Rhythm Paradise*, is a game that quite prominently mentions rhythm in its title. The game presents a number of bizarre vignettes, sketching a few vaguely described narrative situations, framed through simple interactions. Such short, self-contained ludic interactions are usually referred to in this niche of digital game culture as "mini-games". "While some of these levels are overtly musical performance or dance, most are presented as non-musical activities: sports (such as badminton or golf), repetitive labour (such as working an assembly line or harvesting vegetables), or military drills (such as marching)" (Schultz, 2016). In one mini-game, called "Built to

Scale", the player has to tap at the right time, with a high degree of precision, in order to shoot a rod. The objective is to hit one or more rotating squares, that eventually appear on screen with different timings and formations, requiring the player to adjust to their pace. In another, "Rhythm Rally", the user controls a ping-pong player. With similar precision, tapping has to be performed with the right tempo, in order to bounce the ball back to the opponent.

If there seems to be no attempt at maintaining some sort of coherent narrative situation throughout *Rhythm Heaven*, cohesion of the vignettes is to be found in the aural aspects. Each vignette is in fact accompanied by a specific tune, composed for the occasion. The tune contains a number of cues that the player has to understand, since they inform them of the correct timing to perform the action. For example, bouncing the ping-pong ball on the paddles and on the table occurs at a consistent tempo, creating a predictable pace to be followed. The player, ideally, can guess the right moment to tap by simply listening to the cues; however, the visuals will present different information that can be used to determine the right moment. Cleverly, the visuals can initially be easy to follow, but their complexity is augmented as the player moves further towards the end of the stage. In "Built to Scale", for example, a single rotating square is initially present. As the player progresses in the game, two or more rotating squares appear. This seems to increase the difficulty, since there are now multiple visual cues to focus on. Actually, though, the player has to tap at exactly the same time as before: nothing has changed within the aural compartment. From a superficial analysis, the game appears to require the same exact ergodic effort from the player: tapping in time, but if we consider the cognitive aspect of the involved ergodic effort, it can be considered as having increased. By presenting an increasing number of visual cues, in fact, the game successfully gives the impression of increasing difficulty.

It is an interesting example, in that it confirms that musicking is not necessarily solely an acoustic phenomenon. In fact, in the example presented, only the visual component changes and becomes more complex, while the acoustic aspect of the game remains the same. The increased ergodic effort necessary to traverse the text is effectively caused by a similarly increased audiovisual cognitive load. This specific instance of cognitive effort is identifiable within the phenomenon of synchresis. In fact, the synchretic action in place is distinctively different from the phenomenon identified and described by Chion (1994), since the cognitive effort is now situated within the cybernetic loop of digital game play. This phenomenon has been described by Collins as kinesonic synchresis: in this case, "sounds are fused not to image but to action" (2013, p. 32). With kinesonic synchresis, "sound never just reinforces what we see and do; in interpreting a particular event, sounds – like visual stimuli – integrate into the event itself and become a natural part of it" (Jørgensen, 2017, p. 77).

Rhythm Heaven occasionally plays with kinesonic synchresis, overloading the visual component of an event with primarily acoustic connotations, and in turn, augments the ludic difficulty of specific moments. This example shows, once again, the unique aspects of musical action in ergodic media, which cannot be limited solely to analysis of the aural component of digital games.

7. New musicalities: the case of *Thumper*

In this section, a digital game example capable of offering further perspectives with regards to the nuances of musicking in the context of digital games will be presented.

Van Elferen has already argued that "creating […] a dichotomy between gaming and musicking is not very fruitful" (van Elferen , 2014), and the relationship between the two should not solely be limited to digital games that are explicitly musically performative (such as *Rock Band* and *Guitar Hero*). Digital games can also refer, at large, to specific musical genres, cultures, and related meanings, without directly engaging with music-making. "Musical play in games include playing with musical content in *Brütal Legend* (Double Fine Productions, 2009), a game in which the player engages with the corpus of metal music as well as the subcultural capital pertaining to that genre" (van Elferen , 2014). *Brütal Legend* is set in "a mythical world dripped in Rock and Roll folklore" (Double Fine, 2008), where the main character is the roadie in a heavy metal band, brandishing an electric guitar as a weapon. The ability of the player to interpret these explicit references is required in order to grasp the game's musical context. Building on this concept, this section will focus on an example that structures a set of interesting musical references: *Thumper* (Drool, 2016).

Thumper is a digital game that is immediately presented as a "rhythm violence game" by its developer team on their dedicated website. Although the game does not necessarily present any visuals that might be considered gory or violent in a graphical sense, the intensity of the experience is conveyed by its fast-paced and unforgiving gameplay. The following is an account of a session playing the game, published by the British website Rock, Paper, Shotgun: "developer Marc Flury introduced *Thumper* as a "Rhythm violence game", which I assumed to mean it was some sort of action or fighting game, using rhythm inputs. No no, no such thing. The violence – and blimey it did feel violent – was conveyed in the tone." (Walker, 2015) As such, this description of the game corroborates the notion that the semiotic layer of digital games - the range of signs, references, and meanings that digital games can employ – goes beyond the visual level. Furthermore,

categorising digital games in genre compartments such as "action" or "rhythm" is indeed proven to be a futile task, as there are a myriad of game examples that defy such categorisation.

According to different commentators, the "violent tone" of *Thumper* is mostly conveyed by its soundtrack. It is also worth mentioning that the development team of *Drool* consists of just two individuals: the aforementioned Flury, credited as programmer and designer, and Brian Gibson, responsible for art, music, and co-design of the game. Gibson is probably best known within music circles as the bass player of the band Lightning Bolt. Those familiar with the band might be able to perceive certain stylistic continuity with the tone of *Thumper*. The experience of seeing the band live, in fact, has been described as a somewhat violent attack: "while some concertgoers are still fingering the IDs in their pockets, a shock wave rips through the poorly lit venue. The earplugless wince. Instantly, a throng forms around the headlining band, an amorphous beast spewing high-end swoons over low-end in a 45-minute orgy of sound and aural bleeding" (Gornick, 2007).

In this example, knowledgeable game players can refer to a musical literacy that is not necessarily situated within their realm of familiarity with other audiovisual media. The band Lightning Bolt, although certainly active as a recording act (having released five full length records), is probably best known for its live performances. When discussing the roles of live performances and records within the "rock music" discourse, Fritsch and Strötgen note:

> "The record as a primary cultural object evokes expectations concerning the live performance, and live performances have to meet these expectations to authenticate musicians as real rock musicians. These expectations are built on cultural discursive knowledge that provides information about the typical

> manners of playing (e.g., improvisations or virtuosity), expected behavior, stage personae, haircuts, clothing, and much more" (Fritsch & Strötgen, 2012)

In other words, live performances and records coexist, creating specific musical literacies. In the context of this dissertation, this is not simply a detail. Rather, it indicates that the conceptual objectification of music can act as a limit when considered as the theoretical foundation for the musical analysis of digital games. In this case, the musical referencing system in question cannot be reduced to the relationships between musical works, or to recordings made available through a given medium (such as a CD, a vinyl record, or any other form of reproduction format). All these musical encounters contribute to the formation of musical meanings revolving around *Thumper*. Building on previous research, Reid applies Latourian Actor-Network-Theory to musical listening in the context of digital game culture: "Expanding ANT to incorporate musicology, [van Elferen and Blake (2014)] contend that musical and non-musical actors such as melody, rhythm, timbre, harmony, articulation, and technological mediation all converge in musical encounters, and all have an impact upon the listener's subjectivity" (Reid, 2018, p. 284). Digital games are mediated by specific technologies, serving as non-human participants in a network. The construction of musical meaning around Thumper is also manifested in other forms of musicking: the band Lightning Bolt and its musical production are in fact also manifested outside media objects. Specifically, the band is also known for employing ample and explicitly improvisational moments during their live and recorded sessions. In a 2005 interview, drummer and vocalist Brian Chippendale describes their recording methodology: "I think some improvised stuff has snuck into every album, but this one [*Hypermagic Mountain* (2005)] has more, and it's featured more" (Licht, 2005).

For this reason, we are not necessarily only considering stable and well-determined musical compositions here, let alone potential recorded versions included in a media object. Musical literacy includes not only recordings, but also the larger pool of participation forms, as discussed in Chapter 2. In the case of *Thumper*, this aspect is of primary importance, since the digital game structures a web of musical values and cultural connections, that also involves musicking situations such as live performances. Moreover, specifically in the context of digital games, ergodicity further problematises the nature of literacy, as the player is always called upon to express a degree of musicality, rather than just "react" to a musical input or recognise certain musical structures and compositional tropes in context.

In this regard, *Thumper* also presents implications with regards to the intersection of ergodicity and musicking. According to Kassabian & Jarman, in music games "the majority of gameplay activity, and if applicable, winning and losing, are predicated on the ability to make good sound/musical choices" (2016). The authors acknowledge the difficulties of discerning what constitutes a "musical choice", ultimately limiting it to an action that involves discernible music making. For example, answering a music quiz (or acting in any way that does not immediately produce musical sounds) should be excluded from the definition. If instead, the example set forth is "a quiz in which players are engaged in music-making, through the act of humming, […] this engagement would, by our definition, fit the category of music game" (Kassabian & Jarman, 2016). The latter definition is applied to the digital game *Tap Tap* (Tapoulous, 2008).

> "Here, a Guitar Hero visual format is used, with three lines of dots to tap on-screen, and music plays in the background […]. Importantly, though, the dot-tapping process – while it may be in time with the music – does not interact directly with the music, or claim to, and as such it is harder to characterize the tap tap games as music games" (Kassabian & Jarman, 2016).

This account of "music game" focuses on direct musical interaction, characterising music games as affording direct musical interaction. While this definition of "music game" focuses on tangible music making, Miller concentrates instead on contextual elements (2017, p. 93). This class of examples differs from that considered by Kassabian and Jarman, as arguably, in dance games players do not "interact directly" with music, applying a different form of musical engagement. Miller does not relate dance games to a musical discourse due to their direct interaction with music, but also for the musical literacy in place (be it connected with media or other forms of musicking).

Thumper employs a system that is vaguely comparable with *Tap Tap*, in which the player is asked to respond to musical cues with swift action. While it is not the intention of this paper to provide a formal definition of exactly what a "music game" is supposed to contain in order to qualify as such, the range of possible musical participation forms that players are involved with in the aforementioned examples will be considered as musicking: *Tap Tap*, dance games, and *Thumper*. In all these cases, the players are musicking, while concurrently exerting ergodic effort in order to traverse the digital game. To qualify as ergodic effort, there is no specific requirement for a direct relationship between the immediate material effort of the player, such as pushing a button, and the subsequent feedback (in this case, the emission of musical sounds). As mentioned in this dissertation, ergodicity is not only to be understood as direct action, but also as a predisposition for action and a cognitive activity. *Tap Tap* and *Thumper* alike heavily rely on such predispositions in an explicitly musical context.

Thumper, and its range of musical referencing, is also a valid example of how musicking literacy in digital games extends over a wide range of cultural aspects. The experience of playing *Thumper* can actually be enriched with further meanings according to our experience (or knowledge) of different musicking situations, specifically situated within live musical performances.

8. Conclusions: in search of the music game

The scope of this chapter has been that of discussing available interpretations of the music game genre, comparing and contrasting these with the context of musicking established by this dissertation.

It is argued then, that the "music game" category cannot be maintained in tact, and that the methodologies required to determine what a genre or a category is in this context, might initially be problematic. If the solution lies in locating a somewhat coherent set of contents, it has been shown that the musical content of digital games might - quite literally - be the same for games that are overtly musical and those that are not. It has been maintained throughout that music is not a piece of content or a work, but rather a knot of possible forms of participation in musical performances, and included within the umbrella term of musicking. A category such as "musicking games" is also impossible to maintain: the potential relationships that digital games can have with music are too varied and nuanced. Musicking instances are found in games that are profoundly diverse in nature. These instances include aspects connected with ergodic effort as well as the complex web of musical references that constitute the contextual (and paratextual) level of analysis.

Musicking conceptualisation is therefore compatible with the concept of musical media literacy (van Elferen , 2016), as it refers to the contextual elements at stake during gameplay. References can be drawn from other audiovisual media or musical cultures and contexts at large.

The term "music game" is meaningfully used within the journalistic and industrial discourse that surrounds digital games, in order to give a general indication as to which digital games are primarily musical in nature. This discourse has been utilised during the first part of this chapter, to address games that fit this generic understanding. In this regard, *Taiko no Tatsujin* proves to be a valuable example. The game presents evident, explicit music-making features, comparable to those of other popular examples such as *Guitar Hero* and *Rock Band*. In these examples, the player engages in actions that are traditionally musical, such as playing a musical instrument. The repertoire and the musical culture that *Taiko no Tatsujin* references, provides examples of the musical variety available for possible referencing by digital games. The game is in fact based on musicking situations that are not based on established, textualised compositions, but rather on performance practices that feature musical tropes from an oral tradition. In a fascinating cultural twist, the game creates a clash between the traditional values of the taiko timbre and modern musical compositions that are not usually associated with this particular instrument.

If *Taiko no Tatsujin* remediates an already existing musical situation, primarily musical games also seem to be capable of creating new occasions for generating musicking. Numerous examples commonly understood as "music games" do not remediate any explicit music-making activity. Rather, they present non-musical semiotic situations in

conjunction with forms of musical input, in turn rendering new musical opportunities tangible. *BIT.TRIP RUNNER*, *Rhythm Tengoku*, *Thumper*, and many other examples, constitute venues of exploration of the intersection between ergodic effort and musicking, which is manifested when the act of traversing the digital game text is directly linked with musicking.

In order to give further context to the elusive "music game" categorisation, attention was also given to the category of "non-music games": examples that feature music, but that are not evidently and prominently musical in nature. The analysis of the musical content of this large pool of examples reveals that textual analysis of musical composition in games does not help in determining the possible characteristics of music games. In fact, the very same musical compositions can be indifferently included in games, regardless of whether they are primarily musical or not. Moreover, structuring hierarchies of importance between the aural and visual components of digital games is therefore an exercise to be conducted by mixing the theoretical tools of ergodicity and musicking with available literature concerned with listening attitudes and modalities.

The new musicalities of digital games such as *Rhythm Tengoku* and *Thumper* have been analysed in order to clarify that musical "interaction" is an insufficient concept in determining or analysing the musical value of player input or of digital game content. Accounts have been presented that perceive games featuring direct interaction with the musical content as "music games"; this is expanded on within the context of this dissertation, when considering the fundamental aspects of ergodicity while accounting for the cognitive predisposition for action involved in ergodic engagements. The frame of ergodicity is thus to be preferred to the term "interaction", which proves to be a term with too many connotations for it to be valuable as a source of analytical insight. The

concept of ergodic musicking, it is hoped, has the potential to deepen and diversify understanding of in-game musicking, perhaps rendering it possible to place examples that are arguably prominently musical, such as dance games, under one theoretical umbrella.

Chapter 6

Ergodic musicking

1. Introduction

Thus far, clarification has been offered into how the identification of the formal characteristics of "music games" can be problematic, and how this can lead to the exclusion of evidently musical examples. Considering "music" as a musical text, or as an action that is only related to producing musical sounds, fails to account for the variety of new musicalities that digital games feature and afford.

To overcome this theoretical obstacle, this chapter will serve to delineate the possible characteristics, applications, theoretical borders, and limits of a new form of musical participation: that of ergodic musicking, defined here as a form of ergodic effort, in which the non-trivial act of traversing the media text involves degrees of musical effort. At the same time, ergodic musicking is also a form of musicking, in which the participation in a musical performance involves exerting ergodic efforts.

Section 2 of this chapter will situate ergodic musicking within Ludomusicology, understood as the discipline concerned with the study of music in digital games and the relation between play and music. The section will also address the scope and subject of the discipline.

Section 3 and 4 will be dedicated to ergodic musicking manifestation during engagements with cybertexts and cybermedia. Section 3 will clarify that ergodic musicking does not usually take place in the original examples of verbal cybertexts, such as the text game *Adventure*, provided by Aarseth and discussed in Chapter 2. In order to thoroughly investigate cybertexts, it is fundamental to address the "musical analogy" between musical instruments and textual instruments, as noted by Eskelinen (2012, p. 381). After completing this overview, section 4 will focus on the larger category of cybermedia, "a more general class of phenomena to which games belong" (Aarseth & Calleja, 2015). Cybermedia is understood as an evolution of the ergodic paradigm, and the objects that actually afford the possibility for ergodic musicking engagement. Cybermedia is not medium-specific, and can be either digital or non-digital. In order to narrow down the number of possible examples, ergodic musicking will be discussed in relation to digital games, the main application of ergodicity considered by Aarseth and Calleja. Examples related to the interrelations between musicking and ergodic efforts have already been mentioned and discussed in the previous chapter, but it will be necessary to expand on the subject. Having identified ergodic musicking, it may now be possible to offer a contribution when addressing key issues in the current literature concerned with the analysis of music and digital games, such as the theoretical conundrum encountered while trying to define the "music game" genre, as discussed in the previous chapter. The expansions to the concept are, at this stage, overdue: in fact, so far only instances of ergodic musicking in relation to a few specific examples have been considered. Countless other games could be mentioned for the purpose, as the pertinent features are by no means rarities. However, the selection presented so far has been made in order to pinpoint the differences found in the semiotic, representational layer of so-called "music games". The examples have shown that games that are predominantly musical do not necessarily remediate conventional musical situations.

Moreover, digital games like *Thumper* or *BIT.TRIP RUNNER* show common features of the sub-genre of music games addressed as "rhythm" games. This generic, informal classification is understood somewhat differently from that of "music" games. Essentially, the classification extrapolates one specific characteristic from the spectrum of musical features: rhythm. We could intuitively argue that melody or harmony, traditionally understood as formal components of music, are generally present in different shapes or forms in "rhythm games". However, examples from this sub-genre rarely seem to present overtly musical situations in their semiotic layer. In other words, a full, comprehensive spectrum of traditionally musical actions, such as playing a musical instrument, is not represented in these examples. The agency of the players is therefore not intuitively connected with a clear-cut musical activity. A good example of the heterogeneity of situations found in "rhythm games" is *Rhythm Tengoku*, with its overtly cartoonish vignettes featuring ping pong matches, machinery being operated, and so on. Crucially, the situations represented rarely possess any commonality with concerts, performing, or other traditional musical happenings. "Rhythm", in this context, ends up serving as a catch-all term, somewhat placing musicking within non-traditional contexts.

This discussion clarifies that the status of these examples as musical works or musical objects is not limited to simulation, mimicry, or explicit remediation. However, other games such as *Rock Band*, *Guitar Hero*, or *Taiko no Tatsujin* act conversely, and are explicitly musical in that they remediate a clear instance of musicking: that of performing in a musical context, by using a musical instrument. Their status as musical objects is therefore far less problematic.

To introduce the concept of ergodic musicking, focus will be placed on one of the latter examples.

The *Rock Band* franchise was born in 2007. It was developed by Harmonix, the studio responsible for the highly popular and successful *Guitar Hero* franchise. *Rock Band* can be credited with having introduced increasing opportunities for musicking within the format of mimicry or simulation to the "music game" genre. In fact, if *Guitar Hero* was based on the flamboyant guitar style of rock "heroes", the idea behind *Rock Band* was to apply the same popular gameplay to other canonical rock instruments (drums, bass guitar, etc.).

When *Rock Band* was released, I was already an avid *Guitar Hero* player, having gone through all the different iterations of the franchise. To an extent, my musical media literacy was informed by these games, as I found familiarity and appreciation in some of the metal and rock bands I heard. It was also be an opportunity to discover new bands, or to experience well-known classics. In any case, I rediscovered much of the content I already owned through *Guitar Hero*. My experience, in that regard, was therefore similar to that of many other players of the game.

However, my musical literacy was not only limited to media; I was also an enthusiastic student of the drum kit instrument, an activity to which I devoted much time to. With the aid of different instructors, I went through several of the music books familiar to drummers worldwide, covering topics such as music theory, limb coordination, hand

technique and jazz improvisation. I was also involved with a number of bands, playing gigs and recording.

Given this description, it seems likely I was set to be a somewhat ideal *Rock Band* player, being really immersed in the range of references and cultural products featured in the franchise. Most importantly, I was very excited about the opportunity of playing drums in a ludic fashion, making some use of my competence in a new setting. *Rock Band*, in fact, prominently featured drums: a plastic instrument, similar to a regular electronic drum kit, was bundled with the game. The kit included four pads and one kick pad, simulating a bass drum. As with *Guitar Hero*, the player has to follow visual cues displayed on screen in sync with the music. Rather than representing buttons on the frets to be played, the cues indicate which drum pads to hit with the sticks. Also, a comparable "heroic" rhetorical discourse is embedded in this practice, glorifying the performances of famous rock drummers.

However, my first experience with *Rock Band* was somewhat unsettling. In my first session, I went through the extensive song list, quickly finding a personal favourite: Nirvana's *In Bloom*. It is a song I was very familiar with: I had played the song with bands, learnt its structure, and mimicked every drum fill essentially *ad nauseam*. I knew the song and its nuances by heart. But the experience of playing it with *Rock Band* turned out to be distinctly different - perhaps, even alienating. Although I was actually capable of performing a competent rendition of the drum performance while playing with real bands, the digital game would require me to follow a musical score that I found overtly simplified, and that possessed very little musical meaning. Essentially, I felt that the transcription eliminated the complexities of playing drums, especially the intricacies of independently articulating the four limbs to play different patterns. Although

simplifying the matter in order to appeal to an audience arguably made up of non-drummers is understandable for the sake of usability, the rendition of the style of Nirvana's drummer, Dave Grohl, felt unrepresentative of the original, and ultimately uninteresting. Trying to change the difficulty level created new and different problematic topics, as I found myself debating the transcriptions, sometimes disagreeing with how the game developers interpreted specific passages. I was also hitting the pads far too hard, as I was used to hitting drums hard and loud as appropriate in a rock context.

While this is only my experience of it, it is definitely easy to find forums or blog posts debating similar points related with *Rock Band* drums. Interestingly, these discussions did not necessarily take place only on forums dedicated to digital games, but also on music-oriented sites. A good example of this is the *Drummersworld.com* forum. On a thread entitled "Rockband Drums: good practice?" (2008), several participants pitch in on the topic, debating how playing the game *Rock Band* translates into effective drum practicing. Opinions abound: user *nfiora* notes that "Rock Band drums are nothing like real drums", possibly hinting at the different material components and physical feedback, while others agree that it makes for good practice with a metronome. Several users, however, describe problems that are similar to those I encountered. User *Jonesy* comments "it leaves out the important parts like dynamics and total 4 way [limbs] coordination". Charts are also contested; user *JanoHatesDrumming* comments that "if your [sic] trying to learn a song from the game the charts are often time not all that similar to the actual notes for the song". Finally, *drumguyfromWI* offers a rather comprehensive account of such discrepancies: "You should see my drummer friend play the drums on Rock Band. Quite amusing. Even though I and others have tried multiple times to explain it to him, he doesn't seem to understand that you have to follow the

colored dots on the screen in order to not fail the song. So he'll play a song that he normally plays on (real-life) drums, and tries to make up his own fills and plays the song as if he were playing it with his (real-life) band. Needless to say, he fails almost every time […]. Also, he's a super-heavy hitter, and he plays the Rock Band controller like it was his real drumset...he breaks sticks playing the game, and even once broke one of the pads on the controller".

These examples seem to corroborate my personal idiosyncrasies, but without adding further detail to this example, it is noteworthy how our musical media literacy is at stake in a number of different ways in musical examples that are based on mimicry. *Guitar Hero* seemed to have successfully done away with such complexity, as the act of playing the guitar controller bears much less resemblance to playing an actual guitar.

In *Rock Band* instead, the ergodic effort demanded by the game text connected with a significantly different kind of musicking – a musicking that I was apparently not fully involved with, or that somewhat contrasted with my musical upbringing and practice. My musical literacy, therefore, was clearly not a neutral or entirely positive factor; instead, it had to be intended as a knot of knowledge and practices that would be actualised within the ergodic effort hereby demanded in ways that seemed unpredictable, or even problematic.

