Game Sound Technology and Player Interaction:
Concepts and Developments

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Chapter 10
Listening to Fear:
A Study of Sound in Horror Computer Games

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ABSTRACT

This chapter aims to explain how sound in horror computer games works towards eliciting emotions in the gamer: namely fear and dread. More than just analyzing how the gamer produces meaning with horror game sound in relation to its overarching generic context, it will look at how the inner relations of the sonic structure of the game and the different functions of computer game sound are manipulated to create the horrific strategies of the games. This chapter will also provide theoretical background on sound, gameplay, and the reception of computer games to support my argument.

INTRODUCTION

Computer game sound is as crucial to the creation of the depicted gameworld's mood as it is in its undeniable support to gameplay. In horror computer games, this role is increased tenfold as sound becomes the engine of the gamer's immersion within the horrific universe. From the morphology of the sound event to its audio-visual and videoludic staging, sound cues provide most of the information necessary for the gamer's progression in the game and, simultaneously, supply a range of emotions from simple surprise to the most intense terror. In horror computer games, it is not recommended that the gamer divert their attention from the various sound events, as a careful listening will allow for—or at least favour—the survival of their player character. In his thesis on the sound ecology of the first-person shooter, Mark Grimshaw (2008) underlined that in common day life, where dangers are limited, the auditory system "can operate in standby mode (or, in cognitive terminology, [the] auditory system is operating at a low level of perceptual readiness) awaiting more urgent signals as categorized by experience" (p. 10). Just as Grimshaw did about the genre at the heart of his study, I suggest that "the hostile world of the [horror computer] game

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requires a high level of perceptual readiness in regard to sound" (p. 10). The level of attention required *vis-à-vis* sound must be increased all the more so as computer game environments are often designed to limit the visual perception of the gamer. Whether it is by means of a constraining virtual camera system (Taylor, 2005), by using stylistic effect such as the thick fog shrouding the streets of *Silent Hill* (Konami, 1999), or by drastically reducing sources of light, game designers have, through time, found a variety of ways to force the gamer to utilise their ears in order to help their player character survive in the nightmarish worlds in which they play.

To fully comprehend how horror computer games manage to frighten the gamer, one must understand how sound is structured, as well as be aware of how the gamer makes meaning with the information the sounds carry. From this point, many questions arise. What are the implications of the generic context on the reception of the sounds in horror computer games? On what basis should we approach the sound structure of those games? How does this structure allow for the *mise en scène* of the dreadful elements or horrific strategies of the games? What are the basic functions of horror computer game sounds and, once again, how can the game work on these functions to create a sentiment of fear and dread in the gamer?

As it will be further explored in the next sections of this chapter, I make the hypothesis that sound in computer games should be approached directly in regard to its purposes towards gameplay. After all, gameplay is what mainly distinguishes computer games from their linear audio-visual counterparts: the main difference between computer games and films being situated in the participatory and interactive nature of the videoludic medium. Therefore, it is mainly through a study of gameplay that true understanding of the role of game sound can be achieved. In this perspective, I also suggest that sound should be addressed in a way that is both accessible to designers and the most common gamer. In order to do so, I firmly believe that adopting a position that emphasizes reception issues of gameplay can provide a more productive model than one that would be grounded directly in the production aspects (implementation and programming) of game sound.

Overall, this text aims at explaining how horror game sound works in a way to elicit specific emotions in the gamer. Adopting a gamer- and gameplay-centric perspective, it wishes to highlight how the inner relations of the sonic structure and the different functions of game sound are used to create strategies based on the micro events and on the overarching generic context that regulates these events. With examples borrowed from the *Alone in the Dark* (I-motion, 1992-1995, Infogrames, 2001 & Atari, 2008), *Resident Evil* (Capcom, 1996-2009) and *Silent Hill* (Konami, 1999-2008) series, and from the computer game *Dead Space* (Electronic Arts, 2008), this paper will also try to demonstrate how the notion of genre, instead of being merely a tool to classify games, rather impacts on the expectations of the gamer and therefore structures the way they organize and make meaning of sound in relation to the game context.[1]

APPROACHING HORROR COMPUTER GAME SOUND

Before we try to understand what purposes sounds serve in horror computer games and how they contribute in generating fear, it is essential to take a look at the numerous factors which condition the gamer's journey and influence their listening through their gaming sessions.

The Horizon of Expectations

In her book *Game Sound: An Introduction to the History, Theory, and Practice of Video Games*, Karen Collins (2008) noted that "game [sound] has been significantly affected by the nature of technology […] and by the nature of the industry"

(p. 123). Indeed, economic and technological constraints are greatly responsible for the game's aesthetic as the limits imposed by production time and hardware often force the designers to lessen the richness of the soundscape while encouraging others to find inventive ways to overcome these constraints.[2] However, as Collins explained, the games themselves also affect game sound by the means of their genre, narrative structure, and participatory nature. Consequently, she pointed out that "[g]enre in games is particularly important in that it helps to set the audience's expectations by providing a framework for understanding the rules of gameplay" (Collins, 2008, p. 123). Consequently, the horizon of expectations gamers have of the games is probably the first thing that will influence the production of meaning towards a sound. As Hans Robert Jauss (1982) explains:

The analysis of the literary experience of the reader [or the videoludic experience of the gamer] avoids the threatening pitfalls of psychology if it describes the reception and the influence of a work within the objectifiable system of expectations that arise for each work in the historical moment of its appearance, from a pre-understanding of the genre, from the form and themes of already familiar works, and from the opposition between poetics and practical language. (p. 22)

This horizon of expectations will thus be forged by the gamer's previous experiences at playing computer games, particularly those in the horror genre, but also his familiarity with broader horror mythology and conventions such as the ones found in movies and novels. We can also maintain that the notion of genre will play a determining role in the way game sound is produced and then received by the gaming community. This relationship between production and reception is fundamental to understand the functions and evolution of sound in horror computer games. Indeed, these games are generically marked "which rely on generic identification by an audience" (Neale, 2000, p. 28) as well as generically modelled which "draws on and conforms to existing generic traditions, conventions and formulae" (Neale, 2000, p. 28).[3] To be considered as a horror game, a videoludic work must then be designed with a purpose of scaring the gamer and must be received as such by the gaming community that will then treat this intention as a gaming constraint. Accordingly, sound must be exploited to support these design choices, and, to a certain degree, correspond to the expectations the games produce.

What is a Horror Computer Game?

Horror computer games generate fear through mechanisms specifically tied to their videoludic nature even though they often draw their strategies of *mise en scène* from its cinematographic counterpart's conventions and mythologies (Whalen, 2004; Perron, 2004). Derived from the "adventure" genre (Whalen, 2004), these computer games exploit horror conventions on the plot level, often by opposing a lone individual, trapped inside a gloomy location, to a flock of bloodthirsty, monstrous creatures which he must confront—or sometimes run from—in order to survive. On the gameplay level, "the gamer has to find clues, gather objects [...] and solves puzzles" (Perron, 2004, p. 133). As it was mentioned previously, sound will play a determining role, as these games normally limit vision through their formal and aesthetic treatments, in helping the gamer to gather the necessary information on their environment to stay alive.

Horror computer games are not only designed to generate fear based on their narrative setting or the iconography they employ, but are also conceptualised to produce what Bernard Perron called gameplay emotions. According to Perron (2004), these games engender three different kinds of emotions: (1) fictional emotions which "are rooted in the fictional world and the concerns addressed by that world", (2) artefact emotion emanating "from concerns related to the artefact, as well as

stimulus characteristics based on these concerns", but mostly (3) gameplay emotions "that arise from the gamer's action in the game-world and the consequent reactions of this world" (p. 132). While all horror computer games are provided with a more or less elaborate fictional setting, in the end, it remains a part of the experience of gameplay. For horror games to be effective, gameplay mechanics must have been designed with the intent of scaring the gamer, by limiting the quantity of ammunition, for instance.

How to Approach Horror Computer Games Sound?

In the introduction to *Sound Theory, Sound Practice*, Rick Altman (1992) claimed that rather than seeing cinema as a self-centered text, it should be perceived as *an event*. Traditionally, film studies modelled the production and reception as gravitating around the film-as-text. However, as Altman explained: "Viewed as a macro-event, cinema is still seen as centred on the individual film, but […] the textual center is no longer the focal point of a series of concentric rings" (pp. 2-3). Following this model, the film-as-text mostly serves as a "point of interchange" between the process of production and the process of reception which mutually influence one another. The film itself thus becomes a representation of this "dialogue" or this "event". Computer games can be envisioned in a similar fashion. However, while technical aspects of computer game production might enlighten certain points about how the sounds are implemented and structured within the game code, I believe that it is not with regard to this code that horror computer games should be approached. While some PC games offer the option to look at how the files are organised on the disc, most computer games—particularly console games—do not. I will therefore be addressing sounds through the gameplay process of the individuals playing the game and all design matters will be dealt with in regard to creating this gameplay experience. For this matter, the notion of genre will mostly serve as an overarching catalyst through which the gamer structures their journey in the games.[4] Of course, the chapter will still deal with design issues such as looking at the implementation of sound strategies, however, this will be done in order to investigate how designers built these stratagems out of their predictions of how the gamer potentially produces meaning through the sounds, in regards to generic constraints, during their gameplay activity.

But then again, what is gameplay? In *Half-Real*, Jesper Juul (2005) approached the concept of gameplay using Richard Rouse's definition as a basis: "A game's gameplay is the degree and nature of the interactivity that game includes, i.e., how the [gamer] is able to interact with the game-world and how that game-world reacts to the choices the [gamer] makes" (Rouse in Juul, p. 87). To further elaborate on the question of gameplay, and to prevent a misunderstanding of the term, Juul added that "gameplay is not a mirror of the rules of a game, but a consequence of the game rules and the dispositions of the game players" (p. 88). Using this quotation as starting point, and as a way to oppose the fallacy constructed by Manovich's (2001) definition of an algorithm, Arsenault and Perron (2009) reminded me that "one of the misconceptions of gameplay which needs to be addressed springs out when one does not make a distinction between the process of playing games and the game system itself" (p. 110). Following their logic, gameplay must not be understood as "the" game system but as the "ludic experience" emerging from the relation that is established between the gamer and the game system. Therefore, it is important to understand that through the eyes of a gamer, the experience of gameplay is not portrayed by a series of codes managed by an algorithm, nor a direct representation of the implementation of sound within this code.[5] Consequently, I chose to exploit a terminology which facilitates the understanding of the gamer's cognitive process during

gameplay. It will allow me to better illustrate how the gamer produces meaning of sounds as a means of completing their main objective: the survival of their player character.