This example of contrast between ergodic effort and musicking culture is telling in highlighting what ergodic musicking can involve in specific examples. Identifying ergodic musicking can be difficult, due to the number of different variables at stake in the analysis of digital games – but it exists, influencing our interplay with musically rich digital games.

2. Musical play: on Ludomusicology

As mentioned, ergodic musicking formally establishes a connection between ergodic efforts and musical behaviours. Both entities are abundantly debated in their own right in Chapters 2 and 4, and are theoretically placed in fields of study that have identified contiguous concepts. As such, ergodic musicking is not born in a vacuum. A series of phenomena close to it, and that to an extent resemble it, have already been identified, and a variety of research frames such phenomena within the theoretical construct known as ludomusicality. The following section will look into this concept and its main features, in order to provide context and history to ergodic musicking, which is intended as a contribution to the field of ludomusicology. Ergodic musicking presents traits that are not necessarily already considered within ludomusicology, and this section will therefore help highlight what is unique to the ergodic musicking concept proposed here.

In recent years, the term "ludomusicology" has become popular within fields of study concerned with the analysis of sound and music in relation to digital games. It is sometimes used to indicate the field of study as a whole; every application of musicological theory to digital games could, at times, be referred to as ludomusicology. For what it is worth, the Wikipedia entry of the term is as follows: "Ludomusicology (also called video game music studies or video game music research) is a field of academic research and scholarly analysis focusing on video game music, understood as the music found in video games and in related contexts" (2018).

However, the "ludomusicology" moniker has a short history, which illustrates that the term can actually have more specific connotations. In the introduction to their edited book *Ludomusicology: Approaches to Video Game Music*, the authors elaborate: "This book suggests a variety of new approaches to video game music, but collectively we are more broadly concerned with the relationship between music and play – a domain of research that is now commonly referred to as "ludomusicology"" (Kamp, Summers, & Sweeney, 2016, p. 1). Ludomusicology, therefore, is in this case not necessarily structurally focused on the analysis of digital games and their musical content, but could theoretically include analyses of any example that presents music and play characteristics.

Hart acknowledges the dual nature of the term: "Some scholars […] use it to refer to relationships between music and play in a range of contexts. The term is also used more specifically to describe the study of video game music, incorporating musicological, music theory, and sociological studies of music in video game and related contexts" (Hart, 2018, p. 3). Ludomusicology, in this sense, also explores film music extensively (Whalen, 2007; van Elferen, 2012, p. 100-127), adapting central concepts from film studies, such as the issue of diegetic/extradiegetic space (Collins, 2008, p. 125-126; Grimshaw & Schott, 2007; Jørgensen, 2007, 2011) or notions of synchresis (Collins, 2013, p. 32), as discussed in Chapter 3 of this dissertation.

Hart identifies a distinction between the two understandings of what ludomusicology precisely indicates. On one hand, it is understood as the discipline that studies music in digital games; on the other, it is the study of music and ludic play - i.e. not necessarily focusing on digital games, but also on any other instance of ludic play.

The difference in focus, most importantly, would also indicate significant variations in the theoretical toolset that substantiates the academic focus of ludomusicology. This difference has been detailed by Moseley: "To the best of my knowledge, the digital-game researcher and music theorist Guillame Laroche coined the Graeco-Latin word "ludomusicology" in 2007. Whereas Laroche's deployment of the term has reflected a primary interest in music *within* games, I am more concerned with the extent to which music might be understood as a mode of gameplay. In my view, ludomusicology involves the study of both the musically playful and the playfully musical" (Moseley, 2013).

As such, the ludomusicological practice identified by Moseley is not focused on the analysis of musical compositions found and deployed in a different fashion in digital games – in this regard, it is a perspective compatible to the one presented at large in this dissertation.

Specifically, though, Moseley (2013; Moseley & Saiki, 2014; 2016) highlights and documents examples of intersections between the ludic and the musical. Such occurrences are considered as "ludomusical" instances. These activities share the common elements of being musical in nature, while at the same time being initiated by play. The shift in focus between a discipline called "ludomusicology" and a certain characteristic called "ludomusical" is significant. In fact, it gives a different scope to the research objectives: we should now consider ludomusical features as a characteristic to be identified and researched, as opposed to a field of study with a much larger scope.

The author notes the correspondences between play and music: "The verb "to play" connotes a relational mode at the same time as denoting a particular type of ludic action […]. Correspondingly, music is not merely the outcome of a certain type of play, but

constitutes a set of cognitive, technological, and social resources for playing in and with the world through the medium of sound, its mechanisms, and its representations." (Moseley, 2016, p. 16).

Play is confirmed as ambiguous in nature. Not only is its range of meanings within the context of ludic complex; play also has a distinct musical connotation. "Play, in turn, becomes the means by which such musical behaviour is made audible. In these multiple senses, play activates music via patterns of actions that can be identified as *ludomusical*. Within (and against) the constraints that regulate it, ludomusical play fluctuates between the preordained and the unforeseeable, emerging in relation both to the performance of familiar cultural scripts and to the imperative to improvise" (Moseley, 2016, p. 16).

A playful attitude can therefore be manifested not only within the confines of "scripts", musical scores, or other forms of work, but also (and perhaps especially) in improvised musical forms, that structurally exist without notations and do not aim to become objectified. If we clarified that ludomusicality points to examples of musical actions and musical behaviours, it can also be described as certain musical compositions that show ludic features.

There are a number of possible examples that may fit this description; Moseley discusses in detail, for instance, "the playfulness of Mozart's music" (Moseley, 2016, p. 212), as documented in a few of Mozart's musical scores. By analysing the cadence of the Sonata for Keyboard and Violin in B at, K. 454, Moseley highlights what he refers to as a "ludomusical obstacle": "a preceding *inganno* [deceit] (mm. 253–54 and 261–62), which […] assumes the guise and function of the *cadenza finta* ("deceptive cadence") as figured

by the Neapolitan partimento maestro Nicola Sala" (Moseley, 2016, p. 195). The musical situation is also given further context when noting that the composition is made for a duo setting, in which violin and piano playfully engage in a series of *inganni*: alluding to a section that seems to end the composition a few times, before finally doing so. As such, the composition shows traits that are playful and ironic, anticipating but repetitively unfulfilling the expectations of the musicians and of the audience.

Digital games are amply featured as examples of the ludomusical paradigm. "Ludomusical [is] a term that indicates the playfulness to be found at the manifold intersections between music, toys, and games" (Moseley & Saiki, 2014). The performance aspect that is prominent in digital games, together with the musical nature of the media content, suggests specific connections: "Insofar as player input is routed through fingers and thumbs (via controllers and discrete system) and conveyed through gestures (relayed by Nintendo's Wii controller or registered by Microsoft's Kinect multimedia sensor) or even vocalizations (captured by Kinect and DS), digital gameplay has more to do with musical performance than with spectatorship" (Moseley & Saiki, 2014).

Given what has been presented so far, ludomusical – as prominently outlined by Moseley – specifically indicates a variety of possible instances. It is a mode of being musical by playful means, be it by composing musical pieces in ironic fashion, or by playing digital games with distinct musical components. It is also a property of certain musical objects or compositions. Whether digital or not, such understanding constitutes an expansion to the application of the term, which is thus no longer confined to "a mode of gameplay" (Moseley, 2013).

Given that the concept of ludomusicology and of ludomusical activities have been outlined so far, it is important to consider how instances of ergodic musicking contribute to these concepts. As explained in section 7 of Chapter 2, ergodic efforts are not necessarily related to play, although, of course, one might exert ergodic effort while being playful. Playfulness is an attitude, or "a way of engaging with particular contexts" (Sicart, 2014, p. 21), and as such can be ubiquitous and ephemeral, manifesting itself in unpredictable ways, according to personal preferences or situations. Playfulness has also been described as a paratelic mindset, which can be applied during ergodic engagement.

Ergodicity, therefore, is not a substitute for play, and it cannot be applied in all the different contexts in which play takes place. As such, it is a much narrower concept. It is not a property found outside ergodic media; it is specific to them. Subsequently, ergodic musicking can only be meaningfully applied to examples that are already compatible with the ergodic paradigm.

Therefore, if some of the ludomusical occurrences described by Moseley constitute cases of ergodic musicking, others do not.

In this sense, the examples are fairly clear: Mozart's compositions, as described by Moseley, possess ludomusical qualities, as they are capable of stimulating a playful interplay between the composer and the performers. The ludomusicality can also be experienced by the listeners, as the compositions play with their expectations. However, these compositions are not navigated by means of ergodic efforts. Even if the latter seems to be an unproblematic point, it is worthy of further clarification: the efforts exercised by the performers in reading and interpreting the musical texts are certainly not ergodic, in that these texts do not have the cybertextual qualities described by

Aarseth and discussed in Chapter 2. Mozart's compositions are a more standard example of musical text, with certain specific characteristics described by Moseley. They do not reconfigure themselves according to user input, nor do they afford rearranging. Such is the case, for instance, of various examples of aleatoric or indeterminate compositions,. As discussed in Chapter 4 with reference to Stockhausen's *Klavierstücke XI*, the performer does not reconfigure or recombine the material medium, which remains unaltered during use. Rather, the performer is allowed to read different sections in any preferred order, generating different performances.

Other examples mentioned by Moseley have cybernetic qualities and are navigated by means of ergodic musicking. For example, Moseley describes a pivotal moment in the digital game *The Legend of Zelda: Ocarina of Time* (Nintendo, 1998). In this example, the protagonist of the digital game, Link, must learn different songs and perform them on a magical musical instrument – the ocarina of time itself. Each song learned and subsequently performed renders desirable outcomes, which are fundamental to accessing different sections in the game. Moseley describes *Ocarina of Time* as follows:

> "In Nintendo's game, the ocarina's music is instrumental insofar as it is composed of discretely pitched elements that enable the player to accomplish gameplay objectives on behalf of the protagonist Link via digital permutations remembered and recreated via the manipulation of a five-bit serial interface" (2016, p. 245-246)

In this case, five-bit refers to the number of possible input choices available to the player. In this case, the player of the game has to exert ergodic effort in order to traverse the digital game media at hand. The player will do so by means of musicking, participating in a musical performance that requires certain musical patterns to be memorised and subsequently executed where appropriate. It is an interesting example

of ergodic musicking, due to its extemporaneous nature. Even if central to the economy of the digital game as a whole, this specific example of musicking within *The Legend of Zelda: Ocarina of Time* is occasional and limited to specific, distinctive moments. The rest of the digital game, in fact, features plenty of non-musicking activities that are conventional for this genre of digital games, such as fighting monsters, collecting goods, solving puzzles, and so on and so forth.

It is important to note that the latter example is therefore compatible with both theoretical concepts: depending on the academic context, the ocarina example can serve both as an example of ludomusical instance or of ergodic musicking. This serves to prove that the two concepts are not mutually exclusive or in opposition, but rather they have a different scope. As such, they can be productively used in tandem, allowing for a granular analysis of certain musical instances.

The following section of this chapter will further delineate where ergodic musicking applies and what the theoretical perimeter of this concept is.

3. Ergodic musicking and the cybertext

So far in this chapter, a basic outline of the concept of ergodic musicking has been offered, situating it within an academic discourse that is contiguous to it. Ludomusical aspects have been introduced, clarifying the relationship between the two concepts. Such a relationship is not obvious, as ludomusicology in itself is already understood according to two predominantly different paradigms. The introduction of the ergodic

musicking concept is intended to bring a new theoretical tool to the field, a tool that – unlike ludomusicological features - is exclusively related to digital game examples.

Here, ergodic musicking will be defined in light of the two theoretical concepts it stems from: ergodic effort and musicking. In synthesising these two instances, a theoretical operation has been undertaken that still requires further scrutiny. After all, these theories have been developed within substantially different disciplines, and they have been used to analyse objects, actions, and social situations that have little in common. For this reason, it is necessary to devote further attention to harmonising the two; this operation clarifies what ergodic music is and on which occasions it applies.

Ergodic musicking will be situated within ergodicity; a concept that is deeply connected with the characteristics of cybertext. The paradigm of ergodic media introduced in Chapter 2 is a theoretical tool largely applied in different areas of Game Studies. Within the chapter, however, not all relevant aspects relating to such a debated theoretical tool were presented. Rather, focus was placed on the cybertext concept in order to identify how the field of Game Studies at large has identified an actual material object as its subject of study: a "text" of sorts. The ramifications of this paradigm were focused on, in order to show how these perspectives have been assimilated into the sub field of Game Studies: the study of sound and music in digital games. Musicological approaches to digital games were shown to often focus on music as a "text" (or an object) subject to formal analysis and found within the digital game media package. But the status of digital games as objects, in a broader sense, is not an unproblematic topic. Game Studies, for instance, has long debated the status of these products as a form of narrative media, or as objects capable of incorporating or even generating storytelling (examples abound: (Murray, 1997; Eskelinen, 2001; Juul, 2001; Jenkins, 2004) - the list goes on).

Ergodic musicking, however, is intended as a phenomenon that arises during actual navigation of certain cyber-objects. A range of digital game examples to which ergodic musicking applies have been listed. Even if the formal components of digital games may be shifting and hard to identify, the examples examined so far share the common trait of having cybernetic properties in relation to ergodic musicking. They are systems in which an information feedback loop takes place. Of course, all cybertexts show this defining quality, but not all feature prominent musical aspects. Therefore, in these latter cases, no ergodic musicking can possibly take place.

Given this, examples of digital games in which ergodic musicking is eventually manifested should reasonably fit within the paradigm of cybertextuality. That does not imply that the examples presented so far should be interpreted solely as "musical cybertexts". The fact that these examples have musical features and cybertextual properties does not encapsulate every possible analysis, reading, or interpretation of such objects. Rather, these objects are considered as digital games (given all the possible interpretations of this generic term) with significant cybertextual and musical qualities. In other words, the objective of this dissertation is not to identify a new kind of object, by perhaps detailing its characteristics and formal components, but rather to describe a new kind of musicality and a specific example of ergodic effort. The justification for this theoretical stance is to be found within an academic perspective that does not identify a consistently coherent medium in digital games (see for instance the already mentioned (Apperley, 2006)), and as such a coherently consistent object with fairly delineated structural characteristics. Rather than trying to define the properties of these manifold objects, this chapter focuses instead on a set of activities undertaken by digital game users.

With relation to the possible similarities of cybertexts and musical instruments, Eskelinen notices a "musical analogy" between musical instruments and textual instruments (2012, p. 381). Within this line of understanding, a textual instrument is considered a tool with characteristics that are comparable to those of a cybertext. Wardrip-Fruin defines a textual instrument as follows: "a tool for textual performance which may be used to play a variety of compositions. Compositions consist of "a body of text (and/or means of acquiring text) and a set of 'tunings' for the instruments used" (ibid.)." (Wardrip-Fruin, 2003 quoted in Eskelinen, 2012, p. 369). It seems suggestive to substitute the word "music" into this sentence instead of "text". In this hypothetical case, it would read as follows: "a *musical* instrument is a tool for *musical* performance which may be used to play a variety of compositions". The suggested musical analogy would not only be between musical and textual instruments, but also between the kind of action these instruments facilitate or require from their respective users. Specifically, textual instruments seem to be more prescriptive in that regard, while musical instruments are supposedly more "open-ended". Moreover, according to Eskelinen, the skill level necessary to properly engage with a musical instrument is far higher, affording a deeper learning trajectory: "thousands of [musical] compositions are available to be played by instrumentalists who have sufficiently mastered their instruments, and that is one of the crucial motivational factors that encourages instrumentalists to continue learning" (2012, p. 382). Music seems to be understood in this context as narrowly related to musical texts – a perspective that is not compatible with the musicking paradigm maintained here. But regardless of this line of criticism, Eskelinen suggests an analogy, but not a possible overlap between these two; that is, he does not explore possible instances of musical activities that might happen while

operating cybertexts: the latter is exactly what is considered a form of ergodic musicking.

"Texts", as discussed in this section, are not necessarily the most natural territory in which ergodic musicking takes place. The next section will analyse the larger frame of cybermedia, and how ergodic musicking is observable within such a frame.

4. Ergodic musicking: from cybertext to cybermedia

In this section, the evolution of the ergodic paradigm will be addressed, reframing the localisation of ergodic musicking to focus on the concept of cybermedia (Aarseth & Calleja, 2015).

Chapter 2 presented ergodic effort and its realm of application. More specifically, the most common contexts in which ergodic efforts have been identified within the relevant literature were highlighed. Aarseth originally introduced ergodic effort to identify a new kind of activity performed by users of cybertexts; the concept has been since been widely adopted by Game Studies to indicate the multiplicities of activities undertaken by players of digital games. Moreover, ergodic efforts are not limited to tangible and physical actions, such as operating an input device, but are also inherently cognitive, indicating a predisposition to action (Calleja, 2011, p. 41).

By analysing the initial formulation of ergodicity, very little ergodic musicking can possibly take place. In fact, in *Cybertext* (1997), Aarseth consistently used examples where the text in question is of the literary nature. The cybertexts considered in that

context do not usually have musical features, and as such ergodic musicking cannot take place. Of course, there may be cases of cybertexts that occasionally feature musical connotations. For example, a hypothetical digital or analog cybertext might contain references to music, for instance by presenting a narrative situation in which the protagonists play, listen or engage in any way with music. Such cybertext could feature musical references that would likely tap into the musical literacy of the user. This can happen theoretically even if the cybertext in question does not make use of audio as an input and/or output device. These theoretical situations would, at best, most probably constitute liminal examples of ergodic musicking.

More meaningful examples can certainly be identified within the larger frame of cybermedia. In recent years, in fact, Aarseth and Calleja have referred to games as a subset of a larger typology of objects called cybermedia. The latter refers to any kind of medium, be it digital or non-digital, with cybernetic qualities. Cybermedia is understood as "a more general class of phenomena to which games belong" (Aarseth & Calleja, 2015). The authors propose a model that is constituted of four elements: "the representational (or surface) sign, the mechanical system, the material medium and the player" (2015). Musical values can potentially be discussed in relation to any of these elements; all four of them will now be discussed in detail.

First is the representational (or surface) sign. Musicking can be involved as a system of signification, part of the semiotic operation undertaken by players when interacting with a digital game. This is a very common occurrence: for example, a musical piece can be analysed as a sign within a system of significations. Such a research operation would be based on semiotics, a discipline that is not strictly related to the theoretical tools

deployed in this dissertation to analyse music. Nonetheless, nothing forbids applying this discipline to digital game musicking.

Also, the mechanical system of cybermedia can be intertwined with musical instances, which is evident in musically rich examples such as the aforementioned "music" or "rhythm" games. In these examples, musical values are directly connected with the mechanical operations of the digital game in question, which has been designed specifically to work in a musical context.

The material medium can take advantage of acoustic outputs, from standard stereo speakers to surround systems, as most often happen with digital games, or input devices can be used in musically meaningful ways. Thanks to the multi-media nature of digital games, material objects are used in a musical fashion, within different genres of digital games. The material medium of cybermedia can also be non-digital, such as in the case of board games. Analog cybermedia has less musicking potential in general, as it is not an audiovisual media, and as such, it generally does not have musical content. As mentioned before in relation to literary cybertexts, such situations could theoretically be considered as liminal examples of ergodic musicking at best.

Finally, the player is at the centre of musicking, being involved in a multiplicity of ways in musical situations. Listening to musical pieces, interacting with them in various ways, and being intertwined with a musical cybernetic feedback loop implies varying degrees of musical activities.

All these four occurrences are not rare, and similar examples have been discussed throughout this dissertation. Since performance is the primary subject of musicking, focus is centred on the fourth element described: the player. Ergodic musicking is in fact a form of ergodic effort exerted by users of digital games.

As illustrated above, music is omnipresent in cybermedia. Once again, the problem of objectification discussed in the previous section of this chapter in relation to cybertexts once again presents itself: it is, however, of little importance to describe hypothetical objects such as "musical cybermedia". Musicking is oblivious to these narrow categorisations, and it is found in widely different kinds of cybermedia. If the literary, verbal cybertext is barely musical, cybermedia is conversely and overwhelmingly so. In other words, if the "musical cybertext" hypothesis only consisted of a few meaningful examples, the "musical cybermedia" hypothesis could potentially include the vast majority of cybermedia, shedding the confines of digital games to include digital media objects in general. Neither frame is optimal for a research that aims to identify meaningful, productive results.

It is not the material object that is of interest in this context, but rather the musical action available to the players: the ergodic musicking effort.

Now that the relationship between ergodic musicking and the cybermedia concept has been debated, the this will now illustrate in which cases ergodic effort and musicking practices blend together to manifest forms of ergodic musicking.

5. Ergodic musicking within ergodicity

In this section, clarification will offered into how ergodic musicking can be understood as a form of ergodic effort. Ergodic musicking, in this regard, is intended to retain the characteristics of ergodicity. The "effort" in ergodic musicking is related to musical forms of activities. It is in fact a new example of musicking, in which a distinct type of effort can be observed; and at the same time, it constitutes a distinct subset of ergodicity.

Ergodicity, however, is not born in a vacuum; rather, it is a concept rooted in multidisciplinary research, situated mostly within Literature Studies and Semiotics, and subsequently applied to Game Studies. It is not related to any musicological context of any sort.

As mentioned in the introduction to this chapter, the major structural aspect of ergodic effort is in the act of traversing a text or media of some sort. What "traversing" actually entails is not necessarily akin to what the term might suggest on first reading – for instance, the act of moving from one point to another within a digital environment. Rather, it is intended as a form of performance in which the user of a media operates not only in an interpretative fashion, but also engages with an object with mechanical properties. The ergodic performance will reveal the possibilities afforded by the media, and it will actualise one of its multiple possible outcomes during a specific session.

In examples of ergodic musicking, the performances of the user retain all of the above, but it is necessary to add a further layer of analysis to this performance to understand its musical values.

Let us return to the example of *Rock Band* mentioned in the introduction to this chapter. In that case, ergodic effort was exerted in order to traverse a digital game that required the performance of a Nirvana song with a given modality. Also, I had to use a specific material medium in the form of an input device modelled after an electronic drum kit. Such effort is comparable to that exerted by players to traverse practically any kind of digital game example possible. The strong musical element of *Rock Band*, however, distinctively interacted with my overall musicking practice. From buying and listening to certain records, to playing with a band, to learning how to play an instrument, to attending live events, and more, the crux of musical experiences that I had previously experienced was involved in that ergodic moment. I was therefore clearly performing musicking that paralleled the exertion of ergodic effort: the two phenomena are, in the relevant literature on the topics, quite separate, but they actually occur in conjunction on a variety of occasions.

What is interesting about the *Rock Band* example provided is that my own previous experiences related to musicking proved not to be neutral. In fact, they played a significant role in that specific, crucial session: the mechanical opportunities offered by the cybermedia were not harmonious with my musicking. Ergodic musicking, therefore, does not merely reiterate other forms of musicking, but is rather a new, original form of it. This experience offers new critical possibilities to read musically rich digital games, in light of the fact that understanding personal musicking practices renders possible different musicking-oriented readings of digital games. Someone who is musically literate with a certain musical instrument or a specific genre will therefore not necessarily automatically translate that literacy into a new form of musicking, such as the ergodic one. Also, players possessing substantial ergodic media literacy might be

able to apply that in a digital game that is based on ergodic musicking, thus having the opportunity to experience musicking.

Similarly, other examples previously mentioned in this dissertation are in fact opportunities for ergodic musicking: i.e. musically rich games.

Rhythm Tengoku, for instance, is a digital game with a fairly linear structure. The player has to tap with the correct timing; the input provided is tracked by the system, which evaluates the player's precision by assigning a numerical score. Ergodic effort is exerted to traverse the game, and during each play session, the digital game media is reconfigured. Ideally, a "perfect" play-through of the various sections of the digital game is achievable by an exceptional player. In fact, never missing a beat is possible, although certainly challenging: a quick search on YouTube reveals dozens of different "perfect" play-throughs. The ergodic musicking in action in this case may feed into conventional musical skills. For instance, the accuracy required by the game might be compared with that of a skilled percussionist, trying to play with tight metronomic precision. Of course, though, the performance of a musician incorporates many other different facets. If "metronomic precision" is positively rewarded by the cybermedia in question, its value in different musical situations is always derived from the context. In this regard, ergodic musicking is characterised as a musicking modality with certain characteristics, distinguishable from other musicking forms such as playing a musical score, improving with a musical instrument, dancing, composing, and so on.

In the case of *Rhythm Tengoku*, it is argued that the musical literacy of the player is harnessed in a distinctly different fashion. Unlike *Rock Band*, there is no explicit mimicry of other musical situations, since the digital game does not try to simulate performances

that are strictly musical. The ergodic musicking exerted in *Rhythm Tengoku* is therefore devoid of the kind of issues identified in the *Rock Band* example.

These two examples do not represent the full range of possible instances of ergodic musicking. Also, even if the relationship between ergodic musicking and issues related with mimicry and simulation have been emphasised, the concept remains open and applicable to different research purposes.

The main point of this section is to clarify that ergodic musicking is the ergodic-musical effort that players of cybermedia exert when the context is distinctively musical.

6. Ergodic musicking within the musicking paradigm

In this section, I will discuss the theoretical implications of ergodic musicking within the larger frame of musicking. This operation is similar to that conducted in the previous section, in which ergodic musicking as a form of ergodic effort was discussed.

Ergodic musicking is a form of musicking. The musicking concept discussed by Small is structurally a rather wide theoretical construct. Not only does it constitute a critique of the theoretical premises of Musicology and Ethnomusicology, but it also identifies a certain range of common actions that pertain to musical performances, and as such fall under the umbrella term of musicking. The actions identified are not only related to composing musical works, playing instruments, improvising musically, and other activities, but also to dancing. "[Musicking] is about people as they play and sing, as they listen and compose, and even as they dance (for in many cultures if no one is dancing

then no music is happening, so integral is dance to the musical act)" (Small, 1998, p. 9). When describing the interaction of music-playing and dancing, Small offers jazz tenor saxophonist Lester Young, "who liked to play for dancers because "the rhythm of the dancers comes back to you"" (2016, p. 81) as an example. In Young's experience, a creative relationship is established between jazz improvisation and dancing.

The presence of dancing in this list of musical activities can be underlined as an example of the vast scope of the musicking concept. Such an understanding of dancing frames its relevance as an action that is central in given musicking situations, rather than reducing it to a simple reaction to pre-existing musical content.

Other examples of musicking include simply attending musical performances, with all the accompanying permutations of potential behaviours from the audience in many possible contexts. In the case of a dancing event, attendees might be expected to participate in the dance, making them directly responsible for the content of the musical performance - and as such, they are not really a passive "audience". In the context of a seated audience, the attendees would nonetheless be musicking: maintaining silence throughout the performance, sitting in a certain order, and essentially choosing to be present there, constitute an element of participation. Moreover, enjoying a musical performance in any way is an example of musicking, notwithstanding the amount of tangible and visible action being performed. Musicking also involves a cognitive side, of which the act of listening might be considered one of its most prominent aspects.

It appears that placing ergodic musicking within this framework might be rather unproblematic. In fact, ergodic musicking is close to the more obvious forms of musicking action: those that are directly related to performing. Descriptions of play

sessions with musically rich games seem to conjure the intensity of other musical performers. Examples include the nearly proverbial prowess of *Guitar Hero* players, as paraded in countless self-celebratory YouTube videos. Such performances contain musical value, as players are involved in a variety of musically meaningful operations. Players listen analytically to musical compositions contained in the digital game media package, identifying musical cues they might require detecting and acting upon. They also provide musically rich input, for instance pushing buttons in rhythmic fashion. In the case of the *Guitar Hero* franchise, players operate in a semantic context that references rock music, its culture, recognisable protagonists, clichés, and so on.

Miller (2012) analyses the nuances of the musical performance at stake when playing *Guitar Hero* or *Rock Band*. The guitar controller, for instance, features five fret buttons to be pushed; although, "because the player has only four fingers available for fretting, she or he must change hand positions when the notation requires all five fret buttons – a design decision that creates technical fingering puzzles for players to solve" (Miller, 2012, p. 93). Some level of technique is therefore necessary to progress in the game, a characteristic that is conducible to ergodic features. Failing to do so leads to an unsuccessful musical performance, as portions of the recorded song would not be triggered. In this way, "these games inculcate a sense of responsibility for the musical performance" (Miller, 2012, p. 93). From a musical perspective, the attachment that players experience to their performance is described as vicarious: "*Guitar Hero* and *Rock Band* players are serving as gatekeeper for *someone else*'s musical performance" (Miller, 2012, p. 93). This is a reference to the schizophonic aspects of the digital games in question.

If these considerations might be used to comment on the quality or the veracity of the musical performance taking place, within the context of musicking such characteristics are of lesser importance. Players are musicking nonetheless, irrespective of the schizophonic characteristics; the quality, complexity, or prowess displayed in a musical performance is not indicative of it being musical or not, and their function is not to assess if it is more or less musical. Every participation in a musical performance falls under musicking; and it is argued that in this specific example, ergodic elements can also be described.

The fact that the material audio components found in the digital game media package are pre-recorded performances is also not influential in determining if this activity pertains to musicking or not. As mentioned in previous chapters, the schizophonic nature of certain musical performances (such as "live" DJ-ing) is what defines them as musical performances, of no lesser nature than any other performance. Therefore, the musicking practices of DJs and of *Guitar Hero/Rock Band* players are both remediating pre-recorded sources, as such showing evident schizophonic features. What distinguishes them is the ergodic component, which is only present in the digital game player's efforts.

Ergodic musicking is therefore a rather explicit form of musicking. If the ergodic aspect is inherently present, ergodic musicking can shift to feature characteristics that align it with different actions related to music-playing, such as performing a composition or improvising musically. Even if they are similar, these actions are not equivalent. The ergodic component renders ergodic musicking different from the canonical musical actions mentioned above. In other words, digital game players are not equivalent to

"musicians", but they do *music* by actively participating in musical situations mediated by digital games through ergodic efforts.

Ergodic musicking also requires attentive musical analysis, as the musicking aspect is connected in a cybernetic loop to the mechanical recombination of the cybermedia.

Finally, ergodic musicking shows different nuances when considering digital game examples that, unlike *Guitar Hero*, *Rock Band*, and other similar titles, do not present evident mimicry of other musical actions. In these cases, ergodic musicking can be seen as investigating potentially new musicalities, engaging players in unprecedented musical contexts.

7. **The case of ergodic musicking in dance games**

The phenomenon of ergodic musicking is manifested when ergodic efforts occur in conjunction with participation in a performance that features musical elements. The cases presented thus far were selected in order to show the most evident aspects of this phenomenon. Even if digital games such as *Rhythm Tengoku* or *Guitar Hero* are different with regards to remediation of musical situations, they are similar in another important aspect. In both games, player input is directly connected to a musical output: in short, pushing a button (or a touch screen) triggers a sound with musical value.

Digital games based on dancing can be less obvious in this aspect; yet, they are a prime example of ergodic musicking. Moreover, their musical characteristics have presented theoretical issues in past research. As mentioned in the previous chapter, dance-based

digital games have been seen as not belonging to the "music game" genre at all (Kassabian & Jarman, 2016); on the opposite side of this argument, Miller has instead considered "*Just Dance* and *Dance Central* [as] music games as much as they are dance games" (2017, p. 93).

Ergodic musicking can be applied to solve this theoretical conundrum, possibly adopting a form of lateral thinking to the problem. Having discussed issues related with digital game genres in the previous chapter, it is now possible to apply the ergodic musicking concept in this context in order to trace continuity between "dance" and "music" games. The different understandings of what constitutes a "music game" in the previously discussed research can be identified in the different values attributed to player actions. In fact, Miller notes that there is a crucial difference between the two digital game genres: "in dance games, game-play does not affect musical playback" (2017, p. 94). Digital games such as *Guitar Hero* connect the playback of the pre-recorded musical content to successful input from the player.

Although notable, the differences between the mechanical affordances of the two digital game genres are included within the musicking framework. The fact that dance games do not feature a direct relationship between player input and acoustic output is not a defining factor when it comes to determining the presence of ergodic musicking. As discussed, ergodic musicking cannot be reduced to the simple act of triggering musical sounds in a cybermedia context. Rather, it is constituted by the non-trivial effort put into traversing a cybermedia while participating in a musical performance. Moreover, both dancing and playing an instrument are rather archetypal forms of musicking. Finally, in both digital game genres, the ergodic effort is present and explicit.

Given this, both cases constitute examples of digital games that prominently feature evident ergodic musicking qualities. Detecting this property does not directly define what a "music game" or a "dance game" is supposed to contain in order to qualify as such, but rather aims to trace continuity among digital games that feature music-based interactions.

Ergodic musicking can also serve to comment on the differences between playing and dancing in music-oriented digital games. Miller notes: "where *Guitar Hero* players serve as middlemen for a pre-recorded musical track, dance game players are actually dancing. They are not controlling an avatar movement; their gestures do not shape musical playback" (2017, p. 107). Miller is commenting on the dearth of interactive features of dance games, which in various cases are limited to a final evaluation of the player performances at the end of the session. The player input does not, for instance, interrupt the playback of the song in the event of an incorrect dance move.

There are, of course, various forms of musicking involved in the activities described by Miller: performing a pre-recorded musical track is indeed different from playing an electric guitar. But if dance game players are "actually" dancing, what is it that *Guitar Hero* players are "actually" doing? Playing *Guitar Hero* is not equivalent to playing guitar, but it is a form of ergodic musicking – which is an actual, tangible, and relatively original form of musicking. Similarly, the limited feedback provided by dance games is still sufficient to include them within the group of cybermedia. The "actual dancing" - the musicking - of dance games is still happening in conjunction with a form of ergodicity, as players traverse the cybermedia by providing non-trivial effort.

8. **Conclusions**

By introducing the concept of ergodic musicking, a theoretical tool that is specific to digital games and that addresses the uniqueness of musical actions experimented in them is offered. Ergodic musicking stands as a form of musicking: it expands on Small's findings and introduces a new way to music that has been rendered possible by cybermedia. We can play an instrument; we can perform a composition; we can dance; we can music ergodically. It is important to note that these activities are not clear cut: rather, plenty of overlapping is possible and expected. Ergodic musicking is the umbrella term that covers all the possible ergodic forms of musicking. Further differentiation within ergodic musicking activities may be possible, but that would be the subject of future research.

Within this chapter, it has been mentioned how ergodic musicking is theoretically compatible with ludomusicological research. Essentially, though, the aim of ergodic musicking is not focused on the ludic aspect of digital games. Rather, it is based on the cybermedia paradigm, which does not subscribe "to a notion of play that prescribes a particular experiential disposition, such as "playfulness" (however that is conceptualized), to the human agent engaging with the game." (Aarseth & Calleja, 2015). This does not preclude certain cybermedia from being interpreted as ludic, but it does not rely on ludic features to identify the object of research.

Moreover, it is potentially more appropriate to consider ludomusicology as the study of ludic elements in musical artefacts and behaviours, rather than the study of music in digital games. As such, the aim of ludomusicology spans every possible musical instance

that features ludic elements – a much wider frame than the one considered by ergodic musicking.

Within musically rich examples of digital games, ergodic musicking can be used to frame the vast variety of player performances. Ergodic musicking applications are however, also intended to retain the characteristics of musicking. In this regard, musicking is not a tool that can be used to give a quantifiable measure to musical actions – to prescribe what is an action that meets certain criteria and is as such "musical". Small, in fact, does not aim to build a hierarchy of importance, or to favour certain musickings over others. "The verb to music is [...] descriptive, not prescriptive. It covers all participations in a musical performance, whether it takes place actively or passively, whether we like the way it happens or whether we do not, whether we consider it interesting or boring, constructive or destructive, sympathetic or antipathetic" (Small, 1998).

Musical actions do not need to reach a certain level of intrinsic quality or cultural relevance in order to be musical. Similarly, ergodic musicking is not dependent on aspects such as mimicry of other recognisable musical actions, such as playing an instrument or dancing. Digital games might actually experiment with musical situations that do not remediate previously existing ones; that is the case of titles that are not focused on remediation. Also, the aural content of the digital game media and its schizophonic nature are not necessary factors for "actual" musicking to take place or not.

These findings will serve as the basis for the next chapter. Thus far, ergodic musicking has been employed to debate what it is that players do when they engage with a "music game", whereas now, the intention is to describe how ergodic musicking is present in

examples that steer away from that convenient template. The next two chapters will therefore focus on ergodic musicking in different examples.

Chapter 7 will focus on the digital games created by Japanese media artist Toshio Iwai, regarded as a pioneer of musicality in digital games. His contribution to the field of music-oriented games will be discussed for its idiosyncratic aspects, criticising available theoretical takes on Iwai's work. In doing so, the chapter will provide a substantial application of the ergodic musicking concept to meaningful, musically rich examples.

Chapter 8 will enlarge the scope of ergodic musicking, identifying cases of the phenomenon within digital game examples that are not primarily based on music. In these cases, ergodic musicking can be episodic, sporadic, inconsistent, and sometimes even accidental. Nonetheless, these instances of ergodic musicking will be presented as relevant, for they are increasingly occurring during digital game engagement.

Chapter 7

Case study: musicking with Toshio Iwai

1. Introduction

In order to show the numerous possible instances of musicking with digital games, a number of different examples have been presented. Some of them may seem obvious, since music is explicitly posed as the core aspect of these titles: *Rock Band*, *Guitar Hero*, or *Taiko no Tatsujin*, are selected examples of games that explicitly remediate musical activities and situations. On the other side of this spectrum, titles such as *Thumper* and *BIT.TRIP RUNNER* have been described as creating rather unconventional musical situations, in turn exploring new musicalities.

This chapter will present examples that are largely situated within the latter group of games. These digital games are unique exemplars, having pioneered and explored musicking with digital games – and therefore musicking in general – even decades before the games mentioned so far. They also share another common trait: they have all been designed by the Japanese media artist, designer, and creator Toshio Iwai.

As a matter of fact, it is worth mentioning at this stage that encounters with digital games designed by Toshio Iwai were an important inspiration for this dissertation. Titles such as *Electroplankton* (Nintendo, 2005) or the early *Otocky* (SEDIC, 1987), put

players in an environment where engagement with musicality is original and multi-layered. In these games, the traditional roles of musicking described by Small seem to be unstructured and mixed, permeating each other to create a new, contemporary musical figure. In that regard, Iwai will be understood as an innovator of musicking, while at the same time being one of its most compelling exponents. Iwai's creations stand as testament to the validity of the musicking concept, for their ability to create elusive musicalities.

In short, it is impossible to elaborate on musicking with digital games without discussing the innovations and the musicking style pioneered and explored by Toshio Iwai. The status of Iwai, as well as his position in the fields of game developments and design, is far from being established. With a game design career spanning 20 years, his creations have been few and far between, with only a handful of games published. For example, his first digital game, *Otocky*, was published in 1987. It took nine years to release his second title, *SimTunes*, in 1996, while his last game, *Electroplankton*, dates back to 2005.

As such, it would be utterly reductive to consider Iwai solely as a game designer, given the multitude of his interests. Even if he could primarily be considered as a practicing media artist, he has also been involved with TV shows and illustrations. As noted by Huhtamo, "the latter stage of his career has transformed him into a successful author of illustrated children's books. The three-volume series "A House of 100 Stories" (2008-2014) has sold well and been translated into several languages" (2016, p. 92).

As a matter of fact, his relationship with the digital game industry is instead discontinuous - almost occasional. Also, understanding Iwai's digital game productions as a continuum presents difficulties, since they were released in different eras of game

development, with substantial variations in coeval cultural context and in the technological means available at the respective times. But it is not in Iwai's use of available technology that the focus of this chapter lies. What renders this group of digital games collectively approachable is instead the strong emphasis on musical aspects. Moreover, they are recognisable as the creations of a single author, since the exploration of musicality is at the centre of all his works.

As such, Iwai's status within the digital game industry presents contradictions.

On the one hand, major digital game publishers such as Nintendo and Maxis bestowed upon him the creative freedom typically afforded to more recognised "game authors". If the development of commercial, high-budget digital games is usually achieved through the common effort of a sizeable group of developers, a restricted pool of celebrity designers are recognised as the "authors" of digital game creations, in a similar way to auteur film directors in the film industry; in the games industry, to name a few examples, there are charismatic figures such as Hideo Kojima, Peter Molyneux, and Shigeru Miyamoto. Quite tellingly, according to Time magazine, Miyamoto is "the Spielberg of Videogames" (Jackson, 1996), highlighting the analogy between the digital game industry and the film industry and their recognised creators.

On the other hand, Iwai's creations are niche titles, clearly not as popular and successful as those from the aforementioned game designers. Iwai, as mentioned, is really an outsider in the digital game industry.

This chapter will therefore discuss these complexities, adopting an analytical approach to discuss musicking and ergodic musicking in relation to a selection of Iwai's digital games. The full list of games designed by Iwai is as follows:

Title	**Year**	**Publisher**	**Console**
Otocky	(1987)	ASCII Corporation	Famicom Disk System
Sound Fantasy	cancelled	Nintendo	Super Famicom
SimTunes	(1996)	Maxxis/Electronic Arts	PC
Bikkuri Mouse	(2000)	Sony Computer Entertainment	PlayStation 2
TENORI-ON	(2000)	Self-published	WonderSwan
Electroplankton	(2005)	Nintendo	Nintendo DS

In this chapter, no focus will be placed on *Bikkuri Mouse* and *TENORI-ON*. *Bikkuri Mouse* is in fact a digital game focused on painting, and Toshio Iwai's only foray into non-musical games; therefore, it is not of primary importance in relation to musicking. *TENORI-ON* is a self-published prototype of an electronic music interface of the same name (commercialised in 2007 by Yamaha corporations). Even if prominently musical, the title was only published in 120 copies and sold in 2001 during an art exhibition by Iwai himself (Iwai, 2008): this renders the digital game barely accessible. The Yamaha branded *TENORI-ON* will be touched upon later on in the chapter though.

The structure of this chapter is going to be largely based on a chronological analysis of Toshio Iwai's production.

In the second section, a selection of works by Toshio Iwai will be presented in order to focus on his non-digital games production. Iwai is not primarily a game designer, and therefore understanding his contribution to fine arts, animation, and design *tout court* is fundamental to the scope of this chapter. This will allow debate as to how these works are evidently connected with his digital game creations. This operation will also be discussed in relation to processes of historicisation of digital games. If it is indeed the case that different research might tackle different historical aspects of digital games (Suominen, 2017), then a perspective that considers biographical aspects of given designers as important elements will be maintained here.

The third section will tackle in detail the first digital game creation by Toshio Iwai: *Otocky*. The game will be discussed for its less-than-obvious relationship with ergodic musicking. If in fact, it can be considered the archetype of ergodic musicking and its first evident manifestation, it also constitutes a non-conventional form of ergodic musicking.

Following this discussion, the fourth section will tackle problems related with the definitions of different kind of "musics" identified in digital games. If *Otocky* is understood as the first example of dynamic or procedurally generated music in digital games (Collins, 2007; Moseley & Saiki, 2014; Altice, 2015, p. 270), this status will be contested and the definitions will be tested within the framework of musicking.

The fifth section will be dedicated to *Sound Fantasy* and *SimTunes*. While the latter is commercially available, the former has never been officially published. In recent years,

however, a fairly complete prototype version of it emerged unofficially, and is currently available for download. This section will focus on the concept of musical composition within Iwai's poetics, and the shifting relationship between ergodic musicking and musical composing.

The sixth section will discuss Iwai's latest and probably most accomplished game: *Electroplankton*. The section will debate the problematic reception the game faced from critics, while also exploring the confines of ergodic musicking and commenting on the cybermedial aspects of the game.

2. A selection of Toshio Iwai works and methodological notes for historical research

So far, this dissertation has not been concerned with historical issues. For instance, when or where ergodic musicking surfaced has not been debated; nor has the discussion revealed which elements would be worthwhile in order to structure an historical perspective on musicking with digital games. Such questions, while tantalising, are outside the scope of this dissertation, but could be developed into the subject of future research. In this section, it will be necessary to present a selection of Toshio Iwai's non-digital game works, offering selected elements from his oeuvre to provide context.

In this regard, this section will structure a "biographical history" of Toshio Iwai, limited to works, happenings and events that are relevant to the study of his digital games.

In terms of methodology, the historiographical practice applied here has been imported from the relatively close field of film studies. Thompson and Bordwell discuss different possible categories of film history:

> "Some historians believe that there are distinct types of explanation in film history. A fairly standard list would include:
>
> - Biographical history: focusing on an individual's life history
> - Industrial or economic history: focusing on business practices
> - Aesthetic history: focusing on film art (form, style, genre)
> - Technological history: focusing on the materials and machines of film
> - Social/cultural/political history: focusing on the role of cinema in the larger society
>
> This sort of inventory helps us understand that there is not one history of film but several possible histories, each adopting a different perspective" (Thompson & Bordwell, 1994, p. xl).

It would appear unproblematic to tackle the biographies of individuals that are somewhat relevant for their contribution within film histories. Such an approach, however, is practically absent from critical historiography of digital games (an exception being Laine Nooney's article focusing on Sierra On-Line co-founder and lead designer Roberta Williams (2013).

In this regard, Finnish researcher Suominen identifies four different approaches to historicisation of digital games, as produced within this sub-field of Game Studies. The categories are: "enthusiast, emancipatory, genealogical, and pathological. All of these genres are based on various conceptions of what is important in the history of digital games and to whom the history is primarily targeted" (Suominen, 2017). Within these four categories, the biographical approach is never specifically mentioned, indicating the substantial absence of such resources. The closest category is probably the "emancipatory" one: "these examples articulate [a] counternarrative to the above mentioned enthusiast histories" (Suominen, 2017), essentially arguing that dominant

paradigms of digital games history that are based on chronicles of events and milestones are generally uncritical, and therefore arbitrary and non-academic.

The intention of this chapter is not necessarily to fall within already established methodologies or categories of digital games history. Indeed, a biographical approach, albeit mixed with other approaches, seems quite problematic to apply to objects that are as inconstant and complex as digital games.

To start with, the biographical history approach might be concerned with players of digital games, or game journalists, or in general other individuals that are not directly involved with the development of digital games. In this case, however, focus is placed on an individual that seems to be recognised as a well-distinguished "author".

As mentioned, identifying a consistent author of digital games, be it a single person or a team, seems to be non-obvious, due to the shared input and fluctuating roles typical of game development. Perhaps then, a good starting point would be to discern why Iwai is perceived by the industry, critics and academia, as an author. Likely, answers may be found in an analysis of his background, and in his status as a recognised, practicing artist.

A list of his accomplishments in this field include participation in various relevant exhibitions. "His works were displayed at the Seville EXPO in 1992 in Spain, at the EC Japan Fest in 1993 in Antwerp, Belgium, at the Biennale d'Art Contemporain de Lyon in 1995, at the Mediascape Exhibition at the Guggenheim Museum in New York in 1996, and at the G7 Summit Exhibition in Lyon in 1997. As these examples demonstration

[sic], he has become one of Japan's leading artists and continues to exhibit his work world-wide" (NTT InterCommunication Center [ICC], 2011).

The following section will offer biographical notes about Iwai and present works that are relevant for this purpose; by no means is this intended as a comprehensive biography of Iwai, but rather as an introduction to elements that form part of the context for Iwai's digital games.

Iwai was born in the city of Kira, Aichi prefecture, Japan, in 1962 (NTT InterCommunication Center [ICC], 2011). From an early age, Iwai was interested in the moving image. He recalls creating flip book animations as a child: "this is my textbook from junior high school. I was twelve years old. My own cartoon character is transforming into another character. At that time I was making many of these kinds of flip books with pencil drawings on my textbooks. I think it was my first experience to interact with moving images that I created myself" (Iwai, 1993). This interest in moving images would progress to become his first major artistic interest. "In 1985, while Iwai was still a student, his installation "Time Stratum" won the High Technology Art Exhibition Gold prize. He also won the grand prize at the 17th annual Modern Japanese Art Awards, becoming the youngest artist ever to win the award" (NTT InterCommunication Center [ICC], 2011). The *Time Stratum* series of works, consisting of four iterations (1985-1989), deals with animations, focusing on early techniques capable of creating the illusion of a moving image. "Iwai used photogrammes which move further into the third dimension. In this work [*Time Stratum II*], several tens of figures cut from photos are mounted on a turntable, above which a TV monitor is similarly set up to emit a stroboscopic light and create a complex movement" (Morioka, 1994, p. 13). Even if the work most notably achieves an interesting visual effect, it also

features musical content and qualities: “regulating the colour and tempo of [the] light to music, figures enter into continuous transformations” (Iwai, 1994, p. 23). The juxtaposition of musical elements and the illusion of moving images produces an outcome that is relevant for musicking: “the result is these figures spinning as though dancing a Viennese Waltz” (Morioka, 1994, p. 14).