Arsenault and Perron (2009) defined computer games as "a chain of reactions" in which "[t]he [gamer] does not act so much as he reacts to what the game presents to him, and similarly, the game reacts to his input" (pp. 119-120) In other words, the gamer responds to events that were programmed by a designer (whose job partly consisted of predicting the gamer's reactions to the proposed events), and then the game acts in response to the gamer's input with other pre-programmed events fitting the new parameters. According to their gameplay (and gamer-centric model), the authors explained (a single loop of) gameplay through four steps in which "the game always gets the first turn to speak" (Arsenault & Perron, 2009):

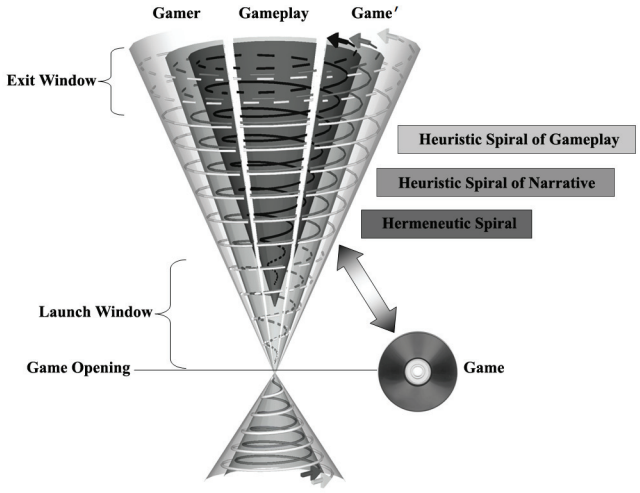
- From the game's database, the game's algorithm draws the 3-D objects and textures, and plays animations, sound files, and finds everything else that it needs to represent the game state
- The game outputs these to the screen, speakers, or other peripherals. The gamer uses his perceptual skills (bottom-up) to see, hear and/or feel what is happening
- The gamer analyses the data at hand through his broader anterior knowledge (in top-down fashion) of narrative convention, generic competence, gaming repertoire, etc. to make a decision
- The gamer uses his implementation skills (such as hand-eye coordination) to react to the game event, and the game recognizes this input and factors it into the change of the game state. (pp. 120-121)

However, as the authors recalled, "the most obvious flaw of representing gameplay with a single circle is that the temporal progression—the evolution of the gamer's relationship with the game—is left aside" (Arsenault & Perron, 2009, p. 115). To correct this failing, Arsenault and Perron proposed a model—the Magic Cycle (Figure 1)—that is based on 3 interconnected spirals: the heuristic spiral of gameplay, the heuristic spiral of narrative and the hermeneutic spiral. They also clarified that: "[t]he relationship to each other is one of inclusion: the gameplay leads to the unfolding of the narrative, and together the gameplay and the narrative can make possible some sort of interpretation" (p. 118). Their model also took into account the gamer's experience in gaming and the horizon of expectations of the gamer that are shaped by their previous knowledge of the game or sometimes by an introductory cut scene. While looking at the model, these are respectively represented by the dotted lines entitled "launch window" and by the inverted spiral. From this point the looping process described above will be "repeated countless numbers of time to make up the magic cycle" (p. 121) and to represent the mental image the gamer develops about the game (represented by the Game′ of the model). This perpetual process, alongside the implication of the generic context, will therefore allow for the mental organisation of sounds towards the gamer activity inside the game.

STRUCTURING HORROR COMPUTER GAME SOUND

When they are engaged in a horror game, the exercise of gameplay requires the gamer to somewhat organise sounds according to their gaming objectives which, in the case of the genre we study here, mainly revolve around allowing their player character to survive the horrors of the game. In order to do so, the gamer tries to answer two basic questions regarding game sound: 1) From where does that sound originate? and 2) what is the cause of that sound? I therefore propose to explore a basic sound structure that will effectively represent the

Figure 1. Arsenault & Perron's Magic Cycle. (© 2009, Arsenault and Perron. Used with permission)



cognitive process (as previously explained with Arsenault and Perron's model) that is performed almost unconsciously by the gamer while playing a horror computer game.