In his reading of Iwai’s oeuvre, Huhtamo proposes calling Iwai’s approach “media-archaeological […], without any doubt [he has] been one of the pioneers in this approach” (1994, p. 12). This phase of Iwai’s artistic output traces back to proto-animation techniques, mixing them with modern digital means. For example, “a mechanical 19th century hand-crank may serve to animate a computer-generated robot on the screen” (Huhtamo, 1994, p. 10). With this approach, past, present, and future of media history are ideally blended together: “abandoning linear and chronological logic, Iwai’s approach emphasizes constant recycling and tinkering with technology” (Huhtamo, 1994, p. 11). The common trait of these works is probably the requirement from participants to produce some sort of input: “Iwai […] demonstrates how diachronous media can promote each other through interactivity and can improve further via computer control” (Spielmann, 2013, p. 109).

In the first half of the 1990s, Iwai produced several works with features comparable to those of *Time Stratus*. Notable examples include *Well of Light* (Iwai, 1992): “made using computer graphics, this work features several hundred fictional aquatic creatures swimming animated as though underwater, moving, playing, and changing form” (Iwai, 1994, p. 27). Then, *Another Time, Another Space* (Iwai, 1993) is a work that has been placed in Antwerp’s central station, consisting of 15 video cameras connected to 30 video monitors. “The coming and going of people through the station were filmed by the

cameras, and manipulated in real-time by the computer. [...] A great many people, regardless of age or sex, stood before the installation and played with it" (Iwai, 1994, p. 27).

An alternate aspect of Iwai is identifiable in another selection of works, that include a stronger musical connotation. An example of this is *Resonance of 4* (Iwai, 1994): "a music and image based artwork where enjoyment of the work depends heavily on the ability of the four participants to co-operate in play with each other. Iwai provides an elegantly conceived 'shell' which the audience can use as a communal creative tool" (Graham, 1996). The live manipulation of interrelated visual and aural elements between participants would become a recurring trope in Iwai's works.

In *Piano as Image Media* (1995), "audience members operate a trackball to draw lighted dots on a grid. The flashing dots move, and as soon as they come close to the piano they accelerate and strike a key. With the sound of the piano, a three-dimensional figure pops out of the keyboard. The audience-drawn shapes play the actual piano. The sound then produces colors and figures" (Hasegawa, 2002).

This work explores the relationship between sound and vision, ideally suggesting that there is not a dichotomy between the two. Rather, they influence each other, and this makes it possible to "draw music" or to "play visuals". Such understanding would be further explored in a performance with composer and musician Ryuichi Sakamoto, explicitly called *Music Plays Images x Images Play Music (Iwai & Sakamoto, 1997).* The performance elaborates the premise of *Piano as Image Media*, this time exchanging rather casual audience members (or "users", if you will) for a celebrated musician and composer. Wired journalist Azby Brown describes attending a performance of *Music*

Plays Images x Images Play Music at the Mito Art Center, in the Ibaraki prefecture of northern Japan: “as Sakamoto plays, his rhythmic cadences giving way to flamboyant arpeggios and then to a lyric nocturne, the notes continue their transfiguration from sound waves into swirling ripplets of light” (Brown, 1997). When Iwai joins Sakamoto on stage, the piece becomes mostly about the interplay between the two: “[in this] symbiotic performance, Iwai [generates] fantastic visuals in real time in response to Sakamoto's playing and Sakamoto [responds] musically to the imagery he sees unfolding above him” (Brown, 1997).

Iwai’s musical works are therefore not self-contained, but rather they rely on the active participation of someone else. If participants are encouraged to music in a casual fashion in *Resonance of 4* and in *Piano as Image Media*, *Music Plays Images x Images Play Music* structures instead concerted musicking interplay, based on the literate contribution of Ryuichi Sakamoto.

Furthermore, these works also feature cybermedia characteristics, in that they require participation that is not solely interpretative. Rather, they can be reconfigured by their users, revealing the numerous possibilities of the works.

As stated, this selection of work is by no means exhaustive, and many pieces have been left out. Nonetheless, they have been selected for how they illustrate different tropes of Iwai’s works that will be referred to in the next sections of this chapter. With that in mind, it is now pertinent to present Iwai’s digital games in chronological order.

3. Otocky

Otocky is the first commercially available digital game designed by Iwai. Published in 1987, it precedes the artworks presented in the previous section. Like every digital game presented here though, *Otocky* does still originate more or less directly from an artwork.

AV-Game I (Iwai, 1986) and *II* (Iwai, 1987) explore Iwai's fascination with the potential of digital games, and at the same time addresses his criticisms of them.

> "I too was carried away with video games in the middle of the mid-1980s video game boom. The thing that excited me most about them at that time was how computers were essentially machines to interactively and simultaneously control audio and visuals [...]. Yet video games were all about getting points and competing with others" (Iwai, 1994, p. 22).

The *AV-Game* series, therefore, tries to remove traditional ludic elements such as a winning condition, or other elements conducive to forms of competition or conflict, and focuses instead on obtaining one effect: "the pleasure of unifying myself with audio and visual" (Iwai, 1994, p. 22). Despite being influenced by digital games, *AV-Game* was not designed for their traditional venues (such as game centres), but rather as an artwork, presumably to be displayed in galleries or museums.

> "[In] *AV-Game II*, [...] the pressing of several switches in an appropriately rhythmic manner allows simplified human images on the screen to start movement with music being automatically performed at the same time. This work has been programmed so that, even if the switches are manipulated at random intervals, the resultant melodies and rhythms are produced in a manner regular enough to make it an 'interactive work' - allowing for the sensual involvement of even the most untutored player" (Morioka, 1995).

Furthermore, the work allows the "player" endless improvisation: "the performer can recall the melodies just performed and improvise on top of them, endlessly" (Iwai, 1994, p. 22).

It is from this concept that Iwai would build on to create *Otocky*. At first glance, the game seems to respect the tropes of the *shoot'em up* genre. The player controls a character, Otocky, flying over a 2D landscape. Swarms of enemies routinely attack, but the player can shoot them down by firing bright red globes. Also, the enemies can be evaded with skillful maneuvering. The objective is to survive as long as possible, while also collecting bubbles marked with a musical note. Once a sufficient number of notes has been collected, a final adversary appears, in the form of a massive and presumably menacing music note. When this enemy has been defeated, the stage is complete.

In this respect, the game is rather traditional; it is its musical elements that are of interest. The player can shoot in eight different directions, with each direction being associated with a musical note of differing pitch. Collecting special bubbles will also change the musical timbre associated with shooting: a clavinet sound can be exchanged for a recorder, or a viola, and so on.

Pressing a button will therefore generate not only a globe to be fired, but also a note to be played. The player input is also quantised (similarly to that described above for *AV-Game*), so that anything that is played gets adapted to the tempo of the main background track. The pitch is also adjusted so that it is always harmonious. The intended effect is for players to discover that they are, in fact, participating in musical performance. Perhaps unwillingly, while playing a conventional digital game, the participants find themselves improvising with musical elements. This sense of discovery is described by

Iwai himself: “as [the players] proceeded through the game, a point would come when they would realize that what they were in fact doing was composing music” (1994, p. 23).

The tension between free musical performance and efficient, objective-oriented competition in a game is palpable in *Otocky*. The digital game actually offers two extra modes, addressing this aspect: in the first, “B.M.G. Mode”, enemies are removed altogether, so that the players are free to perform musically. In the other, “Music Maker”, the players can use the sounds present in the game to compose new musical tracks, using the console as a synthesiser.

In the digital games press, *Otocky* seems to be recognised as a title with *ante-litteram* characteristics. The popular music magazine *Rolling Stone* includes *Otocky* in a list of “The Top 20 Music Games of All Time”: “Think generative music content is a modern-day thing? Think again. While Rez gets most of the credit for allowing players to directly influence the background music through their actions, Otocky—which does exactly the same thing—predates it by 15 years” (Rolling Stone, 2011).

The topic of “generative music” deserves more discussion and will be discussed considered later in the chapter, but what this quote illustrates is that even from a journalistic perspective there were some elements that are now perceived as innovative in *Otocky.* The game remains relatively unknown though, and has only been officially released in Japan. The game was in fact published for the Family Computer Disk System, a peripheral for the Nintendo console Family Computer (often abbreviated as Famicom) that increased the computational power of the machine, while adding compatibility with proprietary diskettes, a modified version of a format known as Quick Disk and produced

by Mitsumi (Altice, 2015, p. 164). The peripheral was only available to the Japanese market. Among other improvements, the Famicom Disk System boasted new, dedicated sound hardware, which augmented the capabilities of the machine by adding a new sound channel. "The Disk System […] used a rudimentary form of single-cycle wave synthesis that allowed composers to "draw" custom waveforms to any geometry […]. Exotic shapes were now at the composer's disposal" (Altice, 2015, p. 268). Different composers, including Koji Kondo, celebrated author of many of Nintendo's familiar themes, creatively used this extra, customisable audio channel. However, *Otocky* made extensive use of this new sonic characteristic, using the extra channel to replicate different recognisable musical instruments. Since it was possible to program the channel in order to switch waveform during gameplay, *Otocky* could, during a single session, modify the sound directly triggered by the players, including a great variety of different "musical instruments".

4. *Otocky* and musicking

Otocky conjures vast and complex musicking implications. On a basic level, it is important to reiterate that the act of playing *Otocky* fits within the definition of musicking – even if, in this case musicking is found in an unusual context, away from the traditional avenues of musical performance. The players have clear musical elements at their disposal: pressing buttons on the Famicom controller triggers a set of recognisable musical notes, ordered on a frequency-related scale, while the musical accompaniment emulates a simple march with an easily identifiable beat.

The element of "participation in musical performance" is therefore definitely present, even when talking about an unstructured performance where there might be no

audience, and actually only one performer: the player. In *Otocky*, the players conflate traditional musicking roles: initially, they can be comparable to listeners in an audience, enjoying a composed work, but at some point they adopt the role of performers, as they find themselves triggering musical notes while shooting enemies. It can be said that *Otocky* stands as a musical sonification of a *shoot'em up*, with the blast of weapons replaced by musical sounds. The effect produced on the players, as remarkably described by Iwai himself, is that at some point the players become aware of their own musicking, and start appreciating, or at least acknowledging their musical output. *Otocky*, however, is not oriented toward musical versatility; rather, it poses precise constraints in order to achieve a desired set of musical affordances, centred on extemporaneous performing. The musical phrasing produced during a session can be described as scattered and rhythmically repetitive, yet it is rare to play the same phrase twice. For this reason, the resulting output seems casual, playful, arguably ironic, even if the players are doing their best to achieve some sort of premeditated musical result. The poetics of *Otocky* encourage a form of occasional appreciation for musical improvisation, where control is not glorified as a desirable quality, but is rather joyfully lost. In this regard, *Otocky* follows *AV-Game* in involving "even the most untutored player" (Morioka, 1995). Actually, there is no discernible intention to tutor players, and no quantifiable value is attached to the musical output. On a musical level, anything goes, as the limits and constraints of the performance have already been preset by Iwai.

A ludomusical reading of *Otocky* is possible, since the game evidently juxtaposes musical and ludic elements. However, according to Moseley, "the software [has an] ambiguous ludomusical orientation […]. The player may choose to prioritize the creation of an optimally pleasing soundtrack over the efficient pursuit of ludic goals" (Moseley, 2016, p. 259). This is much unlike other "music games" previously discussed, in which ludic

goals are instead connected to correct (and as such "pleasing") soundtrack playback. This is the case, for instance, with *Guitar Hero*, *Rock Band*, and so on, where a correct performance leads to a complete playback of a given pre-recorded musical track.

This consideration offers the opportunity to highlight a problematic element of the terminology employed by both Moseley and Iwai. When addressing *Otocky*'s primary modality, Moseley mentions "the creation of [a] soundtrack" (2016, p. 259), while Iwai notes, "a point would come when they would realize that what they were in fact doing was composing music" (1994, p. 23).

A musicking-oriented perspective can be useful to clarify this point. As mentioned, not all musical forms rely on a designated composer. Of course, musicking also includes "providing material for performance (composing)" (Small, 1998, p. 9), but that is not a fundamental, requisite form of musicking. Improvisational forms of musicking are examples of musical performances with no composer – or composing – involved. In fact, improvisation can exist as a musical modality in itself, and not merely as a mean to produce new compositions (Bailey, 1993). In this regard, Bailey describes how improvisation seems to resist transcription: "transcription might help to establish matters to do with style or material used but those elements which are peculiar to improvisation and to nothing else cannot be documented in this way" (1993, p. 15). Improvisation is therefore described as a unique modality, not conducive to other forms of musicking. This description of improvisation largely applies to *Otocky*. In fact, in Chapter 4, Bailey refers to improvisation as "an activity of enormous complexity and sophistication, or the simplest and most direct expression" (p. 83, 84). The "untutored" form of musicking afforded by *Otocky* echoes simple forms of improvisation. In fact, the musical features of players' musicking are not akin to those of composers, as they do not

arrange their musical output in order to create an organised composition for possible future re-playing. Rather, they improvise in a casual fashion: much of the musical output might be fortuitous, or contingent on sequences of the game where players might pursue other goals. As described by Bailey, the improvisational aspect of *Otocky*'s musicking is simple, and for its design constraints it resists specialisation and complexity. It is rather impossible to become an *Otocky* virtuoso, partly because it is hard to assess what would constitute a virtuosic musical performance in this context.

Similar to traditional musical improvisation, performing with *Otocky* can be described as over-productive: players might play for extended periods of time, generating hours of improvisation. As mentioned, this performance is not, however, directed toward musical composition: never in the main modality of the digital game is the player afforded that possibility. Iwai addresses this aspect directly with the "Music Maker" mode, which, as mentioned, is an unlockable mode in which the players can compose and save new works using the Famicom Disk System synthesising capabilities.

Thus it is hard to describe the musicking of *Otocky* as "composing" (with the exception of the Music Maker mode). Not every musicking is directed toward composing musical pieces such as soundtracks, and *Otocky* confirms this fact. The musicking involved in this case is possibly closer to that afforded to performers of indeterminate compositions, as addressed in Chapter 4. In these cases, performers can improvise given elements of a musical work. Eco states:

> "The individual performer [of indeterminate works] must impose his judgment on the form of the piece, as when he decides how long to hold a note or in what order to group the sounds: all this amounts to an act of improvised creation" (Eco, 1989, p. 1).

The comparison between players of *Otocky* and an individual performer of an indeterminate composition is merely an analogy, as substantial differences exist between the two musickings. For instance, *Otocky* does not provide any form of musical text to the player, but merely limits the musicking through designed constraints. While the musicking of *Otocky* seems spontaneous, "free", and even chaotic, it retains certain characteristics of the "open work" described by Eco. In fact, through design constraints, player interventions can be described as "not an amorphous invitation to indiscriminate participation, [but rather] an oriented insertion into something which always remains the world intended by the author" (Eco, 1989, p. 19).

As described by Braxton in Chapter 4, improvisation remains the modality employed by performers in indeterminate compositions. The improvisational connotation of *Otocky*'s musicking is therefore to be understood within the theoretical frame discussed so far.

While "Music Maker" addresses the conflict between composing and improvising, another modality included in the game points toward a different dichotomy. The "B.M.G. Mode" is used to only improvise with music, with all enemies being removed. The points and reward system, as well as the possibility to progress in the game, are also removed. As discussed, digital games should not be understood as a coherent media, and *Otocky*, in its peculiarity, is no exception to that. The relationship between musicking and ergodic aspects in *Otocky*, and the ergodic musicking in place, is in fact not obvious.

Discussion will now focus on instances of ergodic musicking in *Otocky*. In its main modality, *Otocky* presents typical features of cybermedia. Non-trivial effort is required in order to traverse the game; also, the game-object reconfigures itself, according to

internal mechanisms and player input. In regard to musicking, descriptions have been offered into how improvisational aspects are in place.

In the previous chapter, ergodic musicking has been described as a form of musicking, in which the participation in a musical performance involves ergodic efforts. This is the case in *Otocky*, where ergodic effort is required to traverse the cybermedia and, as such, the player is allowed to continue in a musical performance aimed at improvisation. It is however a peculiar case, since musicking is not strictly connected to a desired game state, such as a winning state or any other kind of positive reward.

If we take into account the interaction between musicking and traditional game elements (such as a winning condition), *Otocky* can be ambiguous, as described by Moseley. But if, rather than prioritising the presence of game elements, we instead consider the cybermedia quality of the object, it is observable that the media is nonetheless reconfiguring itself – regardless of the fact that no ludic value is attached to this process. That indicates that the act of playing *Otocky* is classifiable as ergodic musicking.

As stated, it is not intended that a "history of ergodic musicking" is provided, or a timeline of relevant ergodic musicking examples. Nonetheless, *Otocky* should be considered among the first digital games that featured ergodic musicking so prominently. Even so, it does not have the characteristics that are typical of an archetype. *Otocky* has not been used as a blueprint, or even as inspiration, for other digital games that dealt with similar elements. Its nature is instead experimental. *Otocky* implemented a degree of musicking that is potentially subversive and exploratory, situating players in direct contact with the possibility of musical improvisation.

On one particular occasion, my personal experience clarified this point. As part of my teaching, I hold regular workshops on Iwai. After a session of *Otocky* and a subsequent discussion with my students, they agreed on one point: their playing could not qualify as musical improvisation, because they didn't know they *were meant* to improvise. The consideration stuck with me, as it questioned what the spaces for voluntary action within digital games at large are: the cybermedia, of course, poses specific constraints on our activities. The constraints are also cultural and contextual, possibly leading to a set of expectations or preconceptions. Perhaps, for that particular group of students, musical improvisation was not supposed to be found in a classroom about digital games (and indeed it is not, normally). Or, they might presuppose that musical improvisation is only available to musicians that, at least, are conscious of the fact that they are going to improvise. These speculations are however incompatible with the musicological theoretical tools applied in this dissertation: even musical improvisation can be simple and primary. *Otocky* confronts us with this reality, destabilising possible assumption of our own musical possibilities.

With that said, the next section will address the nature of music in *Otocky*, discussing its generative nature.

5. Procedurality and music in *Otocky*

The innovative nature of *Otocky* has been discussed on several occasions within Game Studies. Having already presented the ludomusicological implications of *Otocky*, this

section will discuss how the game is understood in relation to analyses of music in digital games that focus on its procedural aspect.

Aspects related to the non-linearity of the musical compositions included in digital games have already been debated in Chapter 3 of this dissertation. As mentioned, Collins points out: “video game sound is often referred to in a vague manner as “interactive”, “adaptive” or “dynamic” (2007), indicating that the terms seem to be used in a loose fashion.

Otocky, however, has quite consistently been regarded as an innovator in the field of procedural music:

> "Japanese composer and artist Toshio Iwai has been behind some of the most innovative procedural techniques in game audio. As early as 1987’s *Otocky* […], Iwai incorporated procedural techniques" (Collins, 2009)
>
> "[*Otocky* is] an improvisatory music-themed *shoot'em up* with a procedurally generated soundtrack" (Moseley & Saiki, 2014)

Both researchers agree that there is a procedural component involved, either directly in the “soundtrack”, or in certain “techniques” that are employed. In the same article, Collins defines procedural music as follows:

> “[A] composition that evolves in real time according to a specific set of rules or control logics. As shown, this can take the form of generative composition or transformational composition, the line between which can be somewhat indistinct.” (2009)

The difference between generative and transformational refers to the capabilities of the involved algorithms, as well as the impact that such algorithms have on the musical compositions in question.

> "Transformational algorithms [...] impact the overall structure. For example, a phrase may have several notes whose pitch value can be randomly altered, or phrases themselves may be restructured in the wider song. [...] Generative algorithms, on the other hand, increase the overall musical data size in that the basic musical materials are themselves created. Due to the difficulties in composing effective procedural music for games, the vast majority of algorithms controlling music in games discussed here are transformational, rather than truly generative in the traditional sense" (Collins, 2009)

The "generative" nature of *Otocky* is also mentioned by Altice, who considers it "a generative music game presaging titles like *Rez* (2001), *Lumines* (2004) and *Bit.Trip Runner* (2010) by more than a decade" (2015, p. 270)

As discussed, referring to the overall musical output of *Otocky* as a soundtrack or a composition can be confusing. In the context of digital games, it is safe to say that a soundtrack is usually a fairly articulated musical composition, which can involve a varying amount of dynamic activity. As Collins notes, there seems to be a surplus of terminology when it comes to addressing musical compositions employed in digital games, and how those compositions are affected or work through algorithmically controlled music systems: dynamic, generative, procedural, etc. In different fields, as discussed in Chapter 4, musical compositions can also be considered as indeterminate, or aleatoric.

Whatever the case, it is difficult to consider *Otocky*'s musical output as pertaining to any of those examples of compositions. As discussed, the improvisational nature of musicking in *Otocky* is not directed toward the creation of any form of musical composition. This renders *Otocky* substantially different from other examples of procedural or dynamic systems. Collins, for instance, describes the techniques employed in the digital game *Spore* (2008), a valid example of procedurally generated soundtrack:

> "*Spore* [has been] designed by Will Wright (*The Sims*), with music by Brian Eno (programmed with Kent Jolly and Aaron McLeran) […]. After being prototyped in Max/MSP, the music was created in Pure Data and consists of many tiny samples which generate the soundtrack in real time. Melodies and rhythms are all generated within limited rules; for example, a sequence might use notes from only within one specific scale. The player can also construct and edit their own music, including various anthems for cities, by selecting from a number of rhythmic sequences and note samples. Mechanisms were put into place to limit the player's input, however, so that changes would not happen too radically and the pieces could 'make sense' musically" (Collins, 2009)

On the same example, Scirea adds: "Generative algorithms […] create the musical structure themselves […]. An example of this approach can be found in Spore (Maxis 2008): the music written by Brian Eno was created with Pure Data, where many small samples created the soundtrack in real time". When playing *Spore*, musicking is certainly in action, as indicated by this description of ongoing activities. The kind of musicking in place in similar examples of adaptive and generative music will be discussed in the next chapter. With regards to *Otocky*, the difference in place is to be found in the substantial absence of procedural intervention. The players are limited by the design constraints of the digital game, but there is no transformative or generative algorithm in place. Rather, the players have direct control of the musicking activity. The only significant intervention on the players' output is quantisation: the notes played at any given time are automatically transferred to the next available beat, so as to avoid inconsistent rhythms. Such an intervention is however not comparable to the properties of transformative or generative algorithms, which, as described in the *Spore* example, are usually much more substantial.

The ergodic musicking in action is therefore not finalised toward composing music, notwithstanding how occasional or volatile a composition can possibly be. As discussed in Chapter 2, the musicking perspective is critical of musicological takes that equate

"music" primarily or even solely to "musical works". For that reason, it is erroneous to consider *Otocky* as a form of generative tool for compositions: the "Music Maker" modality, in which compositions can actually be produced, is separated from the core part of Otocky and should be understood as being of peripheral importance. Such a perspective stems from the methodological tools employed in previous research, which were directed toward the analysis of musical works found within digital games. As such, they end up including other forms of musicking, such as the one discussed in *Otocky*, underneath the rubric of musical compositions.

6. *Sound Fantasy*

The genesis for Iwai's second commercially released game started in 1990. During that year, Iwai produced a new artwork called *Music Insects* (1990). The piece can be described as a painting software combined with a music sequencer, or, as Iwai elaborates, as a "tool for visual music performance" (1994, p. 26).

> "These music insects as I call them, "react" to color dots on the screen. When they pass over them such dots [sic], they trigger musical scales, sounds, and different light patterns. The user selects colors from a palette with a "mouse", and paints in their path, and the insects perform the color when they pass over them. The insects' direction can be changed with certain colors, and colors can be painted to achieve less random musical "performances" (Iwai, 1994, p. 26).

A second version of the piece was displayed at the Exploratorium Museum in San Francisco in 1992. During that period, Iwai was artist in residence at the museum. This iteration of the piece included a trackball, rather than a mouse.

Music Insects followed along the elements introduced in *AV-Game*, but afforded a less extemporaneous musicking, allowing to actually compose and craft audiovisual pieces. As mentioned, musicking may or may not include composing.

According to an interview with Wired magazine (Brown, 1997), Nintendo personnel casually saw *Music Insects* at the Exploratorium, which led to the development of a version for the 16-bit Nintendo console Super Nintendo (or Super Famicom as the console is known in Japan). The project expanded upon *Music Insects*, including four different musical mini games.

The magazine Electronic Gaming Monthly announced that the game would be released in September of 1994, and it would be bundled with a mouse peripheral (1994), a marketing plan that would replicate the one used with *Mario Paint* (1992).

Sound Fantasy was eventually completed and readied for release. Promotional material, including covers for the North American and Japanese market, were prepared.

> "However, Nintendo never released *Sound Fantasy*. Iwai says he is not sure exactly what happened. Because of personnel changes at Nintendo, he never received a straight answer. Iwai speculates that market challenges from the new 32-bit Sony PlayStation and Sega Saturn, coupled with the success of Nintendo's *Donkey Kong Country*, with its 3-D look, may have convinced Nintendo executives that they needed more action, not music" (Brown, 1997).

The game did appear in public on a few occasions. In 1993, a fairly advanced demo of *Sound Fantasy* was playable at the Nintendo *Shoshinkai*, a trade show that Nintendo hosted from 1989 to 2001. The presence of the game has been documented by YouTube channel *DragonScreen RetroGames* (2007). Much later on, in 2010, Iwai showcased the final version of *Sound Fantasy* during an exhibit celebrating the life and works of late

Nintendo engineer Gunpei Yokoi, who is also credited as the executive producer of the game. The talk, entitled "The Genes of Gunpei Yokoi Inside of Me", underlined the influence Yokoi had on the development of *Sound Fantasy* and *TENORI-ON* (Winterhalter, 2010).

In a fairly unexpected turn of events in 2014, two unnamed prototype Super Famicom cartridges appeared on eBay. The cartridges were revealed to be in fact copies of *Sound Factory*, the work-in-progress name of *Sound Fantasy*. The ROM of the game would eventually be dumped and published on a BS-X Project, a website dedicated to emulating the Super Famicom peripheral *Satellaview* (2015). The leader of the project, known by his screen name of LuigiBlood, also compiled an article detailing the differences between known iterations of the game (LuigiBlood, 2015). LuigiBlood was then able to determine that the prototype cartridges that surfaced on eBay were the ones originally shown at Nintendo Shoshinkai in 1993.

Thanks to these efforts, the ROM of the prototype version is now currently accessible, and is compatible with emulator software. If an analysis of the final version of the game is not possible, due to its unavailability, the *Sound Factory* prototype certainly does present relevant material.

The prototype includes three mini games. The first, *Pix Quartet*, closely resembles *Music Insects*. Iwai would return to this concept in 1996, developing a further iteration with *SimTunes*. Since these games share various similarities, commentary and focus will specifically be placed on *SimTunes* in the next section.

The second mini game included in the prototype is *Beat Hopper*. In this game, the players use the mouse to control a bouncing insect. The hopping is synced with a percussive pattern. As the insect hops on platforms, they get progressively cleared, eventually disappearing. Every platform is connected with a different musical tone: the sequence chosen to jump on the platforms will hence bring different musical results.

Beat Hopper's musicking is closely related to that of *Otocky*. Players employ musicking with improvisational aspects, exploring the notes connected with the platforms to form unplanned melodies. Different strategies are afforded by the game, revealing in turn new musical possibilities. Since each platform has to be jumped on a number of times before eventually disappearing, players can do so in a variety of different possible sequences. The resulting musical output is extemporaneous, a simple form of musical improvisation. Sessions with *Beat Hopper* are shorter than those possible with *Otocky*: while the latter affords a more extensive improvisational performance, *Beat Hopper* features short vignettes which are cleared in a matter of seconds. Nonetheless, as the game progresses, more complex stages afford different strategies, from the daring to the more conservative.

Beat Hopper and *Otocky* are also similar with regards to ergodic musicking. Iwai's style is based on the juxtaposition of musicking and traditional ludic elements. Musicking is not operationalised, as there are no quantifiable values attached to the musical performance. Every possible musical outcome is valid, favouring a degree of musicking that is at the same time casual and intense. On the one hand, it is possible to simply focus on the ludic aspects of the game, trying to navigate the course, and considering the musical output as a mere sonification of such activity. On the other hand, the musical

output is concurrently and prominently featured in the game, dictating the pace of every session and assuming central importance.

The poetics of *Otocky* and *Beat Hopper* are based on a simple, conflictual relationship, where optimal ludic performance and conscious, controlled musical improvisation seem to be aspire to opposing objectives. This said, a playful approach generates vivid, ironic musicking.

Players will always be involved in a musical performance, while at the same time exerting ergodic effort, confirming that ergodic musicking is a phenomenon that spans from Iwai's improvisational poetic to the more objective oriented styles of *Guitar Hero* or *BIT.TRIP RUNNER*.

The third mini game, *Star Fly*, introduces new aspects to Iwai's musicking exploration. As mentioned with regards to *AV-Game*, Iwai has always been interested in digital games for their ability to offer simultaneous control on audio and video, while finding traditional ludic aspects related to competing to be limiting (1994, p. 22). So far, Iwai has never directly addressed this aspect in a commercially available digital game, but has explored it primarily in the aforementioned *AV-Game*. *Star Fly* can therefore be considered as Iwai's first attempt in designing a digital game without canonical game features, focusing primarily on eliminating rewards, point systems, and forms of competition.

In *Star Fly*, players control a fairy-like character, flying over a dark backdrop. Pushing a button will place a small star on the screen. Players soon discover that the stars have a musical aspect, as they start emitting pleasing sounds.

Effectively, *Star Fly* plays much like a music box: stars are progressively activated from left to right, producing an automated sequence. The player is free to decide where the stars should be placed, perhaps opting for a crowded sky and a potentially cacophonous musical output, or a sparsely lit night, and a similarly ethereal melody.

The element of musical discovery, a distinct characteristic of Iwai, is present in *Star Fly* as well, since players slowly unveil musical possibilities. Different opportunities are afforded: for example, two or more stars placed perpendicularly will play simultaneously, connecting a relevant musical output to their placement. The audiovisual connection is also present since player operations will have an impact on both the musical and the visual component of the performance. The player can also choose to prioritise visual elements, producing a desired visual composition. Iwai develops this aspect further in *SimTunes*, which will be the subject of the next section.

There is also a substantially new and different component: players can save their creation, loading it again at a later stage to further elaborate on it. The musicking in play here is therefore quite different. If in *Otocky* and *Beat Hopper,* musicking assumes improvisational features, here the compositional aspect is prominent. Improvisation, in fact, can still be considered to be in place, as players explore the musical affordances available; but it can be directed toward composing more or less finished works.

Ergodic musicking can include both improvisational and compositional characteristics. Player effort is directed towards reconfiguration of the cybermedia in question, involving a degree of musical features. To reiterate, it can be said that the musicking of

Beat Hopper is akin to improvisation, while that of *Star Fly* is closer to composing; in both cases, the performed activity is identifiable as ergodic musicking.

7. *SimTunes*

Shortly after the false start of *Sound Fantasy*, Iwai spent a period between 1994 and 1995 as a visiting artist at the ZKM in Karlsruhe, Germany. During that residency, he completed *Piano as Image Media*, among other works. But the possibility to resume the concept started by *Music Insects* eventually presented itself.

Mirroring what happened with Nintendo, a group of Maxis employees encountered *Music Insects* during a visit to the Exploratorium in San Francisco. The visit was meant to be a day-off for the company, but it ended with unexpected results.

> "Maxis producer Michael Wyman says the group immediately appreciated [*Music Insects*] open-ended, noncompetitive nature and saw how well the game fit in with their company's idea of "stealth learning." Maxis soon contacted Iwai to discuss releasing the game under its label. "One afternoon away from the salt mines, and we came up with a new title," Wyman says" (Brown, 1997).

Maxis is probably best known for its *Sim* series, including the popular titles *SimCity* (1989) and *The Sims* (2000). In 1996, Maxis expanded the Sim franchise to include rather different titles such as *SimGolf* (1996) and *SimCopter* (1996), aiming to apply the "simulation" aspect to different genres.

SimTunes was eventually included in this new batch of releases. If the *SimTunes* title was to be interpreted literally, one might wonder how exactly a tune is "simulated". Indeed, the simulative aspect is to be understood in a very loose manner; what was consistent in

the series was a broad educational slant. As prominently displayed on its cover, *SimTunes* was marketed to kids aged 8+, as a software that could be used to explore the users' creativity.

As the third iteration of *Music Insects*, *Sim Tunes* expands on the original concept, adding a number of new features. The base concept remains the same: players can paint a picture, much like with conventional painting software such as the popular Microsoft Paint (Microsoft, 1985), but in *Sim Tunes*, each block of colour also represents a musical note. Four "music insects" walk around the picture, triggering the notes according to the instrument they represent: guitar, drums, trumpet, and so on. "Musical pictures" can therefore be easily created, aiming to produce a predominantly musical composition, or perhaps a visual one, or more ambitiously, a work that equally balances the two aspects. *SimTunes* is preloaded with different examples demonstrating its versatility, such as a "SurfinUSSR", a bizarre painting representing a surfer hovering on top of a stylised Kremlin, accompanied by a musical composition reminiscent of the famous Beach Boys tune *Surfin' U.S.A* (1963).

In this selection of Iwai's works, it is clear that *SimTunes* most obviously steers clear of the "digital game" template. It was marketed as "software", rather than as a digital game, and it does not have structural elements that can render it ascribable to most definitions of games. This is consistent with Iwai's intentions as a game designer. In an interview from 2006, he states: "[I] always wanted to create creative software played on the game platforms other than game software. This concept has not changed since *Otocky* right through to *Electroplankton*" (Riley, 2006).

It has been maintained in this dissertation that “digital games” are not understood as a consistent medium. The aspects of *SimTunes* that align with the other examples are to be found in relation to the playfulness it applies to its interactions. Rather than being a piece of software that prioritises ease of use, functionality, or productivity, it rather aims to entertain and to achieve playful or even humorous results, as exemplified by the “SurfinUSSR” example.

As noted by Collins, “with no set objectives, rewards or in-game narratives, these and similar interactive tools - while sold and marketed in the games industry - are arguably not games, but rather musical toys that use game interfaces” (2009 , p. 7).

The non-game qualities of *SimTunes* were not casually achieved, but rather a concerted effort by Iwai, stemming from his aforementioned criticism of digital games. Commenting on *SimTunes*, and on “traditional computer games”, Iwai declared: "though [digital games] are really interesting the first few times you use them, games are repetitious, and they leave nothing afterward - just a high score [...]. Compared to reading a good book or seeing a good movie, they're very time-consuming. A waste". (Brown, 1997).

Possibly, *SimTunes* was meant to achieve some sort of long-lasting, possibly educational status. However, it is also important to underline that *SimTunes* was a commercial product, and that such a vision was compatible with what Maxis intended to achieve at the time. The simulation aspect was marketed with a utilitarian angle, aiming to convince the public that this product contained legitimate tools to enhance creativity, and that it was not “just a game”.

In any case, the intentions so far described also reverberate on the resulting musicking possibilities. In fact, *SimTunes* can be described as being much closer to *StarFly*, while also being quite different from *Otocky* and *Beat Hopper*. Worth underlining in this regard is the compositional musicking practice favoured by *SimTunes*.

The pure improvisatory ergodic musicking introduced by Iwai with *Otocky* is not present in *SimTunes*. Improvisatory techniques can be employed here as a means to explore the range of possibilities afforded. The "insects" stroll around the canvas, slowly but surely, and controlling them can be a complex affair. Players must design ways to keep them in check, perhaps blocking them in a section to avoid them wondering off. Such makeshift techniques might actually lead to meaningful audiovisual results, and could be reused and implemented to achieve a desired final work. At any point during the session, it is also possible to save the creation, in order to return to it later.

According to Collins, *SimTunes* is "arguably a composition device rather than a game in the traditional sense" (2009 , p. 7). Further to that, Herber elaborates on the notion of composition-instrument, an umbrella term covering a wide range of examples:

> "A composition-instrument is not a specific piece of music or interactive work in itself but a means of approaching any work where music can be created and transformed. Composition-instrument is a conceptual framework that helps facilitate the creation of musical systems for interactive media, art, and telematic environments" (2006).

According to Herber, the composition-instrument framework might refer to free improvisation, generative music, or digital games such as *Rez* and *Electroplankton*. *SimTunes* would most probably fall within this category; in any case, the composition-instrument definition can be useful to discuss the kind of ergodic musicking in place in this case.

As a device, tool, or indeed object in itself, *SimTunes* has elements of cybermediality, since it can be reconfigured by the user while being operated. This form of ergodic effort is connected with prominent musicking practices, in this case akin to musical composing. Ergodic musicking is therefore not necessarily connected to game-like elements, as seen with examples such as *Guitar Hero* or *Thumper*. Also, it is not necessarily found in relation to improvisational musicking, as explained with *Otocky*. In this case, ergodic musicking can assume features similar to composing: while the cybermedia is delivered as a complete, finished object, it, still requires an active user. In this case, such activity is directed towards the creation of new audiovisual pieces. With *SimTunes*, Iwai offers the opportunity to explore yet another possible variation of ergodic musicking.

In this regard, it is important to specify that this dissertation does not aim to offer a complete typology of ergodic musicking variations. The inconsistencies between the different examples considered show that musicking forms cannot be formally encapsulated, due to the shifting nature of digital games. The approach emphasised in this chapter is therefore directed towards a detailed analysis of musicking-rich, unorthodox examples, regardless of their status as paradigms or tropes.

The next section will tackle Iwai's most complete digital game work, which in many ways addresses the most salient characteristics of musicking and ergodic musicking discussed so far.

8. *Electroplankton*

Iwai's relationship with Nintendo ended quite unceremoniously with the cancellation of *Sound Fantasy* in 1994, although this was not to be the end of their partnership, as Nintendo subsequently released *Electroplankton* for the Nintendo DS portable console in 2005.

Upon its release, *Electroplankton* was presented to the public and the press with a dedicated event. The presentation took place in the museum area of the prominent department store Laforet Harajuku, in the Shibuya neighbourhood of Tokyo. The event was accompanied by an exhibition, centred on *Electroplankton*, but including a selection of Iwai's works.

An account of the event is offered by the popular website IGN.com. One part of the exhibit gave the opportunity to play *Electroplankton*, displaying it in different ways:

> "The main event hall includes an area for trying out *Electroplankton* on standard [Nintendo] DS units, complete with headphones and copies of the game's thick instruction manual (supposedly, Iwai spent as much time crafting the impressive manual as he did the game itself). […] One area uses sixteen DS units to show how the plankton evolve as you play. Another area gives a close look at all ten forms of plankton via high resolution monitors." (Gantayap, 2005)

While this description is reminiscent of what normally happens in conventions and media events, the rest of the exhibition took a different approach, focusing on Iwai's previous works:

> "One corner […] tracks Iwai's creations from childhood until current times. Iwai's been coming up with interesting ideas since he was a child, as revealed by his elementary school drawings, and as he grew up, his ideas came to take physical and, eventually, digital form". (Gantayap, 2005)

The opening of the exhibition also featured a live performance by Iwai, who played *Electroplankton* with a live accompaniment by a violinist. Finally, a talk was organised, hosting Iwai, Shigeru Miyamoto, and the late Nintendo president Hiroshi Yamauchi. Such an extensive event, and the presence of the hierarchy of the company, suggests a certain investment and aura of prestige associated with the release of *Electroplankton*.

The title was effectively a selection of Iwai's artworks, alongside a set of new pieces. Huhtamo recalls a conversation with Iwai about this aspect: "Iwai once surprised me by stating that *Electroplankton* was his version of Duchamp's *Boite en Valise* (1941). After some reflection it made sense: the tiny game cartridge indeed contained many aspects of his career as a "miniature museum" (Huhtamo, 2016, p. 92).

The "miniature museum" was assembled by employing a reductionist approach, reshaping parts of previously displayed works in a new environment. *Electroplankton* features ten parts in total, each one distinct enough to require specific discussion. For the sake of this dissertation, however, focus will be placed on two mini games: *Luminaria* and *Rec-Rec*. These examples have been selected for two main reasons. The first is that they employ aspects of ergodic musicking that can represent the game as a whole, involving improvisation and composition in original fashion. The second is that they show how *Electroplankton* was designed to use the specific technical affordances of the Nintendo DS console: this approach shows Iwai's awareness of the technological tool at hand, as was the case with *Otocky* and the extra sound channel of the Famicom Disk System.

Luminaria, the first mini game to be discussed, is a repurposed version of the artwork *Composition on the Table* (1999). Originally designed for a gallery setup, this work consists of four tables, equipped with different interfaces, such as switches and dials. On top of the tables, images are projected, which react in turn to interaction with the user. Sounds are also affected by this activity, changing simultaneously. When it was first displayed in 1999, the work was described as follows:

> "The intimate connection between the interface and the reaction by the computer graphics ensures that the graphics and sound respond just as they ordinarily do when one touches an object; thus, as one experiments with the interface, one gradually comes to see physical reality and the images as being equivalent […]. The objectives of this were to create a Mixed Reality environment that several participants can share while creating visuals and music together, interactively" (NTT InterCommunication Center [ICC], 1999).

Of the four tables, Iwai selected the first, called *No. 1: Push*, and effectively included it in *Electroplankton*. The bulk of the work remains substantially identical, if not for new graphical details and, of course, for the different proportions involved. *Luminaria* swaps the original table for the relatively small screen of the Nintendo DS. The following description of *No.1 Push* also fits *Luminaria*:

> "The 36 push switches on the round table are fitted into a six by six matrix. Each time the participant presses a switch, the arrow projects on it changes direction. Furthermore, the four lights moving across the table top change direction according to the switch combination pressed, and the interaction creates pulse-like music" (NTT InterCommunication Center [ICC], 1999).

Luminaria features ergodic musicking elements already explored by Iwai in other works. The four planktons move around the screen, rhythmically touching the arrows on the matrix: every contact generates a piano note. The plankton movements are reminiscent of the insects seen in *Music Insects*, *Sound Fantasy*, and *SimTunes*. In fact, they will inexorably move at their own pace, and they can't be stopped or directly controlled; it is

however possible to orientate their paths by switching the arrows. The ergodic musicking is therefore mainly oriented towards improvisation: although it is possible to lock the planktons in loops, creating a sort of composition, the result is oriented toward ephemerality. The musicking effect can be described as similar to juggling, balancing the four plankton and progressively adjusting their path.

If distinct game elements are not present in *Luminaria* (or in *Electroplankton* as a whole), the sense of playfulness is also communicated by visual details. The plankton are cartoonish, smiling creatures, happily strolling around the DS screen. These visual features are also shared with the other compositions (or mini games) included in *Electroplankton*.

While *Luminaria* resorts to the Nintendo DS touchscreen, the rest of the game is designed to make full use of the console's input and output features. The DS is also equipped with a microphone, which made it possible to include instances of musicking focused on recording sounds. *Rec-Rec* is one of these mini games. Here, a drumbeat is constantly played; at the same time, the user can tap a plankton to record four bars of sounds. Iwai encourages experimentation with this setup: "while you can record in exact time with the rhythm, you can sometimes end up with an unexpectedly funny or interesting result by just speaking and recording randomly" (2005, p. 58). As such, *Rec-Rec* encourages a kind of playful exploration of the musicking possibilities, allowing for the production of short mini-compositions. Themes of ephemerality and improvisation are also consistent in *Rec-Rec*: the musicking involved emphasises appreciation for extemporaneous, almost casual results. Through the constraints involved in the game, even recording sound - an act that could be generally associated with composition - serves as a form of musical improvisation.

As is clear with this selection of mini games, *Electroplankton* does not particularly fit the general expectations of what a "game", intended in its traditional sense, might entail: for example, there is no winning or losing condition, and no point system or rewards. However, as mentioned in Chapter 6, Aarseth and Calleja referred to games as a subset of a larger typology of objects: cybermedia, "a more general class of phenomena to which games belong" (Aarseth & Calleja, 2015). As such, *Electroplankton* is considered one of "those cybermedia objects that are commonly referred to as games" (Aarseth & Calleja, 2015). The cybernetic features of *Electroplankton* are found in its mechanical system: the user is in charge of recombining elements of the media by means of non-trivial, ergodic effort. Since, in this case, ergodicity happens in conjunction with a performance that is ostensibly musical, ergodic musicking is manifested. As mentioned, ergodic musicking stands as a peculiar, unique form of musicking. The musicking of *Electroplankton*, for example, seems to recombine aspects that might better pertain to traditional musicking roles, actualising them in a new context, and affording audiovisual forms of improvisation in a unique, original style.

If this explains how ergodic musicking is manifested in *Electroplankton*, its non-game qualities is not to be intended as incidental, but rather as an aesthetic element that Iwai had been pursuing since his early fascination with digital games. The next section will discuss how this aspect of *Electroplankton* initiated a discussion regarding its status among the digital game press and critics.

9. *Electroplankton*: critical reception

As mentioned above, Nintendo announced *Electroplankton* with a unique event, signalling its importance for the company. The game, however, was poorly received, selling about 20.000 units in Japan (Vgchartz.com, 2012).

A news article published by game development website *Gamasutra* confirmed that the game was objectively underperforming:

> "*Electroplankton* has been one of the games most demonstrated by Nintendo representatives as an example of the company's creative thinking […]. However, the title has […] not performed well at retail in Japan, despite a relatively positive critical reception" (Carless, 2005).

In order to quantify what can be considered as successful sales figures in this context, it is worthy of mention that *Electroplankton* was presented alongside *Nintendogs* at the Game Developers Conference in 2005, and *Nintendogs* went on to sell 1.93 million units in Japan (Vgchartz.com, 2005). Nonetheless, *Electroplankton* was republished in 2009 as a downloadable release, although the mini games were available as separate purchases.

A discussion on the retail performance of *Electroplankton* is well outside the scope of this dissertation. However, the mixed reactions to its release has generated a meaningful discussion, revolving around the musicking practices that are expected and acceptable in the context of digital games.

An account of this is offered by Pilchmair, who compiled a meta-review of *Electroplankton* (2007).

The following is an extract from an *Electroplankton* review: "it's audiovisual art. That's the game's intention and it does it well. For the experience, though, the designer missed a few good opportunities, like save functionality and multi-system support" (Harris, 2006) in (Pilchmair, 2007).

Noting that the absence of a save functionality is a recurring theme in the critical reception of the game, Pilchmair elaborates:

> "The lack of a function to save the game may originate from Toshio Iwai's exhibition practice. Also, most musical interface don't feature saving. Even a lot of electronic instruments don't. Since there is no specific goal to reach, beside the act of playing in itself, save games would most likely not intensify the experience anyway. Much more, the lack of being able to save a configuration highlights the playfulness of the game. Since playfulness is the only feature the game offers, playing it is the only way to experience it" (Pilchmair, 2007).

A save functionality is also crucial in relation to ergodic musicking. If sessions could be saved as compositions, the effort involved would presumably tend toward composition far more, orientating a substantially different musicking.