Inside and Outside of the "Diégèse"

While glancing at the game sound literature (Collins, 2008; Grimshaw, 2008; Huiberts and van Tol, 2008, Jørgensen, 2006, 2011; Stockburger, 2003), we notice that one of the most common ways to envision the structure and composition of sound in games is relative to its status regarding the *diégèse* of the game (I am using the French word to avoid any misconception that this term holds the same meaning as Plato's and Aristotle's definition of diegesis[6]). Taking its origin in film studies, the diégèse must be understood as a "mental reconstruction of a world" (Odin, 2000, p. 18, freely translated) that can be "perceived as an inhabitable space" (Odin, 2000, p. 23, freely translated). This definition of diégèse clearly refers to the "historico-temporal" universe in which the story—or in the case that interests us, the simulation—takes place. This definition thus allows more easily for the parallel that is often established between the diégèse and the gameworld.[7] From a structural perspective, more than the description of a world, it is particularly in the division that exists between elements considered as being part of the fictional world (diegetic) and elements which are not judged to be components of the fictional world (extra-diegetic[8]) that this notion has found a niche in works on sound in game studies.

Indeed, while listening to horror computer game sound, the fact that a sound is part of the depicted gameworld or not will have a considerable impact on the decisions the gamer will make regarding this sound. Based on the gameplay model that was introduced earlier, these sound cues will engender many questions in an attempt to recreate the mental image of the game state. Is the sound produced by an instance present in the "diégèse"? If it is, does that instance represent a threat to the player character or is it just a part of the ambience of the gameworld? Furthermore, as it was hinted by this set of queries, while the diegetic status of a sound holds much importance, recreating the mental image of the game state necessitates a more elaborate set of qualifiers.

Sound Generators

In computer games, much attention must be paid to sound sources as they contribute to the construction of the diegetic space. However, more important than what instance or event emits the sound is what generates the sound. Not only does the notion of generator furnish knowledge on what caused a specific cue, but it also provides information on its relationship to other sounds, its relationship to the game state, as well as the situation in which they are heard. These sound generators, as Kristine Jørgensen (2008) explained are "not the same as the source of the sounds. While the source is the object that physically (or virtually) produces the sound: the generator is what causes the event that produces the sound" (*Player Interpretation of Audio in Context* section, para. 2). If we adapt Jørgensen's example to a horror computer game context, this basically means that the shrieking sound emitted by one of *Dead Space*'s necromorph (its source) while being dismembered by the player character's plasma cutter is in fact generated by the gamer. Therefore, this concept (in its definition) also reflects the interactive nature of computer games by putting forward the agency[9] of the gamer within the simulated world, as well as the response of the game to the gamer's actions. While studying *World of Warcraft*, Jørgensen (2008) identified 5 categories of sound generators: the gamer, allies, enemies, the gameworld, and the game system each of which is organized according to the perspective of the gamer.

Even though, some horror games propose an interaction with friendly non-player characters such as Luis in *Resident Evil 4* (Capcom, 2004) or, as in *Resident Evil 5* (Capcom, 2009) and *Left 4 Dead* (Valve Software, 2008), offer a multiplayer co-operative mode, most games of the genre privilege the solitude of the player character and allies are normally quite scarce. Therefore, this chapter will focus on the dynamic and non-dynamic sounds (Collins, 2008) produced by the gamer, the enemies, the gameworld, and the game system. Accordingly, I will briefly describe these generators following Jørgensen's definition and adapt them to my own corpus of study. General informative functions of each type of generator will also be mentioned as they will provide a tighter relationship with the next section of this chapter on the functions of horror computer game sounds.

A sound generated by the gamer is "caused by [gamer] action" (Jørgensen, 2008, *Player Generated Sound* section, para. 1). As Jørgensen explained:

> *The most important informative role of [gamer] generated sounds is to provide usability information, or more specifically to provide response since they always seem to appear immediately after a player action. Player generated sounds also provide spatial information, and sometimes also temporal and [player character] state information. (Player Generated Sound section, para. 1)*

In *Resident Evil* (*Capcom*, 1996), for instance, these sounds may include footsteps, gunshots, the opening of doors, angry monster growls after they are shot by the gamer, the opening of Chris Redfield's or Jill Valentine's inventory menus and so on.

For their part, enemy generated cues "are produced externally from the [gamer's] perspective, by being detached from the [gamer's] own actions and emerging from the gameworld" (Jørgensen, 2008, *Sound Generated By Enemies and Allies* section, para. 1). Such sounds will furnish spatio-temporal information and will also serve "presence" purposes as they engage with the existence of enemies in the vicinity. Of course, these sounds also give information about modification in the game state and supply progression functions of the game: these might include the sounds of off-screen or on-screen monsters, or may indicate that the player character has been wounded after being hit by a zombie.

Gameworld generated sounds are similar to what Huiberts and van Tol (2008) described as

zone sounds. These sound cues consist of sounds "linked to the environment in which the game is played" (Huiberts & van Tol, 2008, *Zone* section, para. 1). While these sounds are often implemented to generate the ambience of the game, they also serve as spatial functions and might give certain information about the game state. In *Dead Space*, these sounds include the rumbling of the ship and some of the gruesome sounds emitted by the pre-programmed burst of blood coming out of organic matter that can be found on the wall and floor.

Game system-generated sounds are by far the most ambiguous. Jørgensen (2008) defined them as sounds "generated by the system to provide information that any [player character] cannot produce on its own, and carry information directly connected to game rules and as well as game and [gamer] state" (*Conclusions and Summary* section, para.3). Horror computer games do not include many of those sounds. However, a few examples can be found. The "fuzzing" sound, accompanied by heart pounding, that is emitted when an player character is lethally wounded in *Resident Evil 5* could correspond to this description as it is not directly produced by a gamer's action, it is generated by the system to warn the gamer that his player character needs immediate health assistance. While it is not explicitly mentioned by Jørgensen, I would argue that the extra-diegetic musical score of the game is also system generated. While this music often plays an affective role in the game, it also serves presence and game state purposes. For instance, in *Alone in the Dark: Inferno* (Atari, 2008), the music ramps up, signalling that enemies are nearby or attacking the player character. It is mostly according to the relationship between this extra-diegetic music, the gamer, and the gameworld that this category of generators will be examined in this paper. These generators will be used as a structural basis when studying the creation of horror game sound strategies.

THE FUNCTIONS OF HORROR COMPUTER GAME SOUND

To reach his objective, the gamers must also gather information about the game state. To do so, they must ask themselves what are the functions of a particular sonic cue and, if the sounds serve more than one purpose, which function is more important according to the context?

In computer games, sounds contribute to the gamer's immersion: they construct the mood of the game, and provide information that will be used in gameplay. According to Jørgensen (2006), we can state that sound serves two main functions. On one hand, it "has the overarching role of supporting a user system" and, on the other, it is "supporting the sense of presence in a fictional world" (p. 48). This basically means that sound creates "a situation where the usability information of elements such as [sound] becomes integrated with the sense of presence in the virtual world" (Jørgensen, 2008, *Integration of Game System and Virtual World* section, para. 1).

The (Double) Causality of Sound

To fill the important functions exposed by Jørgensen, I believe that sounds first need to create a feeling of causality with: 1) the images (and more largely with the gameworld) and 2) with the gamer's actions.

Just like in movies, images and sounds are tightly linked, producing the effect of *added value*, described by Michel Chion (2003) as a "sensory, informative, semantic, narrative, structural or expressive value that a sound heard during a scene leads us to project on the image, until creating the impression that we see in this image what in reality we 'audio-see'" (p. 436, freely translated). The added value of a sound on the images creates what Chion called *audio-visiogenic effects* which can be classified within four categories: (1) effect of sense, atmosphere, content, (2) rendering and matter effect (*materializing sound indices*)

which creates sensations of energy, textures, speed, volume, temperature, for example, (3) scenography effect concerning the creation of an imaginary space and (4) effect related to time and the construction of a temporal phrasing. These audio-visiogenic effects and materializing sound indices are essential to horror computer games such as *Dead Space*, as they give an organic texture to an anthropomorphic monster. The gooey sound that accompanies the impact of a plasma cutter blast as blood and guts explode on the screen helps the gamer believe that what they are seeing is real, while in fact what is showed on the screen is a simple translation of coloured polygons. The effectiveness of the added value rests upon 3 factors that have also been defined by Chion. It is principally by means of *synchronisation points*, "a more salient moment of a synchronised reunion between concomitant sonic moment and visual moment" (p. 433, freely translated) or, more broadly, an effect of *synchresis*, and an effect of *rendering* which will give the sound a necessary degree of veridicality (Grimshaw, 2008) for it to seem "real, efficient and adapted" to "recreate the sensation [...] associated to the cause or to the circumstance evoked in the [game]" (Chion, 1990, p. 94, freely translated). For this to be effective, Grimshaw (2008) reminds us that a sound "must be as faithful as possible to its sound source [within the game], containing and retaining, from recording or synthesis through to playback, all the information required for the player to accurately perceive the cause and, therefore, the significance of the sound" (p. 73).

However, we must not forget that computer games are not only audio-visual, but also interactive. Therefore, sound must also establish a sentiment of causality between the gamer's actions which mostly correspond to the handling of joysticks and pressing buttons on their controller, and the action performed by the player character on the diegetic level. For this matter synchronisation points turn out to be less aesthetic and more pragmatic as they become the product of the gamer's will in act. This relationship between action and sounds is primordial in establishing the horror games conventions and greatly contributes to the effect of presence as it gives a sensory support for the gamer's agency.

Gameplay Functions

From a gameplay point of view, and following the loop of Arsenault and Perron's (2008) model, sound performs two main functions: (1) to give information on the game-state and (2) to give feedback on the gamer's activity in response to the game state. Before we engage in a typology of the different gameplay functions of sounds, I wish to mention that I am fully aware that every sound, while serving gameplay purposes, simultaneously has immersive and affective functions. However, for reasons of brevity, I will not integrate those functional poles together right away. In this line of thought, I will not present an exhaustive list of gameplay functions, and keep only those useful for my analysis of horror computer game sound strategies.[10] Based on Collins (2008), Grimshaw's (2008), Jørgensen's (2008) and Whalen's (2004) work, I wish to take a look at five gameplay functions that some horror game strategies are founded upon: spatial functions, temporal functions, preparatory functions, identification functions, and progression functions.

In computer games, it is essential to determine the approximate location of the sound generators. Spatial functions allow for the localization of generators in terms of direction and distance, contribute to the quantification and qualification of game space and help the gamer to navigate through it. More precisely, the sounds will be described as *choraplasts* which are sounds "whose function is to contribute to the perception of resonating space [volume and time, localization]" (Grimshaw, 2008, p. 113). By privileging a "navigational" mode of listening (Grimshaw, 2008, p. 32), the augmentation or diminution of a sound's intensity might, for instance, assist the gamer in localizing

the generators and help them decide if they want to advance, or not, in their direction.