During an interview, Iwai was asked directly about the topic:

> "*Interviewer*: […] it seems to be the general consensus that the lack of a save function is very restrictive. Was there any particular reason why this was left out?
>
> *Iwai*: We have discussed a save function many times, and finally concluded not to included it [sic]. There are following 2 reasons:
>
> The first reason is that I wanted players to enjoy *Electroplankton* extemporarily and viscerally, and I thought if the save function was added, the software would become more like a tool. I did not want a play style where players have to open additional menus or windows, or have to input file names to save.
>
> The second reason is that it would require large volume of flush ROM and it would take a lot of time to save and read the data in order to save many voice files for *Volvoice* and *Rec-Rec*. I thought players could play the software without stress if I got rid of the save function". (Riley, 2006)

Putting the technical aspects mentioned by Iwai aside for the time being, it is noteworthy that the discussion presented so far essentially implies that there are a number of desirable musicking qualities in digital games. As mentioned, a number of reviews have pointed out the absence of a save function, meaning that performances cannot be reworked at a later stage. This perspective, however, can be criticised as prescriptive, implying that musicking with digital games should be an activity aimed at the production of new audiovisual works. Also, it undermines the relevance of ergodic musicking, which is not to be understood in utilitarian fashion: rather, it is a modern, varied, and flexible instance of musicking, capable of including multiple traditional forms of musicking (such as composing, improvising, dancing, and more) in a new cybernetic context.

The improvisational brand of ergodic musicking pioneered by Iwai expresses this poetics, prioritising extemporaneity and improvisation over compositional purposes, and revealing the full extent of the possibilities available to ergodic musicking.

10. Conclusions

Throughout this chapter, the contradictory and unusual aspects of Toshio Iwai's works as a game designer have been highlighted. Notice has been taken of the discontinuous, almost occasional pace of his career in this field, punctuated by long periods of time passing between each release. And yet, a consistent topos is found, situated in the exploration of the musical possibilities of cybermedia.

Similarly, analysing the ergodic musicking involved in these examples can also identify opaque and problematic elements. As argued, one of the main points of contention regards the improvisational nature of ergodic musicking in Iwai's works, as opposed to readings that see these works as examples of procedural or generative compositions.

In fact, *Otocky* is frequently included in discussions about generative compositional techniques, and credited as a precursor and a milestone. *Electroplankton* has, in turn, been criticised for its improvisational nature. The fact that it was not designed as a compositional tool is interpreted as an incomprehensible flaw – a missing feature, at least. Both understandings of Iwai's works have here been contested, and a different reading of the subject offered, including within the conversation relating to the different and legitimate ways in which ergodic musicking might happen in cybermedia.

The instances of musical improvisation introduced by Iwai quite possibly constitute the most contentious point in the critiques of his work. The relevant literature related with musical analysis of digital games is in fact not generally concerned with aspects of musical improvisation. However, the ergodic musicking that can be experienced in Iwai's work lives instead of the contraposition between these two musicking forms, exploring the musical fields of improvisation and composition in a personal, original fashion.

As such, understandings of Iwai as a pioneer of "music games" should take into account that his contributions do not have the structural, foundational features and the long-lasting influence that could be expected from an "archetype". Rather, as explained throughout this chapter, his intuitions remain fairly under-explored. Iwai's contribution

can be understood as idiosyncratic, even divisive, and certainly still underrated within Game Studies.

A full understanding of the ergodic musicking in place in Iwai's games can contribute with new perspectives on their deep meanings. Their contradictory nature is also manifested when it comes to analysing the ergodic musicking involved. No example embodies this aspect better than his first digital game, *Otocky*: it is at the same time one of the first clear instances of ergodic musicking, and yet one of the most complex examples of the full extent of the concept. As explained, with examples such as *Guitar Hero,* musicking and ergodic effort are directed towards mutually "positive" directions, clearly indicated by the game system with obviously manifest positive or negative feedback. In *Otocky*, musicking is not prescribed, nor can it be considered in binary terms as "right" or "wrong". Rather, the limits to musicking agency are set by the constraints embedded in the design, and are not determined by any intervention that could be attributed to generative music systems.

The full extent of the musical activities ongoing in Iwai's games can be discussed using the framework of the theoretical tool of ergodic musicking, a tool here used to disentangle the conundrum of activities undertaken and synthesised by players of Iwai's games. Playing *Otocky*, *SimTunes*, or *Electroplankton* is not equal to composing or improvising, as discussed in Chapter 4.

In other words, ergodic musicking cannot be reduced to an activity that is only musical (composing, improvising, dancing, etc.) or only ludic. It is an activity that can contain all of the above, to varying degrees, and within different cybermedia examples.

Chapter 8

Branching out: musicking outside musical games

1. Introduction

In this chapter, the full extent of the ergodic musicking framework will be discussed and investigated. Examples of digital games in which forms of ergodic musicking are found will be included in the conversation, even if not as evidently as other earlier examples.

The previous chapter started debating the possible nuances in which ergodic musicking can manifest itself. Through the digital games of Toshio Iwai, a number of prime examples of ergodic musicking were presented, while at the same time exploring unconventional cases. The improvisational connotations of ergodic musicking experienced in digital games such as *Otocky* remains largely unexplored, both within Game Studies and the digital game industry – a unique, interesting example, rather than a blueprint or a model. Due to their originality, the digital games created by Toshio Iwai were presented in order to discuss what the possible extents of ergodic musicking can be, and rather than prescribing boundaries to ergodic musicking, preference was given to exploring cases that are unconventional or unusual. For all the different characteristics presented so far, ergodic musicking can be described as a field of possibilities, an instance of ergodicity and musicking that remains largely unexplored, both by digital game developers and by Game Studies at large.

However, if Toshio Iwai's musical games embody a contradiction, being at the same time foundational and yet unexplored, examples that seem to be more linear have also been presented. Throughout the dissertation, but primarily in Chapter 5, the topic of "music games" has been debated at length: examples of digital games that primarily revolve around music. At this stage, by no means can the discourse regarding musicking and ergodic musicking in relation to such examples be said to be over. The examples presented in Chapter 5 are to be understood as a restricted pool and were selected for several different reasons. First, digital games that are popular and recognised were chosen, in order to include examples that would presumably be familiar to the readers of this dissertation. The choice was also made to emphasise the wide popularity of ergodic musicking, a modality that is experienced by a large number of digital game players.

The other discriminating factor behind the selection process took into account the formal characteristics of the examples. The digital games were selected for their simulative contents: titles that contain mimicry of conventional musical situation (*Guitar Hero*, *Rock Band*, etc.) were contrasted with examples that would do the opposite, not representing known musicking forms (*Thumper*, *BIT.TRIP Runner*, etc.). The intention behind these choices was to show how ergodic musicking is found in these different examples, unifying titles with substantially different formal contents under a new theoretical umbrella.

Countless other examples, however, can be considered as more or less orthodox examples of ergodic musicking. The vocalisations of *PaRappa the Rapper* (NaNaOn-Sha, 1996); the isomorphic creativity of *Vib-Ribbon* (NaNaOn-Sha, 1999); or perhaps the

musical warfare of *Patapon* (Pyramid/Japan Studio, 2007): these are just a few valid, prominent examples of ergodic musicking. The selection is therefore not to be considered encyclopaedic, but rather illustrative of the main properties of ergodic musicking. Many examples can be used to illuminate other aspects of ergodic musicking, and it is certainly not being argued that digital games designed by Toshio Iwai exclusively show idiosyncratic, unique forms of ergodic musicking.

The scope of this chapter will not be to expand on central aspects of ergodic musicking, further debating other examples from the many possible. Instead, focus will be given to instances of ergodic musicking that, albeit subtly, actually constitute some of its most common occurrences.

Ergodic musicking is not solely limited to digital games that prominently feature musical activities. Rather, it is a modality that is increasingly adopted, fostered and implemented in different ways among digital game examples that pertain to non-musical genres. In these cases, ergodic musicking can be episodic, sporadic, inconsistent, and sometimes even accidental. In general, it can be said that the examples debated in this chapter will present instances in which the players' awareness of ergodic musicking can be said to be lower. Players and game developers may not intentionally or consciously produce an object or a performance with a relevant musical meaning; and yet, they actually do.

The intentions of this chapter has two relevant aspects: on the one hand, to expand on what has been presented so far, offering examples that show the full range of ergodic musicking. On the other, this chapter has a baseline value, as it discusses instances of ergodic musicking that are possibly common to a broader range of digital game examples, and that are not only limited to those with a musical focus.

The first section of this chapter will come full circle, once again discussing an example mentioned in Chapter 1 in light of the newly introduced theoretical construct of ergodic musicking.

2. On "musical agency"

In the first chapter of this dissertation, I mentioned an episode from my childhood, describing how it would eventually spark my interest for expressions of musicality in digital games. While playing *Super Mario Bros.* (Nintendo, 1985), I would enjoy jumping on the same spot, somewhat exploiting the musical side of Mario's "jump" sound.

The soundtrack of the game includes a recognisable set of compositions, also being the subject of a dedicated monograph (Schartmann, 2015). The musicality of this game, however, is not considered to be simply limited to its soundtrack. While Whalen comments that Mario's "jump" is "accompanied by an ascending chromatic glissando or slide" (2004), this characteristic musical sound is also commented upon by Summers, who expands on the subject:

> "The *Mario* series […] involved a high degree of sonic responsiveness to game action […]. Mario's jump is musicalized with a rising glissando, collecting coin sounds as a rising fourth, an ascending sequence accompanies a power-up, and so on. Such synchronized musical responsiveness rewards player interaction and, in reacting to the player's action, apparently plays *with* the gamer […]. Even what is not ostensibly a 'music game', this is undoubtedly a music**al** [emphasis in original] game […], bestowing small degrees of musical agency upon the player." (2016, p. 193)

This example of tight synchronisation between music and image is clearly describable as isomorphic, as it is actually reminiscent of the conventions developed at large in animation films. As mentioned by Curtis with reference to early Warner Bros. cartoons, these conventions include comparable examples: "a character's wide-eyed blinks are accompanied by a couple of light, sprightly notes, buildings sway to the music, characters dance to the tempo, or a glissando accompanies a "pan" across an animated landscape" (Curtis, 1992). Arguably, these techniques can also be found in live action films. Slowik identifies instances of tight musical synchronisation in "films from the early sound period, [which] contain scores that catch precise sound moments" (2014, p. 52). In these instances musical sounds produced by an orchestra would accompany specific moments in the films. "In Warner Bros' *When a Man Loves* (February 1927), "a sforzando chord played by violin and brass is heard when Chevalier Fabien des Grieux turns the table by striking the prefect of the police with his own pistol" (Slowik, 2014, p. 52).

Slowik, however, argues:

> "These questions of musical illustrations were not unique to the 1920s. They arose during the Renaissance, when musicians became concerned with proper text setting. "Word painting" or "madrigalism" developed into conventional melodic and harmonic figures for images, emotions, and concepts […]. Creating affect in the listener – rather than differentiating between music and sounds produced by diegetic action – was the greater concern" (2014, p. 53-54).

The use of short assemblages of musical sounds as "musical illustrations" can therefore be observed in digital games, films, animation, and word paintings. In digital games such as *Super Mario Bros.*, sounds are not just isomorphic, but also arguably kinesonically congruent with players' action (Collins, 2013, p. 35). In that regard, the sounds mentioned by Whalen and Summers are musical while also being kinesonically

congruous, as the two instances are not opposed to each other, but rather happen to work in conjunction.

The previous quote by Summers opens up a number of questions in relation to the musical form of participation here named ergodic musicking. Summers refers to "musical agency", noting that the *Mario* series (including newer episodes like *Super Mario Galaxy* (Nintendo, 2007)) offers a smaller degree of it to the player, compared to what happens in "ostensibly musical" games. "Musical games" would instead afford a higher degree of musical agency.

Although a full discussion on the topic of agency is outside of the scope of this dissertation, a short contextualisation is relevant in order to properly address it within the framework of ergodic musicking. Aarseth notes:

> "Accounts of agency in games often fail to observe the ludic framing that invalidates the spectator/participant dichotomy. In these accounts (e.g. (Wardrip-Fruin, Mateas, Dow, & and Sali, 2009)), agency is operationalized and reduced to game operation; the agent becomes a manipulator of game mechanics, not a free person in charge of their own destiny" (2017).

Applying this critique to Summers' account of musical agency in *Super Mario Bros.* (and to music games at large) can reveal similar problematic issues. In fact, the musical agency of *Super Mario Bros.* is considered to be of a lower degree, in which it does not directly connect with game mechanics or with the soundtrack. Although intuitively meaningful, this account presents certain incompatibilities with the musicking framework, as described by Small. In fact, the musicking concept is focused on the idea of participation in a musical performance – regardless of the level of agency. As mentioned in Chapter 4, a listener or a spectator is effectively considered a participant

and as a substantial part of the musical performance in question. Framing a form of musical participation by means of the agency afforded to an individual effectively reduces the many possible instances of musicking to a tangible operation.

The same concept applies to instances of ergodic musicking. Ergodic musicking retains the characteristics of ergodic efforts, and as such it should not be considered a game operation. Similar remarks have been noted within other areas of Game Studies: with relation to the cognitive implications of game involvement, Calleja notes that "disposition to act, and not just the instance of input, is critical because […] game involvement is not limited to the flicking of a thumb stick or clicking of a key" (Calleja, 2011, p. 70).

However, Summers inscribes the "musicalized interactions" typical of the *Super Mario* franchise design philosophy within a larger analytical parallelism between digital games and musical instruments.

> "When we notice that gamers play, and play with, music as they play games, this is not an analogy – players are routinely given agency to prompt and alter musical output of the game. This […] is part of a modern landscape of musical instrumentation that includes synthesizers, turntables, samplers and virtual instrumentation software. If we are to investigate further, then the game system appears as a musical instrument that is played by the gamer" (Summers, 2016, p. 193).

Here, players stand as instrumentalists (or as performers playing an instrument), while digital games appear as musical instruments, specifically modern, digital schizophonic ones, such as synthesisers.

While this analysis points to certain similarities between these different objects and the activities they involve, ergodic musicking is instead a theoretical construct that can

specifically identify the musicking involved in using cybermedia (such as digital games). While ergodic musicking conflates and mixes a plethora of previous musicking forms, it is ultimately unique and different. Playing a musical instrument, albeit a modern, digital one, remains a musical activity fairly distinct from ergodic musicking. Both are musicking forms, but only using cybermedia involves exerting ergodic effort, and hence manifests ergodic musicking.

Ergodic musicking stands as a conceptual viewpoint that aims to offer a coherent theoretical frame to musicking with cybermedia, overcoming the rationalisation that relies on analogies with contiguous musical objects such as digital musical instruments.

Summers refers to the ludomusical quality of Mario's jumps and other sounds, noting that the game system "apparently plays *with* the gamer [thanks to] playfully responsive music" (2016, p. 193).

This account, however, is based on a particular perspective of the phenomenon at hand. The word "music" here, is understood not in musicking terms, but rather as a material object: a pre-composed musical sound sequence, arranged within the *Super Mario* franchise in a certain dynamic fashion. If, instead, the perspective is to be based on "music" as a form of participation in performance, priority would be on the performative aspects. As such, the ability of the music to be "playfully responsive" (a property of the musical object) is not emphasised; rather, focus is placed on the phenomenon of players performing.

This perspective focuses attention towards performance, "the primary process of musicking" (Small, 1998, p. 113). At the same time, it does not intend to negate the

structural qualities and characteristics of the musical object; but those qualities are not primary in this analysis.

Ergodic musicking is therefore generally compatible with analyses that shift focus from the aesthetic object to its actualisation. Albeit referring to a different context, a compatible perspective has been offered by Alperson:

> "In short, the aesthetic object model orientation of Anglophone philosophy, combined with the presumption of the normativity of classical European composed music, tends toward a view we might call *spectatorialism*, an ontological and evaluative position that concentrates on the more or less intrinsic aural qualities of musical properties available to the listener in direct experience" (Alperson, 2016).

According to Alperson, this spectatorialist perspective in musical analysis ends up prioritising notated, composed music over other forms of musical performance, primarily improvised ones. Similarly, in this analysis of "musical agency" in digital games, the players are primarily understood as agents "rewarded" by a musical game system, rather than as "free persons in charge of their own destiny" (Aarseth, 2017) - albeit, in this case more modestly, of their musical destiny.

Instead, the *Super Mario Bros.* example should constitute a case of ergodic musicking – similar to other ostensibly more consistent examples of ergodic musicking presented so far. *Super Mario Bros.,* and other examples, are not necessarily cases of lower degrees of ergodic musicking; rather, they are islands of musicking situated in a context in which musicking is not continuously present.

Ergodic musicking emerges then as a modality that is available in many instances of digital games, and not solely limited to obvious musical examples. Further instances of ergodic musicking are detailed in the next section.

3. Experimental ergodic musicking

As suggested in the previous section, some of the most common occurrences of ergodic musicking are actually occasional and episodic, and their occurrence is only evident during specific segments of gameplay.

Super Mario Bros. is a particularly clear example of such a case. The musical component of the performance is rendered explicit by clear references to musicality, thanks to the isomorphic musical qualities of the audio/video synergy. Sounds that are synchretically connected with common events in the digital game (such as jumping, fetching a coin, and so on) are imbued with distinct musical meanings: the musically literate listener will have no difficulty recognising a glissando, or the pitch of a certain note, or perhaps the distinct timbre of a musical instrument (as commented on by Whalen and Summers).

The musicality of this content also extends towards ergodic effort: manipulation of the cybermedia takes musical forms, rendering possible ergodic musicking. Countless other digital game examples present a similar isomorphic synergy, in which the pressing of a button or a given visual event is accompanied by a tightly synchronised sound. In these other examples, there might not be such evident musicality: the sounds employed could be more akin to what is considered a "sound effect", an organised composition of sound that does not present evident, self-sustained musical qualities, not referring to

conventional musical sounds. The sonic materials used to craft these "effects" are usually attributed extramusical value, and they might include previous recordings such as foley sounds and synthesised elements, or they might employ methods of compositions that do not adhere to established musical conventions such as musical temperament or tempo.

In this section, these examples will be explored by theorising on how they could constitute instances of an "experimental" type of ergodic musicking. This theoretical concept will be addressed as "experimental" by contextualising it within experimental composition practices, specifically technique related to "musicalization of sound" (Kahn, 1999, p. 18).

Examples of extramusical "sound effects" that fit this description abound; for instance, "gunshot effects" are a rather stereotypical sound that can be found in a number of digital games, such as the popular multiplayer first-person shooter series *Counter-Strike* (Valve Corporation, 2000/2012). These sounds, and the ergodic effort involved in playing this digital game, have no evident musicality. The digital game represents non-musical contexts, and no elements in the digital game seem to refer in any way to forms of musicking. Ergodic musicking is a musical performance that defies the parameters of previously established forms of musicking, extrapolating properties of different musical performers and mixing them together in original ways. The absence of evident reference to musicality should therefore not impede the search for ergodic musicking. By basing the discussion on the theoretical construct built up so far in this dissertation, a case will be made that the sounds of *Counter-Strike* and other similar examples can serve to actualise experimental ergodic musicking – a speculative, plausible form of ergodic musicking.

In digital games, players are given control over portions of the acoustic output of the cybermedium. Players might interpret their performances as musical or try to play the digital game so as to produce somewhat musical results. For example, it could be said that the repetitive sound of a machine-gun being fired in the digital game forms a rhythm, as such presenting instances of musicality. Therefore, players might use this affordance in order to produce moments of musicking. The activity can have a simply interpretative, cognitive nature, in which players note the musicality of non-musical situations; or it can involve more tangible and explicit effort, where players perform to produce a desired musical result. In this latter case, during experimental ergodic musicking moments, the ergodic effort would not be directed toward competing or obtaining positive outcomes, or otherwise reaching goals pre-set by the ludic system. Rather, it would constitute a form of self-determined achievement.

When commenting about goals in digital games, Leino notes:

> "In many games (more specifically in those to which Juul (2007) refers as having "obligatory goals") what the game artefact requires the player to do in order to keep the activity from ending corresponds to what could be conceptualised as a "goal" of the game […]. Not all games have goals, and many of those that have, can be played without acknowledging the existence of the goal. For example, *SimCity* (Maxis, 1989), according to Juul (2007), has no goal at all. If trying to explain a playing of such game with the goal-framework, we would describe the situation so that the player herself has set the goal to strive for" (Leino, 2009).

Leino also adds that self-determined goals have to fulfil a general "gameplay condition" set within the given digital games. In the case of experimental ergodic musicking, the result desired by the player is not to be intended as a fully detailed, extensive goal to be consistently pursued, similar to the one described by Leino in *SimCity*: it might rather comprise a momentary detour. It would therefore be potentially possible to actualise

experimental ergodic musicking even in a digital game that is ostensibly based on canonical goals, such as *Counter-Strike*.

With that said, this instance of musicking is not considered to be on the same level as the ergodic musicking examples of the previous chapters, since it does not present most of the characteristics debated in the previous chapters. It can be said though, that in these cases, players are performing an experimental, exploratory form of ergodic musicking.

Analyses of experimental ergodic musicking share several methodological challenges with improvisational musicking. In fact, it is an ephemeral musicking, available to the casual dilettante, which might employ the modality in a purely cognitive form. This renders its manifestation inherently difficult to document: indeed, as Bailey commented with regards to improvisations, it seems "too elusive for analysis and precise description" (1993, p. IX).

Albeit difficult to document, experimental ergodic musicking can be contextualised alongside the musical traditions and practices of fields such as experimental composition, or sound art.

> "The emergence of sound art in the 1980s was characterized by a problematic attitude toward Western art music […]. The idea of the *musicalization of sound* arose as a means to identify and supersede techniques in which sounds and noises were made significant by making them musical" (Kahn, 1999, p. 18).

Instances of musicalisation of sound have also been documented before. A primary account of this phenomenon is undoubtably Luigi Russolo's *intonarumori*, a series of experimental musical instruments that employed non-musical sounds as musical material as early as 1913 (Chessa, 2012, p. 4). However, the practice of experimental

ergodic musicking echoes the ideas described by Kahn in that it focuses on instances of musicalisation of extramusical sounds.

The experimental modality of ergodic musicking is therefore afforded to digital game players and is not connected with intrinsically musical elements to be found in the cybermedium in question. The parallel being drawn between experimental compositions practices and ergodic musicking needs to be punctuated by specifying some of the most evident differences between the two forms of musicking.

As it is self-evident, the processes of the musicalisation of sound described by Kahn were directed towards compositional efforts. In other words, musicalisation of sound is described as a technique available to, and developed by, experimental composers. The practice is contextualised in a specific historical phase of Western art music.

> "Within the history of Western art music, noises were not intrinsically extramusical […]. The determination of extramusicality rested not in a hard and fast materiality but in the power of musical practice and discourse to negotiate which sonorous materials will be incorporated from a world of sounds […] and how" (Kahn, 1999, p. 68).

Avant-garde or experimental music can be inserted in this line of thought. The avant-garde composer would contribute, in transgressive fashion, to the complex cultural processes at stake in assigning musical value to sounds. The ideal activity of the experimental composer is directly focused on the production of some form of composition and/or performance:

> "To make extramusical material musical, the sounds of the world were processed in numerous ways. [For example,] sounds were technologically selected and manipulated to render them suitable as musical materials, as in phonographic practices such as *musique concrète*" (Kahn, 1999, p. 69).

The latter example of *musique concrète* consisted of experiments with direct intervention on phonographic media, altering the grooves of a vinyl record in order to generate new, unprecedented sonic experiences. The alteration was designed to render the original recorded sound event unrecognisable. Famously, the "cut bell" experiment consisted of a modified vinyl record in which the initial and the final part of the recording of a bell was omitted, only maintaining the central part of the recording. This process generated "new sounds", previously unavailable acoustic experiences, rather than mere reproduction of recorded sound events.

These elaborate compositional techniques are not involved in experimental ergodic musicking: what is involved is the effort of musicalising sounds. As argued throughout this dissertation, ergodic musicking tends to deconstruct established musical roles, forging a new musical participant in the digital game player. Experimental ergodic musicking can in fact present elements that are akin to the methodology and the role of the avant-garde composer. In our *Counter-Strike* example, players were performing a type of attentive listening, selecting certain elements from the overall acoustic output, and purposefully activating them in musical fashion. This activity does not produce the long-lasting results of experimental composition, but, in typical ergodic musicking fashion, is instead extemporaneous and volatile.

Experimental ergodic musicking therefore includes a substantial cognitive predisposition, in which any element of the sonic aggregate of a digital game can, once actualised, be appreciated in musical fashion.