Sonic temporal functions are also very important to horror computer games. For example, in *Resident Evil 5*, the flamethrower and satellite laser-guide that the gamer needs to utilise in order to kill the dangerous Uroboros monsters are regularly required, respectively, to be filled with fuel or to regain energy. To signal that the weapons are recharging, in addition to a visual indicator, the game underlines this process with a distinctive sound. Similarly, when the replenishing is done, a tone will inform the gamer. The same assumptions can be applied to other weapons as reload times and rate of fire are sometimes vital to the survival of the player character. Sounds that are "affording the perception of time passing" are named *chronoplast* by Grimshaw (2008, p. 113).

The preparatory functions, a term I have borrowed from Collins (2008), and which correspond to what Jørgensen (2006; 2008) called urgency functions, are sounds alerting the gamer that an event has occurred in the diegetic world or which forewarn them of the presence of an enemy within the immediate environment of the player character. For instance, in *Dead Space*, the alarm signalling that a section of the ship is being put into quarantine serves as an alert, while the off-screen moans of zombies in *Resident Evil* are considered a forewarning. It must also be acknowledged that adaptive and interactive (Collins, 2008) extra-diegetic music can also occupy these roles as they either punctuate an event or, as in *Resident Evil 4*, testify to the presence of infected Ganados.

For their part, identifying functions, which were more accurately theorised by Jørgensen, (2006), correspond to the ability of a sound "to identify objects and to imply an objects value" (*Identifying Functions* section, para. 1). For example, the heavy footsteps and the characteristic music loop accompanying the presence of Nemesis in *Resident Evil 3* (Capcom, 1999), as well as the screeching of Pyramid Head's gigantic blade in *Silent Hill 2* (Konami, 2001) lead to a quick identification, while at the same time provide these characters with an imposing an threatening demeanour. The identifying functions' use is not limited to distinguishing and qualifying enemies, it also "has a central role related to changes in game state and player state"[11] (Jørgensen, 2008, *The Role of Audio in a Gameplay Context* section, para. 2). In *Dead Space*, when Isaac Clarke grunts in pain after taking a hit, it signals to the gamer that the player character's physiological integrity has been affected. Musical loops can also signify transitions in the game state. In the *Resident Evil* series, the leitmotif associated with the "save room" means that the player character is in safety, while fast-paced music normally implies the presence of a threat or requires immediate attention from the gamer.

Progression functions is a term I propose based on my reflections upon the motivational purpose of music proposed by Zach Whalen (2004) in his text *Play Along*: *An Approach to Videogame Music*. As Whalen explained, in *Silent Hill*, "the music is always in a degree of "danger state" in order to impel the player through the game's spaces. The mood of the game is crucial to the horrific 'feel', but it also provides motivation by compelling continual progress through the game" (*Silent Hill* section, para. 1). I suggest that other sounds, such as the enemies' sound cues or alarm sounds, can achieve a similar purpose and encourage (or sometimes discourage) the gamer to progress into the game. While these functions are mostly integrated in enemy-generated sounds, some segments of dialogue can also be considered as serving progression functions. For instance, in *Dead Space*, radio communications with Kendra and Hammond help the gamer to figure out how to reinitialise the ventilation system of the hydroponic station of the *U.S.S. Ishimura*.

Of course, one single sound event can serve many of these functions simultaneously. Furthermore, as Jørgensen (2008) specified, "the functional roles of sounds [will be] judged with

different urgency in different situations even though the sound is exactly the same" (*Player Interpretation of Audio in Context* section, para. 1). While this quote was intended to portray the relationship existing between sound and context in multiplayer sessions of *World of Warcraft* (Blizzard Entertainment, 2004), it is, nevertheless, quite applicable to the single player games which characterize most of the horror computer game genre. It is in regard to the macro and micro contexts of the games that prioritisation of one function over another will be possible. With all this in mind, it is now time to take a look at how horror games partly build their sound strategies by playing with these functions.

HORROR COMPUTER GAMES' SOUND STRATEGIES

Horror computer games have been around for a long time. During the 1980s, many games such as Atari's *Haunted House* (1981), *Sweet Home* (Capcom, 1989)[12] and the videoludic adaptations of the movies *Halloween* (Wizard Video Games, 1983) and *Friday the 13th* (LGN, 1989) hit the shelves to satisfy gamers in quest of an adrenalin rush. However, as I explained in a chapter published in *Horror Video Games: Essays on the Fusion of Fear and Play*, the abstract graphics and synthesised sounds of those games could not provide a simulation of evisceration as convincing as certain computer games can provide today. Indeed, "at that time, the horror was more lurking in the paratextual material than the games themselves" (Roux-Girard, 2009, p. 147). As Mark J. P. Wolf (2003) explained:

The boxes and advertising were eager to help players imagine that there was more to the games than there actually was, and actively worked to counter and deny the degree of abstraction that was still present in the games. Inside the box, game instruction manuals also attempted to add exciting narrative contexts to the games, no matter how far-fetched they were. (p. 59)

As Remi Delekta and Win Sical (2003) suggest in an article of the only issue of the *Horror Games Magazine*: "[Horror computer games] can not exist without a minimum of technical capacities: sounds, graphics, processing speed. Fear to exist needs to be staged and *mise en scène* needs means" (p. 13, freely translated). It was in 1992 that *Alone in the Dark*, designed by Frédérik Raynal, shook the entire videoludic scene by incorporating polygonal characters, monsters and objects in two-dimensional, pre-rendered backgrounds. While this simulated three-dimensionality opened a new "game space" allowing for novel possibilities in gameplay, it also created an innovative "playground" for imaginative sound designers.