4. Ergodic musicking with adaptive musical systems

The principles for an "experimental" reading of musicking with digital games was elaborated upon, explaining that ergodic musicking can happen with digital games that have no intrinsic musical content, or otherwise do not feature forms of musical performance. It is however possible to musicalise ergodic efforts, effectively turning a session into a form of musical performance.

The ergodic musicking framework is therefore applicable to a wide range of examples. Throughout this chapter, light has been shed on how digital games such as *Super Mario Bros.* use intrinsic musical sounds, employing a tight kinesonic congruence and synchretic connection, intertwining musicality and ergodicity.

In this section, examples that have opposing characteristics, that feature loose kinesonic congruence, are not isomorphic in nature and do not show evident synchretic connection will be considered.

In Chapters 3 and 7, it was argued that digital games do not just feature linear musical compositions: rather, they also (and possibly prominently) employ musical systems capable of dynamically intervening on the playback of pre-recorded musical tracks. These musical systems, or compositional forms, are described as dynamic (Collins, 2007). As mentioned, dynamic audio is "audio which reacts to changes in the gameplay environment or in response to a user" (Collins, 2007).

In Chapter 3, however, Collins' account of different forms of dynamic audio (Collins, 2007) was presented. When the change in audio is identifiable in the "game

environment", not being directly triggered by active user input, the audio is considered to be adaptive. Adaptive techniques have long been used in digital game sound design; "an example is *Super Mario Bros.*, where the music plays at a steady tempo until the time begins to run out, at which point the tempo doubles" (Collins, 2007).

The adaptive function of *Super Mario Bros.* is used to signal to the players that time is running out: the levels in the game need to be completed within a given time limit. Even if the change in music is not synchretically connected in a tight fashion with user input or with visual events, the occurrence is however only manifested if the players fail to act in time. As such, the cybernetic qualities of digital games are also involved with adaptive sounds.

In other cases, the change in sound (or the transitions of the musical composition) can be, more or less directly, influenced by the players' ergodic effort. An example of this degree of dynamic activity can be found in a large number of digital games; for the sake of this dissertation, focus will be placed on one specific example. In *The Legend of Zelda: Breath of the Wild* (Nintendo, 2017), different musical cues and segments are triggered according to the players' movements on the digital game map. In fact, different gameplay moments, or locations situated on the game map, are connected with certain musical compositions. For example, approaching a group of enemies will trigger a specific tune, which has been associated with combat phases. This will in turn temporarily mute the standard musical accompaniment associated with a given in-game location.

This dynamic system has different functions directly related with gameplay actions, alerting the player of immediate danger, while providing a musical commentary to specific game situations.

These examples of music and sound are clearly in line with filmic tradition, being reminiscent of the functions and tropes of "background music". By applying a film studies paradigm, these examples should be considered as extradiegetic, as they do not seem to pertain to the fictional world represented in the digital games; rather, they should be considered as part of the *mise-en-scène*. As mentioned in Chapter 5, the diegetic/extradiegetic compartmentalisation of sound was already considered to be "simply untenable" (Curtis, 1992) in early cartoons. In digital games, which are a substantially different audiovisual medium, such compartmentalisation is even more problematic. Adaptive musical works have also been analysed for their implications in relation to the notion of diegesis. Imported from film studies, diegesis has been adapted differently to digital games. This has led to analyses of player action in relation to their diegetic placement (Grimshaw & Schott, 2007; Jørgensen, 2007; Collins, 2008, p. 125-126; Jørgensen, 2011). For instance, a player can act within the diegetic space following extradiegetic musical cues such as "background music", short-circuiting the supposed clear-cut distinction of diegetic space (Jørgensen, 2007).

A full discussion on the applicability of the notion of diegesis to digital games is beyond the scope of this dissertation; it is however of note that these diverse examples point to a similar occurrence. In all cases, player actions often have contingent musical implications. Players with diverse degrees of willingness and awareness, control parts of the musical content, juxtaposing them during gameplay.

In these cases, the ergodic musicking in action is comparable to that discussed in relation to the early *Super Mario Bros.* example. As mentioned in that case, players are given control over snippets of musical sound, controlling them by direct action: the

pushing of a button results in a glissando sound. If in these cases, the ergodic musicking is connected with a tight isomorphic synchronisation, in *The Legend of Zelda: Breath of the Wild* there is much less isomorphic sound involved: the changes in the musical accompaniment are not directly connected with player input. The musical transitions are in fact purposefully designed in order to take place in a smooth fashion, without resulting in abrupt changes.

Nonetheless, from a musicking perspective, it has to be noted that the player is actively participating in a form of musical performance: in fact, the final musical output that is actualised during a given play session is directly correlated with the player's activities. Even if those activities, such as moving and approaching a group of enemies, are not immediately musical, musicking is in action, since the player is effectively juxtaposing musical segments, producing and structuring a certain acoustic output. As such, the ergodic efforts are not primarily directed toward musical results, but are imbued with musical meanings, since the cybernetic feedback loop of digital games happens to be permeated by musical features.

This understanding of ergodic musicking with adaptive musical systems aims to be consistent with the musicking concept. Small does not aim to build a hierarchy of importance, nor to favour certain musickings over others. "The verb to music is […] descriptive, not prescriptive. It covers all participations in a musical performance, whether it takes place actively or passively, whether we like the way it happens or whether we do not, whether we consider it interesting or boring, constructive or destructive, sympathetic or antipathetic" (1998, p. 9).

The degree of active participation or agency in the musicking is therefore of relative importance. In the cases considered, the players of *Legend of Zelda: Breath of the Wild* seem to be passive when compared to the players of *Guitar Hero* or *Rock Band*. In both cases, however, relevant musicking can be found. Ergodic musicking does not achieve a certain degree of quality or relevance in order to be considered as such. Disregarding musicking because of insufficient complexity would therefore not fit within the musicking framework. Similarly, a less active or discernible form of musical action is to be considered for its degree of musicality, and as such, should be included in this discussion.

5. Generative musical systems in digital games

In Chapter 7, the digital game *Otocky* was discussed as an example that affords a form of improvisational ergodic musicking, contrasting this perspective with previous takes on the subject that had commented on the procedural or generative features of the game (Collins, 2007; Moseley & Saiki, 2014; Altice, 2015, p. 270). In this section, this topic will be expanded, investigating examples of generative musical systems in digital games in relation to ergodic musicking.

One of the possible fields of research connected with procedural content generation (PCG) is concerned with the production of "methods [that] can alleviate some of the demands on game designers, developers, and artists by fully automating the process of creating game facets or within computer-aided tools designed to assist the human creator" (Hoover, Cachia, Liapis, & Yannakakis, 2015). In this context, the game facet would be a loosely defined game element, such as "audio, visuals, gameplay, narrative,

level architecture and game design" (Hoover, Cachia, Liapis, & Yannakakis, 2015). Hoover et al. are interested in exploring "multiple generated game facets that are combined through mixed initiative co-creativity, where the machine and the player create and collectively augment the player's gameplay and creative experience" (Hoover, Cachia, Liapis, & Yannakakis, 2015). The system is applied to a proof-of-concept game reminiscent of classic *shoot'em ups* called *AudioInSpace*. The players are afforded different gameplay-relevant options, while the system, based on the player choices, will evolve multiple parameters, assuming that the players' choices represent their preferences. In this sense, "multifaceted game creativity" is produced by a mixed-initiative, combining the player and the machine. Audio is deeply involved in *AudioInSpace*. Firing a bullet generates a random musical note, with new notes being played by the system once enemies are eventually hit. The result is a musicalised acoustic output, similar to that described in *Otocky*; unlike *Otocky*, in this case the machine performs the activities typical of procedural content generation (and discussed in Chapter 7), adding significant initiative to the overall output.

A similar example is the *Sonancia* system, "built for generating multiple facets of horror games, with the intention of creating tense and frightful experiences" (Lopes, Liapis, & Yannakakis, 2015). The main concern addressed in this example is "orchestration":

> "It can be argued that most games already display a form of "procedural sound", where player actions determine what sounds or music the game should play (e.g. players firing guns in the background of a multi-player shooter) or through the simple actions of non-player characters that inhabit that virtual world (Garner & Grimshaw, 2014). This work however argues that this is a limited and narrow way of coupling sound with game levels and new approaches could potentially be developed to better orchestrate the two with the specific aim of increasing the player experience and immersion" (Lopes, Liapis, & Yannakakis, 2015).

The coupling of sounds and game levels is achieved via a process of sonification of the digital game environment, creating " an audio experience that is tailored for any level" (Lopes, Liapis, & Yannakakis, 2015). The system combines spatialisation techniques typical of 3D game engines and mixed-initiative creativity, processing and placing sound recordings in game locations based on player in-game actions. For example, a player might decide to stand still in a given room of the level, or perhaps sprint through the course; the different actions would generate different sonifications.

Similar examples in the field of generative musical systems are augmenting the involvement of machines in the cybernetic loop typical of digital games. Previously, examples of adaptive musical systems used in commercially available digital games have been considered, such as *The Legend of Zelda: Breath of the Wild*. In these cases, player engagement has been described as ergodic musicking, emphasising the participatory nature of the musical output actualised during gameplay. In *AudioInSpace,* the players are similarly performing ergodic musicking in a fairly evident manner, since the musical content involved is explicitly musical. In *Sonancia*, the acoustic content is less explicitly musical, and as such, verges more towards experimental musicking practices.

In both cases, the players and the machines form part of a musical ecology in which the resulting acoustic output will be the product of a mixed-initiative, involving the players' ergodic musicking efforts and the input produced by the computational systems. As discussed in Chapter 2, Actor-Network-Theory clarifies how non-human agents participate in the social assemblage; in relation to digital games, Taylor takes into consideration "how we are interwoven with our technologies and how they may at times come to act as a kind of independent agent we play alongside" (2009, p. 333). In *AudioInSpace* and *Sonancia*, the implications described by Taylor in relation to mods

assume musical significance. The systems included in the two cybermedia considered in this section are contributing, within the context of a given session, to the overall acoustic and musical output, acting as autonomous agents within a mixed-initiative feedback loop. The possibilities of actualising different musical choices are not fully predictable, as the algorithm trains and evolves based on player inputs. The ergodic musicking exerted by the player is ultimately dynamically interwoven with the autonomous agents, which are also involved in a technologically enabled form of musicking.

6. Unit of musical performance in digital games

Through the course of this chapter, an alternative side of the analysis of musicking with digital games has been considered, with focus instead being placed on the formal contents of the musical compositions included in the digital game media.

Specifically, debate has focused on how the cybernetic qualities of digital games permeate the musical systems included in them. Composing musical works for digital games is a practice that needs to address this cybernetic nature; as debated in Chapter 3, Kaae defined dynamic music in games as "music which is in some way able to react to gameplay, and/or is in some way composed or put together in real time by the computer" (Kaae, 2008). The "computer" then, seems to have a significant level of agency on the resulting musical output. Of course, the adaptive musical systems handled by the computer mentioned by Kaae are programmed in order to progress according to parameters pre-decided by the development team, which can possibly include dedicated sound programmers, sound designers, composers, and so on.

This occurrence constitutes a form of cybernetic musicking system. Traditionally, participants in a musical performance would, regardless of the role they might take up in a given performance, be composed of instrumentalists, attendees, dancers, and the like. Composers could be said to be participating in the performance asynchronously, having previously provided material to be performed. In digital games, software actively reconfigures the musical material in real-time. In generative musical systems, autonomous musical agents music alongside the player, producing a technologically mediated form of musicking.

Moreover, the three modalities of ergodic musicking debated in this chapter are substantially different from one other.

First, the presence of fragments of sound that are clearly musical in digital games constitutes an opportunity for ergodic musicking. Such is the case of *Super Mario Bros.*, and of similar examples of digital games that use isomorphic musicalised sounds.

A similar occurrence of ergodic musicking can also be manifested with non-musical sounds: I define these cases as experimental ergodic musicking, a performative modality made possible through the cognitive and/or tangible musicalisation of sound.

Adaptive musical systems afford the player the possibility to recombine the musical output of a play session. In these cases, fairly articulated musical compositions are juxtaposed or intertwined based on the players' ergodic efforts, as they traverse the digital game media. The sounds, in these cases, would most probably be notably musical, without being synchretically connected to distinct units of action or visual events.

Generative musical systems produce musical content alongside the ergodic musicking exerted by players.

These cases of ergodic musicking are to be understood in conjunction with the prime examples of ergodic musicking discussed in Chapter 6 and 7 of this dissertation, as they all pertain to it.

Given the diversity of these examples, ergodic musicking is characterised by a wide heterogeneity. So far, it has been maintained that ergodic musicking is a form of ergodic effort occurring in conjunction with participation in a musical performance. The definition can also be inverted, as it is also correct to say that ergodic musicking is a form of participation in a musical performance involving ergodic effort. In this section, this definition will be problematised in light of the different examples provided in this chapter.

Throughout this dissertation, it has been maintained that digital games should not be understood as a consistently coherent media (Apperley, 2006). This perspective is substantially agreed upon within Game Studies. Jayemanne gathers different sources concurring on this point:

> "Videogames thus display an extreme heterogeneity, which Linderoth (2015) calls their "composite form". As Calleja argues, "digital games constitute a broad family of media objects, some of which diverge so much in their constituent characteristics that they cannot be considered as one homogeneous mass" (2010)[…] because they differ in so many respects from one another" (Jayemanne, 2017, p. 5).

According to Jayemanne, this heterogeneity constitutes a theoretical problem not only with regards to the analysis of the formal properties of digital games, but also when it

comes to determining what should constitute a “performance” with a digital game. “This all makes coming up with a rigorous unit of performance very difficult” (2017, p. 5).

Ergodic musicking can, to a certain degree, sit within this framework, albeit with notable differences.

Similar to that noted by Jayemanne in relation to performances, coming up with a unit of musicking with digital games can be very difficult. Ergodic musicking is multifaceted and heterogeneous; in the present chapter, diametrically opposite examples of it were broached. With regards to performances, Jayemanne notes: “at what point of observing someone play do we analytically declare ‘a performance’ to have occurred, and how might it be possible to generalize this across all possible games and research priorities?” (2017, p. 5). Ergodic musicking falls within this understanding: not a single unit of play that might constitute ergodic musicking has been described. Rather, different examples have been illustrated, using a comparative approach, and these cases have been contextualised within different research paradigms of musicology. For example, experimental music and its theoretical background has been brought into this chapter in order to exemplify instances of experimental ergodic musicking.

There are, however, substantial differences between ergodic musicking and Jayemanne’s theoretical premises about performance in digital games. The main differences are to be found in the theoretical background set up for ergodic musicking. In fact, musicking is not solely understood as a performance: the idea of participation is at a foundational level of ergodic musicking. As mentioned, the aspect of performing an operation in a musical context is of relative importance within the musicking framework. Spectatorship is also central and is considered as an activity not only in a cognitive and

interpretative sense. Small, for instance, emphasises how spectators have to choose to attend and be present for a musical performance; even aspects as mundane as sitting and behaving in an appropriate fashion are important for the spectators' role. These elements of participations might not have a direct, operational outcome on the musical performance in question, but are still fundamental to it. In other words, Small does not prioritise direct action in a musical performance as a paradigm of analysis. All participation/musicking is important and worthy of consideration. This characteristic is of critical relevance in ergodic musicking. In fact, the range of "active" participation in digital games is a rather unpredictable variable, as the examples presented exemplify. Using such a variable to define what it is to music would mean prioritising certain (ergodic) musickings over others, possibly "gauging" the level of musicking found. Such an undertaking would be theoretically unsustainable within the larger musicking framework applied throughout this dissertation.

The role of the ergodic musicker, therefore, is not solely that of an active performer, but rather that of a participant in musical performances with cybermedia. This aspect will be analysed further in the next sections of this chapter, in which will focus be placed on the technological implications of ergodic musicking spectatorship.

7. Ergodic musicking as transmusicking

In the previous section, the theoretical difficulties in locating a consistent unit of musicking in general, let alone in examples of musicking that also include ergodic musicking, were clarified. It was also stated that musicking is increasingly experienced with digital games, and that arguably developers and game makers are tapping into the

possibilities of ergodic musicking in new ways – a phenomenon that is facilitated by the fluid, developing nature of ergodic musicking.

These evolutions, or current trends, of ergodic musicking are not just centred on "music games", or notably musical digital games, but also involve digital games that are not based on specific musicalities of sort. The widespread use of adaptive musical systems in digital games augmented the instances of ergodic musicking available to digital game players. The interrelation of musicking and the new technologies applied in digital games has revealed new opportunities for musicking. It is reasonable to speculate that new technologies and their applications might in turn generate new forms of ergodic musicking, and certainly provide new examples for a worthwhile comparative analysis of musicking.

In this regard, musicking with digital games has provided some of the most futuristic and technologically advanced instances of musicking in recent times. On a similar topic, Borgo has highlighted the new characteristics of musicking in the contemporary, digital world on multiple occasions (2007; 2013), aiming to bring "Small's notion of musicking into the twenty-first century" (2013).

Borgo's research tackles technological innovations in musicking, and their relation with musicking practices. However, his analysis priorities the unprecedented affordances that these systems have made possible:

> "I am less interested here in musicking that uses newer technologies primarily for the creation of conventional musicking products, practices and occasions. I am more interested, instead, in approaches that explore the unique affordances of digital and network technologies" (2013).

Digital and network technology have rendered a new form of musicking possible, i.e. that of "transmusicking". Borgo offers a wide range of transmusicking examples:

> "Virtual music, network music, generative music, reactive music, interactive music, navigable music, telematic music and sound art, to name only a few. These practices and communities differ in significant ways, but they often share an orientation that questions presupposed boundaries between composers, performers and listeners, or those between music conceived as product or process" (2013).

In doing so, transmusicking focuses on the transgressive side of these practices, as it deconstructs established roles in musicking processes – a trait that has frequently been described in this thesis as also being present in ergodic musicking.

Borgo never includes digital games in his examples of transmusicking, but the musicking practices described here in relation to ergodic musicking seem to be able to cut across a number of the examples he provides. It can be said that ergodic musicking is another form of transmusicking – and one of its most lively. For example, Borgo considers examples of telematic musicking, shortened to "telemusicking", which have relevant implications for ergodic musicking. Telemusicking is presented as a performance practice, facilitated by network technology, in which participants take part telematically.

> "A […] telematic event presented on February 13, 2008 was organized, according to [contrabassist Mark Dresser], around the pressing question of "whether or not we could play 'in time.'" This performance was co-located between three California institutions to reduce the distance that signals would need to travel. The distributed ensemble included seven musicians [and] featured a set of new compositions written by group members to explore ensemble playing in challenging rhythmic and metric situations and to facilitate collective improvisations" (Borgo, 2013).

The performance was considered to be a satisfying experiment; Mark Dresser, the main organiser of the event, described the experience of playing in such a unique setup as

"somewhere between live performance and playing in an isolation booth in a recording studio […]. Time proved to not be a problem." (Borgo, 2013). The telemusicking described in this example could potentially have immediate practical uses for professional musicians, for instance in "developing artistic collaborations with international colleagues" (Borgo, 2013). However, Borgo highlights that this application of telemusicking would essentially constitute a surrogate experience: playing in close proximity would remain a desirable setup, with telemusicking largely employed as a practical tool to remove logistic issues. Instead, telemusicking might develop as an original form of musicking in its own right, and as a new creative opportunity. "We may be best served looking for the transformative rather than the replicative potential of these new technologies, exploring ways to expand and reinvent our sense of presence, body, agency, interaction and identity" (Borgo, 2013). The "transformative" is hence identified as a desirable direction in which to foster telemusicking practices.

Telemusicking and ergodic musicking are not mutually exclusive, and are related in different ways. It can be said that in recent years, digital games have rapidly become the most popular applications for telemusicking. Recent iterations of both *Rock Band* and *Guitar Hero* have included online multiplayer features. *Rock Band 4* (Harmonix, 2015) added synchronous online play through an update in 2017, while *Guitar Hero Live* (FreeStyleGames, 2015) features a modality called "Guitar Hero TV", which includes head-to-head synchronous online battles.

As is customary for contemporary commercial digital games, updates are routinely released, fixing issues or adding new content. The online functionalities of these two digital games have already been updated several times. The Guitar Hero TV service was discontinued in December 2018, and as such, telemusicking is no longer available on the

platform (financial reasons and a general low retail performance for Guitar Hero Live is probably behind this decision (Yin-Poole, 2018)). *Rock Band 4* though, is currently still active, and includes an optimised "Online Quickplay" mode, which promises to "bring you and your bandmates together, whether they're across the street or across the world" (Harmonix, 2017). Among the many features of this modality, players can perform songs together with other players connected to the game's servers, deciding which songs to put in the concert setlist, while also competing with other groups of players.

These added functionalities fall within both ergodic musicking and telemusicking; as such, they constitute cases of telematic ergodic musicking. The telematic ergodic musicking features of *Rock Band 4* and *Guitar Hero Live* might actually constitute one of the positive outcomes that Borgo envisioned for telemusicking, since arguably they do not aim to "replicate" live musical performing, but rather have transformative implications, if compared to a canonical musicking setting. Most probably though, the relevant transformative innovations for musicking brought about by these two digital games are to be situated within their ergodic characteristics, rather than their telematic features.

If, in the cases mentioned so far, telematic ergodic musicking seems fully manifested, it is also possible to conjure examples that merge telemusicking and experimental ergodic musicking. Contemporary digital games are increasingly found online, offering a number of features for multiplaying.

The concept of telemusicking as introduced by Borgo could also be applied to a larger frame. His interest lies in examples that primarily involve the performative aspects of

musicking, namely performing music telematically. Musicking does not only include performers, but also any sort of participants in such performance. As such, the term "telemusicking" should most likely also include instances of telematic participation in musical performances.

If that is the case, instances of telemusicking multiply exponentially. Borgo considers a telematic performance organised by Mark Dresser and focuses on the players' experience of it; but the subject of analysis could have also included the novel aspects related to attending a telematic event. Participation in telematic musical events can also include tele-spectating: in a case described by Borgo, four musicians were located in a single theatre, with two others joining in telematically. The audience was presumably situated in the theatre, for which no tele-spectating was in place; but tele-spectating is not an unlikely form of telemusicking. Spectating, and other forms of musical participation, are in fact deeply intertwined with digital and networked technology. An example of this could be as simple as watching a concert streamed online, which is hardly a rare occurrence.

These considerations should therefore bring up a range of implications for ergodic musicking. The digital games mentioned in this section, *Rock Band* and *Guitar Hero*, are in fact particularly suitable as spectacle: "these games are deeply theatrical, by design" (Miller, 2012, p. 125). Miller devotes much attention to performances with *Guitar Hero* uploaded on YouTube, and the kind of debate and exchange they generated among that community (2012, p. 144-151). Among other findings, Miller's research proves at the very least that spectating ergodic musicking is a very common practice, and that telematic technologies are commonly used for that purpose.

Similar examples of telematic spectatorship of ergodic musicking are increasingly common, as streaming platforms such as Twitch have facilitated live streaming of digital games sessions, while also developing spectatorship practices. Currently, the Twitch channel dedicated to *Rock Band 4* counts 62,985 followers, with a number of concurrent live sessions streaming virtually at any given time. Viewers of these sessions can also actively participate in a number of ways through a chat box, asking questions or requesting songs from the streamers. While a full debate on the topic of spectating in the context of digital games is beyond the scope of this dissertation, it is worthy of note, in relation to telemusicking, that platforms such as *Rock Band 4* and Twitch are to be considered as sophisticated and readily available instances of it.

8. "Navigable music" and ergodic musicking

Similarities and interrelations between transmusicking and ergodic musicking are not only limited to telemusicking.

Among the different transmusicking examples provided, Borgo also focuses on "navigable music". The term, introduced by architect, designer, and academic Marcos Novak, refers to works that organise sound not in time, but rather in a more or less delimited space. According to Borgo, an example of navigable music is found in the art installation *Sensuous Geographies* (Rubidge & MacDonald, 2003), "a responsive sound and video environment designed by Scottish choreographer Sarah Rubidge and composer Alistair MacDonald (in collaboration with Maggie Moffat and Maria Verdicchio)" (Borgo, 2013).