Between Horror and Terror

Before we begin our analysis of horror games' sound strategies, I need to clarify that fear, terror, dread, horror, anxiety and disgust, while they are broadly analogous emotions, are not synonymous. Moreover, not all horror computer games try to generate this entire emotional spectrum[13]. Accordingly, while some games rely on visceral manifestations of fear such as horror and disgust, others create fear at a psychological level, generating suspense, terror and dread. To understand how games manage to scare gamers, we must first take a look at the difference between horror and terror.

According to Perron[14] (2004),

horror is compared to an almost physical loathing and its cause is always external, perceptible, comprehensible, measurable, and apparently material. Terror, as for it, is rather identified with the more imaginative and subtle anticipatory dread. It relies more on the unease of the unseen. (p. 133)

Of course, sound design plays a prominent role in setting these two poles up. On one hand,

sounds provoke spontaneous sensations using rendering effects of matter, and on the other, they contribute to the elevation of suspense by creating ambiguity between causes, uncertainty regarding the origin of the sounds and by limiting the information carried by the sound's affordances. To achieve this, horror computer games rely on a plurality of strategies.

In the preceding sections of this chapter, I introduced a number of theoretical tools to help us understand how gamers structure sounds within and without the gameworld and how they produce meaning with the different cues they listen to. I now propose to revisit those concepts in light of a horrific *mise en scène* to comprehend how horror games develop those strategies.

The Choice of the Sounds

While horror computer games (and mostly survival horror games) utilize a wide range of sound strategies, the staging of fear starts at a purely formal level. The choice of sounds and the way they are used are greatly responsible for the quality of the mood of the games. Some empirical research (quoted in Grimshaw, 2009) attempted to demonstrate that there is a certain degree of correlation between the physical signal of a sound and the emotions felt by listeners. For instance, Cho, Yi, and Cho's (2001) research on textile sounds shows that loud and high-pitched sounds are unpleasant to the ear, while Halpern, Blake, and Hillenbrand (1986) point to loud, low-mid frequencies as being disagreeable. Whereas these investigations seem contradictory, they nevertheless tend to reveal that the acoustic qualities of sounds can have, amongst other factors, a physiological as well as psychological impact on the gamer.

However, to arouse emotions, we need much more than mere frequencies. Borrowing from Pierre Schaeffer's theory (synthesised by Chion, 1983) on the morphological description of sounds and *Quatre écoutes* (*écouter*, *ouir*, *entendre*, *comprendre*), it is mostly the work performed on the *allure*, *grain*, *dynamic profile,* and the *mass profile* of a sound that determines its repercussion on the gamer. During their gameplay activity, the gamer hears (*entendre*) the morphological qualities of the sounds which allow them to comprehend (*comprendre*) and experience them as frightening. Therefore, it is not only because the gamer listens (*écouter*) to what they can identifiy as a zombie that they are scared, but because they hear (*entendre*) a moan or a growl, which correspond to the sound motifs contained in their knowledge of horror symbols. Therefore, it is not so much because the lamentation is generated by a zombie and comprises low-frequencies that it is frightening but, because, in its essence, it contains an energy reminiscent of a certain form of pain and agony. Ambiences can have a similar effect as they associate acoustic qualities with unpleasant situations and frightening locales. Reciprocally, the emotions produced by these choices of sound force the gamer to focus on every little detail of the sound design and are partly responsible for the gamer's high level of "perceptual readiness".

Of course, the selection of sounds must also aim to create uncertainty as this feeling is essential to the creation of suspense. To do so, designers sometimes have to baffle the gamer's expectations to a certain point. In his book on the *Silent Hill* series, Perron (2006) observed an evolution, from one title to another, in the sound used to portray the monstrous nurses. As the author explains: "The nurses, which have a much low-pitched 'voice' in [*Silent Hill*], have a penetrating sped up respiration in [*Silent Hill 3*]" (Perron, 2006, p. 93, translated by the author). According to me, this purely aesthetic strategy has the effect of reducing the gamer's "launch window" into the game, preventing him from using his anterior knowledge to identify (identifying functions) his opponents. Consequently, *Silent Hill 3*'s sound design created ambiguity regarding the cause of the sound, and forced the gamer to reconstruct, from game to game, the relation between the sounds and their generators.

However, as we have seen earlier, horror games do not create fear only with their aesthetic dimension, but also with their narrative structure and gameplay. Therefore, some of their strategies are also constructed from these two dimensions.