The installation includes an “active space” of 4.5 square meters, which is allocated for active participation. Once dressed with bright coloured robes, participants are blindfolded and prepared to enter the space. Once there, their movements are tracked and used to trigger and control different sounds that are subsequently played by an array of surrounding speakers.

> “The installation comprises a collection of polyphonic electroacoustic sound worlds which are created as the actions of visitors to the installation generate and influence both individual musical layers and the overall texture of the sound environment […]. The visitors' engagement with and immersion in the sound environment results in a continually evolving world of sound, image, light and colour which visitors can alternately observe from without and experience from within.
>
> *Sensuous Geographies* is intended primarily to be a space for interaction, for contemplation, even for play. It is in a very real sense a performative space, for the users both generate and become an integral part of the environment as they engage with it” (MacDonald, 2015).

The musicking role that participants take on while performing with *Sensuous Geographies* is clearly different from traditional musicking roles, such as that of musician, composer, spectator, and so on. In this regard, transmusicking phenomena and ergodic musicking can be confirmed to be theoretically compatible.

In this sense, the musicking has a degree of improvisation involved, since participants explore the installation’s affordances without much preparation. Also, *Sensuous Geographies* is designed for multiple simultaneous participants, shaping different possible interplays: “individuals listen and make space for others, respond, contradict each other, and build duets and ensemble sequences together” (Dixon, 2007, pp. 403-404; Borgo, 2013). The installation encourages body movements and connects them with music, in a way that can be reminiscent of dance practices. Given this description, participants can be said to be involved in a cluster of musicking practices.

The "navigable music" of *Sensuous Geographies* is comparable to various examples of ergodic musicking presented in this chapter, and the means by which adaptive musical systems attach loose synchretic connections to the act of navigating digital environments have also been described. For example, simple navigation of the digital environments of *The Legend of Zelda: Breath of the Wild* triggers transitions in the musical accompaniments, generating opportunities for ergodic musicking. The digital game examples presented in that regard, such as *The Legend of Zelda: Breath of the Wild*, were specifically selected for their non-musical nature. As such, this instance of ergodic musicking is occasional and volatile, only manifesting itself during certain portions of the session: this is unlike *Sensuous Geographies*, in which musicking is central and consistent. Different examples can be more telling in illustrating how aspects of "navigable music" can be emphasised when ergodic musicking takes place in digital environments with adaptive musical systems.

Proteus (Key & Kanaga, 2013) is a digital game focused on the exploration of an abstract landscape, with no clear ludic goals involved. Vella describes its musical system:

> "Specific musical cues, aural elements and melodies are attached to particular objects in the landscape, emerging onto the horizon of the audible as the objects come into view. Thus, for instance, when approaching the tower-like structures standing on certain hilltops, a high-pitched squeal of discordant, electronic notes makes itself heard, growing increasingly dominant, and finally almost overwhelming, the closer the player approaches to the towers" (Vella, 2013)

The synchretic connection between movements and objects in the game is rather loose. Sounds and musical cues are not tightly synchronised with visuals, but are rather loose and sparse. They would also appear to be rather incongruent kinesonically; although this is intended as a desired aesthetic effect. There tends to be little isomorphism: quite

possibly, the designers were looking for the antithesis of an isomorphic effect. In fact, players find themselves trying to determine which movements, objects or game locations are connected to certain acoustic outputs. The experience described by Vella, in which a squeal of notes is synchretically connected with a tower, is a rare example of one of the few discernible sound signals in the game.

The experiences of participants of *Sensuous Geographies* are comparable to those of *Proteus*. Players gauge their movements and try to determine which musical outputs are connected with their activities, exploring not only the environment, but also the possibilities afforded by the interface.

Without delving into the nuances of what "navigable music" as a category should constitute, stress must be placed on how the kind of transmusicking described by Borgo seems to be fully manifested, in an original fashion, within examples of ergodic musicking.

> "One of the challenges of even the most advanced examples of interactive art remains the extent to which participants can gain some level of fluency with the interface and familiarity with the work's "landscape." How much time do most participants actually spend "navigating" these new environments […]? A visit to the museum on a Sunday afternoon may not suffice […]. Transmusicking practices may have the potential to alter and expand our sense of presence, body, agency and control, as well as our conventional notions of "music" and "performance" (Borgo, 2013).

The transmusicking potential to affect our sense of presence, and most importantly for this dissertation, our "conventional notion of music and performance", is actually well manifested in ergodic musicking. On a daily basis, musicking is experienced in an unquantifiably large number of concurrent play sessions with given digital games.

Players of digital games engage in the full range of musickings possible with ergodic musicking, taking part in unconventional musical performances.

Also, Borgo expresses concerns related to the availability of the new environments for transmusicking, and the limited time that can be allocated to them. However, if ergodic musicking is to be addressed as a form of transmusicking, this problem ought to be considered as solved, as the availability of digital games is now far more widespread, with significantly lower prices for hardware and software.

9. Conclusions

This chapter has been dedicated to addressing the further instances of ergodic musicking, and completes an overview of ergodic musicking, illustrating its wider theoretical boundaries and contextualising it within contemporary technological discourses related to musicking.

Ergodic musicking has been outlined in Chapter 4, where some of the most urgent and evident examples of this contemporary form of musicking have been presented. Digital games with clear musical content represent its most logical environment: musicking in games such as *Guitar Hero* or *Thumper* is continuous, persistent, and central to the overall ergodic experience. Even so, different examples show the diversity of the ergodic musicking phenomenon. For instance, the digital games designed by Toshio Iwai are deeply imbued with ergodic musicking, but have come to represent a contradiction: they constitute a crucial stepping stone, while also being idiosyncratic and original. Even within examples of digital games largely revolving around music, ergodic musicking is

nuanced and different, revealing new facets across a variety of different cases. Comparing different examples reveals the plurality of available forms, a multitude of opportunities for musical participation that together constitute the plurality of ergodic musicking.

And yet, ergodic musicking should not be understood as a modality that is only available in clearly musical digital game examples. The present chapter has an important role, in that it shows how ergodic musicking is actually manifested within examples that might seem unlikely.

Digital games commonly feature musical sounds: in these cases, musical elements become evident and recognisable. A "musical sound", in this sense, should be understood as a form of organised sound that presents elements that are akin to those understood as "traditionally" musical, such as the use of musical timbres, or their adherence to a system of tonality. Conventionally, extended musical compositions should not be considered as "musical sounds", as these examples are usually fragmental and relatively constrained in scope and duration. This understanding of "musical sound" is informal and derives from conventions mostly established among filmic practice and studies.

The presence of musical material renders performances with digital games a musical affair, in which participation of the players might presuppose different musicking roles. By manipulating musical materials in a cybermedium, the players' ergodic efforts are connected with musicking, rendering ergodic musicking possible.

But ergodic musicking should not be connected solely to sonic elements with clear musical value contained in the digital game media package. In fact, attributing musical value to given sonic fragments is not a formal operation, and should vary according to the cultural context considered. Traditionally, extramusical sounds in audiovisual media are referred to as "sound effects" and are usually considered to be organised forms of what Kahn calls "contraptual sounds produced by noninstrumental objects" (1999, p. 103). These sounds, which ideally should not be originated by musical instruments, are considered to be "significant" in that they are imbued with aspects of "reproduction, representation, meanings, semiotics" (Kahn, 1999, p. 102). These sounds represent something, and are used because they are recognisable and discernible, as they are "imitative" in nature.

The status of such sounds as non-musical, has been challenged by composers operating within experimental and avant-garde musical circles. *Musique concrète* is a prime example of the musicking practices centred on musicalisation of sounds. With different modalities, the process has involved composers and artists such as Luigi Russolo and John Cage: avant-garde composition has shaped and contributed to "the changing auditive environments of this century" (Kahn, 1999, p. 102).

If the cultural distinction between musical and non-musical sound has become blurred, an experimental modality of ergodic musicking is theoretically possible. Experimental ergodic musicking can be purely cognitive, understood as a musical interpretation of sounds, or it can be manifested in actual operations during play sessions (of course, an operation of this kind implies a concurrent cognitive and interpretative attitude). By musicalising non-musical sounds in digital games, players use ergodic musicking in an

experimental fashion, using the potentiality of the cybermedium for extemporaneous, volatile musical purposes.

Finally, further musicking can be observed in examples that, to varying degrees, make use of adaptive and generative musical systems. This technology is widely spread and continuously developing in digital games. Effectively, adaptive musical systems are a further actualisation of the musical potential of cybermedia, and interact in multiple ways with instances of ergodic musicking. While much theoretical attention is devoted to these systems (or musical compositions, as they are often seen to be), focus was instead placed on the players' renewed musicking roles. For example, by navigating a digital environment, players can now music, as their actions are cybernetically connected with an adaptive musical system. Moreover, in a generative musical system, the ergodic musicking exerted by the players is coupled by means of mixed initiative with autonomous agents, that music along players, producing ephemeral musical content tailor made for the current session.

These modalities of ergodic musicking, as with the previous two, have an extemporaneous nature, and bring musicking into unlikely scenarios. It is, of course, a form of musicking; for which "the verb to music […] covers all participations in a musical performance, whether it takes place actively or passively […], whether we consider it interesting or boring, constructive or destructive" (1998, p. 9). The participation does need to reach a certain prescribed level of complexity or awareness in order to qualify as musicking.

For its complexity and heterogeneity, ergodic musicking can (and should be) further contextualised within other musicking researches concerned with contemporary technological musicking. Specifically, Borgo has applied the musicking framework to

examples of musicking made possible by digital and networked technologies. These instances of musicking are collectively understood as transmusicking. Ergodic musicking can be considered as a form of transmusicking, although the specifics of ergodic musicking seem to cut across a variety of previous example of transmusicking.

Telemusicking, as introduced by Borgo, is a form of musicking made possible by networked technology. Presented as innovative, not fully developed, and brimming with potential, telemusicking has actually been implemented in recent years in digital games such as *Rock Band 4* and *Guitar Hero Live*. The ergodic musicking of these digital games becomes telematic and can be considered as ergodic telemusicking. Combined with other digital networked platforms such as Twitch, ergodic telemusicking is a contemporary reality, involving a substantial number of participants, and affording new forms of spectatorship to musical performances.

Similarly, the "navigable music" theorised by Novak and Borgo, and the musicking it entails, is akin to forms of ergodic musicking discussed in this chapter. Navigating digital environments is a common occurrence of contemporary digital games, and selected examples can be used to emphasise how developments invoked by Borgo, and considered as positive and desirable, have recently been featured in digital games. Once again, ergodic musicking seems to be a concrete example of transmusicking, realising its potential while adding the further theoretical layer of ergodicity to it.

Chapter 9

Conclusions

1. Musicking with digital games

This dissertation has detailed what musical participation in digital games constitutes, defining it as ergodic musicking, and proposing a theoretical framework for its academic conceptualisation. The musicology of digital games is therefore to be initially understood as the study of *musical forms of participation in digital games*.

These conclusions have been reached by applying the concept of "musicking", as introduced by Small (1998), to the analysis of digital games. This theoretical operation centres musicological analysis of digital games around musical practices, with a specific focus on the musical forms available and practiced by players of digital games, rather than aspects that are related to traditionally musicological musical content. It is insufficient for the musicology of digital games to only concentrate on content analysis, as identifying musical texts or musical objects within cybermedia is an operation that can only focus on a narrow section of these media objects. It is also imprecise to solely recognise musical participation in cybermedia if it happens to remediate an already established musical performance, thus focusing on aspects related to simulation.

Digital games, in fact, are not a consistently coherent media, but rather a cluster of different media forms belonging to the larger category of cybermedia. By comparing different digital games, it is possible to notice that players engage musically with them in

a variety of different ways. If ergodic effort can be identified as a unifying form of engagement across cybermedia, *ergodic musicking* can be defined as any form of participation in a musical performance that involves exerting non-trivial ergodic effort.

The subject matter of the musicology of digital games is therefore substantiated as *the study of forms of ergodic musicking*.

This perspective provides a new theoretical tool that tackles the widely different forms of musical participation employed by digital game players. Ergodic musicking is a new form of musicking, unique to cybermedia and characteristic of digital games. From dance games to *Rock Band* or *Guitar Hero*, from adaptive musical systems to digital games making use of musical fragments: ergodic musicking is in place in all these occasions. It can be continuous, consistent and central to the overall experience; or it can be episodic, ephemeral and peripheral.

Ergodic musicking solves previous theoretical conundrums regarding the musical status of music games, by re-centring the focus of analysis on the performance of game players. It is not intended to answer the question of what a music game is supposed to contain, but rather it details the phenomenon in place when digital games involve musical forms of participation.

Ergodic musicking is a theoretical construct that synthesises musicking and ergodicity. Ergodic effort is here understood as the non-trivial effort exerted by users of cybermedia (Aarseth, 1997; Aarseth & Calleja, 2015). Ergodic musicking is manifested in all digital game sessions in which a musical performance can be said to take place: these include music-oriented digital games, as well as examples in which musical fragments

are involved in the cybernetic feedback loop between players(s) and digital games. Players can also musicalise sounds, an operation that can be purely cognitive and interpretative, or explicit and tangible.

2. Situating musicking with digital games

The perspective upheld in this dissertation is theoretically situated within the current academic discourse related to the analysis of sound and/or music in digital games. Since this line of research can be placed within the larger frame of Game Studies, this dissertation engages with both game sound studies and with Game Studies at large.

Essentially pertaining to the humanities, the discipline of Game Studies is a multidisciplinary one, characterised by a wide variety of different approaches. The analysis of the sound and music of digital games is only one of the many different subfields of Game Studies. Within this broad theoretical scope, a few major research tools, academic topics, and general areas of interests have emerged in recent years.

Specifically, Aarseth introduced the concept of "cybertext" (1997), a form of literary text that is defined by its cybernetic qualities. The idea of a "text", be it a literary or a semiotic text, is as such present in this foundational publication for the discipline of Game Studies. In Chapter 3, examples were selected from a thread of research concerned with the analysis of the "musical text" to be found in digital games. In these cases, the analysis of "music in games" is identified as the study of pre-composed musical works found in given digital games. This approach is focused on the "non-ephemeral, artistic content" (Aarseth, 2003) stored in the game container. For example,

an application of this approach consists of analyses of the peculiarities of such content, including its non-linear and adaptive nature (Collins, 2007; Kaae, 2008).

Although the study of musical text is certainly relevant, it is only a fraction of what the musicology of digital games should provide. This dissertation has included different studies that express concerns regarding this methodological outline. In fact, authors within musicological research have already proven that musicology cannot be considered as the study of musical texts. Blacking is concerned with the methodological divide between musicology and ethnomusicology, arguing that musicological scholarship should actually include the study of musical practices, which is traditionally the main subject of ethnomusicology (1973; 1987). Taruskin (1982), Abbate (2004) and Cook (2001), have shaped musicology around a performance-based perspective. The plurality of forms that determine musical meaning (Frith, 1996; DeNora, 2000; Kramer, 2002) is also central to musicology. Similarly, Small criticises academic takes focused on the study of musical texts, ignoring other musical practices and in the process effectively identifying as "music" only "musical works" (1998). Music, instead, should be considered not as a noun, but rather as a verb: to music. This perspective has led Small to the concept of musicking: "to music is to take part, in any capacity, in a musical performance, whether by performing, by listening, by rehearsing or practicing, by providing material for performance (composing), or by dancing" (1998, p. 9). This perspective affords the means to tackle supposedly elusive musical practices, such as musical improvisation, a form of musicking that might not involve musical compositions at any point.

Applying this line of musicology to the previously mentioned studies about musical analysis of digital games brings up a new path of enquiry: if music is not to be

understood as a musical work, the actual subject of musical analysis of digital games should not be musical composition, but rather the larger spectrum of musicking. This framework provides the musicology of digital games with a much larger and complete scope.

The concept of ergodic musicking is the result of this perspective, and is intended as a theoretical tool for the analysis of musical participation in digital games and its related aspects.

3. Ergodic musicking in music games

Ergodic musicking is particularly evident in digital games that are centred on music, informally known as "music games".

Even if the "music game" category cannot be formally maintained, it is possible to identify music-centric digital games that explicitly remediate already existing musical situations (*Guitar Hero*, *Rock Band*, etc.). However, others "music games" do the opposite, presenting non-musical situations in conjunction with forms of musicking (*BIT.TRIP RUNNER*, *Rhythm Tengoku*, *Thumper*, etc.). "Music games" do not solely remediate musicking, but also create new musicking opportunities.

The status of "music games" within Game Studies is contested. Specifically, the case of dance-based games is considered, highlighting the degree of agency on the musical content afforded to the players. In fact, Miller argues that "[dance games] might be considered music games first and foremost, because of the way they capitalize on

players' prior relationships with particular songs, artists, and genres" (2017, p. 93). Others maintain that for a digital game to be a "music game", there should be direct intervention on the musical output (Kassabian & Jarman, 2016), an aspect that is arguably absent from dance games, where players dance to pre-composed musical tracks. The two perspectives on the subject are therefore distinct, as they give different relevance to contextual elements: while Miller includes player predispositions, Kassabian & Jarman focus on tangible music making.

The musicology of digital games cannot be limited to cases in which the mechanical affordances of the cybermedia include direct "music making"; making music is not simply concerned with pushing an input device and triggering a sound, but rather, it includes a variety of cognitive and tangible implications. Such mechanical features are of relative importance. As previously mentioned, the musicology of digital games is the study of forms of participation in digital games where music is involved – not the study of the formal musical properties of certain digital games.

Players of digital games music in a variety of different modalities, regardless of the different formal properties of the digital games in question. Specifically, in both cases mentioned above, ergodic musicking is taking place, since players are exerting ergodic effort while participating in a musical performance. The fact that players directly intervene with musical material is of relative importance for ergodic musicking, for all the modalities discussed (dancing, playing an instrument, spectating) amount to forms of musical participation.

Previous research has already focused on aspects that are contiguous to ergodic musicking; subsequently, this research thread has been grouped under the theoretical

frame of ludomusicology. The term is sometimes understood as a form of synonym for "musicology of digital games". According to Hart, "the term is [...] used […] to describe the study of video game music, incorporating musicological, music theory, and sociological studies of music in video game and related contexts" (Hart, 2018, p. 3). This can be confusing, as the term has come to signify two different meanings: "Some scholars […] use it to refer to relationships between music and play in a range of contexts (Hart, 2018, p. 3). Moseley tends to the latter, as he considers ludomusicology to be "the study of both the musically playful and the playfully musical" (Moseley, 2013). This is a research focus with a degree of difference from that proposed in this dissertation. A playful attitude towards music is a central feature for ludomusicological enquiry; for instance, Moseley comments on the playful aspects of Mozart's compositions. Therefore, ludomusicology does not necessarily focus on digital games, but rather on locating playful features in musical artefacts and phenomena, and is as such, a discipline with some overlaps but with its own distinct focus and methodology. Ergodic musicking is not necessarily denoted by a playful connotation: while it is certainly possible to maintain a playful attitude while exerting ergodic musicking, the latter remains a modality only available to cybermedia, which cannot be extended to canonical musical artefacts.

4. Iwai and other examples

Ergodic musicking is a new theoretical concept, but it applies to old and new digital games alike. In this regard, the games designed by Japanese media artist Toshio Iwai hold special relevance: his first commercially published digital game, *Otocky* (1987), is considered an innovation in the field of procedural music compositions (Collins, 2009 ; Moseley & Saiki, 2014). However, these considerations were cotested, as it was argued

that *Otocky* does not actually make use of any procedural (be it generative or transformational) algorithm (Collins, 2009). Rather, the player exerts a form of improvisational ergodic musicking, without involving any procedural aspect. The example of *Otocky* shows that relevant, specific musicking occurrences elude analysis if the theoretical tools utilised are only concerned with aspects related to musical composition (be it of a procedural nature or not). As such, musicological analyses have so far failed to grasp the actual foundational importance of *Otocky*, because any kind of musicking involved in it was being reduced to a type of "composition".

Instead, not all musicking is directed toward composing musical works; musical improvisation is also a legitimate musicking modality, and it can be observed and practiced in ergodic musicking.

Iwai's work explores improvisation in ergodic musicking in an original, unique fashion, as evident in *Electroplankton* (2005), likely his most accomplished digital game work. Critical reception to *Electroplankton* has identified the lack of a save function as problematic (Pilchmair, 2007); ergodic musicking, in this sense, can be used as a theoretical tool to expand preconceived notions regarding what is the appropriate and expected musicking within digital games.

Iwai's work demonstrates that musicking with digital games is not necessarily an activity aimed at the production of new audio-visual works. Ergodic musicking is instead a modern, varied, and flexible instance of musicking, capable of including multiple traditional forms of musicking (such as composing, improvising, dancing, and more) in a new cybernetic context.

Procedural musical systems, however, have also created new technological opportunities for ergodic musicking. If ergodic musicking has long been expressed through manipulation of musical fragments, procedural music systems render new forms of musical participation possible. For example, in many contemporary digital games, different musical cues and segments are triggered according to player movements on the digital game map. The affordances of these musical systems have a direct impact on the ergodic musicking in place: the players are now actively participating in a form of musical performance, since the final musical output that is actualised during a given play session is directly correlated with player activity.

Digital games are not the only field in which new musicking is being facilitated by contemporary technological means. Borgo created the term "transmusicking" to classify forms of musicking mediated by digital and networked technologies (2013). Transmusicking also has a transgressive connotation, in which it disrupts previously established musicking conventions. In this regard, ergodic musicking can be understood as a form of transmusicking; in fact, it is the most accomplished, concrete, and widespread form of transmusicking. For example, Borgo identifies "telemusicking" as a form of transmusicking in which participants join in telematically, and describes example of music performances facilitated by such technologies. However, a fully realised instance of transmusicking is observable within examples of ergodic musicking. The interconnected musicking happening during online multiplayer sessions of digital games such as *Rock Band 4* (Harmonix, 2015) is defined as telematic ergodic musicking. Telematic ergodic musicking constitutes a frontier of musicking; the telematic exchange can also be intertwined with video streaming platforms, allowing the creation of complex webs of musicking interchanges.

Ergodic musicking is not only to be understood as a form of ergodic effort, but also as a contemporary form of technologically mediated musicking. Players of digital games revolutionise musicking, deconstruct established musical roles, and re-synthesise them in the new, hybrid figure of the ergodic musicking participant. The gamut of knowledge and musical literacy experienced within cybermedia today juxtaposes elements in unexpected and novel ways, creating a contemporary and widely adopted musical role.

The critical theoretical argument presented in this dissertation details this musical revolution, and it constitutes a theoretical foundation for this line of research, aiming to contribute to a renewed musicology of digital games.

5. Future developments

This dissertation has presented an outline of musicking with digital games, and further development of this perspective is certainly possible. In this section, topics that could be expanded in future work are presented.

Historical inquiry on ergodic musicking has only briefly been touched upon in this dissertation. An historical take on musical forms of participation in digital games is a necessary step in this discipline, as the means by which musicking in digital games actually evolved is currently unknown. Moreover, historical musicking research could also focus on regional scenes and/or specific historical periods.

Throughout this dissertation, reference has mostly been made to single-player digital games; aspects related to multiplayer ergodic musicking have only been addressed briefly under the banner of telematic ergodic musicking. Future research could explore

this aspect of ergodic musicking, possibly through case studies of digital games involving mimicry of consolidated musicking practices, or by considering digital games that propose new musical contexts.

Other aspects that can be developed relate to post-humanist readings of ergodic musicking. As recently discussed, "automated play […] encompasses a wide range of differing examples, from idling game worlds, seemingly autonomous NPCs, player-automated characters, to smart self-learning bots. Although all of them illustrate a post-human dimension of digital games, they differ substantially not only in terms of specific AI techniques but more importantly in terms of varied contexts of their usage" (Fizek, 2018).

If "participation" seems redefined in these examples, so musical forms of participation could be re-considered for this new context. While this dissertation references ergodic musicking in the context of generative musical systems, which involve degrees of automation, automated play suggests new possible forms of musical participation.

These are but a few examples of the potential development of a modern musicology of digital games. The possible applications of the study of musical participation – musicking – in digital games, however, remain innumerable and yet to be explored.

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