Creation of a Startle Effect

Sound plays a preponderant role in the creation of a variety of surprise effects. Following an analysis of this phenomenon by Robert Baird, Perron (2004) explained in his text *Sign of a Threat: The Effects of Warning Systems in Survival Horror Games,* that the essential formula for creating a startle effect can be summed up into three steps: "(1) a character presence, (2) an implied offscreen threat, and(3) a disturbing intrusion [often accentuated by a sound burst] into the character's immediate space" (p. 133). As noted by the author, it is indeed at the moment of the intrusion of the off-screen threat inside the screen that sound will take on all its importance. At this level, it is a question of contrast in the sonic intensity and synchronisation of the sound and its generator in the visual field of the gamer. Therefore, startle effects depend on the physical limitations of the ears. As ears are slower to react than the eyes, the startle effect will temporally cloud the gamer's evaluation and identification operations. To favour such effects, horror games often rely on a refined sound aesthetic and create moments of approximate silence. We can also say that the sounds the gamer cannot hear—the noises an enemy should make while moving towards the gamer that are rendered inaudible—play a role as important as the ones he can hear. In Schaefferian terms, we could say the game plays on the limits of hearing (*ouïr*) as a way to fool the gamer's listening (écouter). It is only into these considerations that the episodes of respite before an attack play a determining role in the staging of a startle effect. This is stressed by Whalen (2004):

> *As it is the case with horror films, the silence [...] puts the player on edge rather than reassuring him that there is no danger in the immediate environment, increasing the expectation that danger will soon appear. The appearance of the danger is, therefore, heightened in intensity by way of its sudden intrusion into silence. (Silent Hill section, para. 3)*

It is according to this technique that designers punctuated, by shattering a window, the intrusion of a long-fanged monster in *Alone in the Dark* (I-Motion, 1992), or in a similar incursion of a zombie-dog in *Resident Evil* (Capcom, 2002), intensified the attack of a crawling monster in *Silent Hill 2* (Konami, 2001), or amplified the brutal opening of an elevator door by a necromorph in *Dead Space*.

As Perron (2004) mentioned: "To trigger sudden events is undoubtedly one of the basic techniques used to scare someone. However, because the effect is considered easy to achieve, it is often labelled as a cheap approach and compared with a more valued one: suspense" (p. 133). Following this line of thought, if sound plays a decisive role when it comes to making a gamer jump out of his shoes, it also plays a role in the creation of suspense. It is in this perspective, towards dread and anticipation, that the next strategies will be explored.

The Impact of Forewarning

To create suspense, forewarning is one of the most effective strategies. Before further developing this concept, it is essential to mention that forewarning is not always exclusively based on sound. Forewarning, which consists of alerting the gamer to the presence of a menace in the surroundings of his player character, can also be based on visual cues, as it is the case with *Fatal Frame* (Tecmo, 2002) when the indicator in the bottom of the screen turns orange, signalling the presence of a ghost. However, many forewarning

systems have been designed through sound. The most renowned case of such a technique and, incidentally, the most studied—being discussed by Carr (2003), Kromand (2008), Perron (2004) and Whalen (2004) —is the pocket radio in the *Silent Hill* series. This radio, which emits static when a threat is nearby, plays its role as a warning system perfectly. Forewarning can also be created through a more classical way through making use of off-screen sounds (Perron, 2004). This is the case in *Alone in the Dark: The New Nightmare* (Infogrames, 2001) when, during the numerous seconds necessary for the gamer to go down the stairs leading to the interior court of the fort, it is possible to hear sounds associated with plant monsters coming from outside the frame of the fixed virtual camera shots.

If we could believe that such a warning, prefiguring the entrance of a gloomy monster inside the screen, could reduce the feeling of fear or uneasiness in the gamer, research cited in Perron's (2004) work tends to prove the opposite. As the author himself specifies, "[…] simple forewarning is not a way to prevent intense emotional upset. It is worse than having no information about an upcoming event" (Perron, 2004, p. 135). Such a method creates terror by anticipation based on a fear of the unseen.

However, what Perron fails to highlight, is that forewarning does not rely only on the sound function of the same name. To be really effective, the forewarning must be unreliable and/or the quantity of information about the localisation of the generator must be limited. This precision offers the opportunity to introduce another strategy of horror computer games which relies on the functions of game sound: luring the gamer with sound.

Luring the Gamer With Sound

In his master's thesis, Serge Cardinal (1994) explained that "filmic writing favouring the emergence of a clear spatial structure will have the tendency to anchor the sound with its source, will privilege without ambiguity the identification and localisation of the source with sound, will submit sound's diffusion to the sound properties' logic" (p. 53, freely translated). To create fear and strong feelings of discomfort, horror games execute a reversal of this concept making the generators of the sounds harder to identify and localize. In the example from *Alone in the Dark: The New Nightmare* described earlier, the designers have avoided creating an evolution in the morphological properties of the sounds of the plant monsters in relation to the player character travelling through the fort's space. This technique is used to alter the information the sound is carrying regarding the distance separating the threat and the gamer's player character. While listening carefully, the gamer remarks no variation in the dynamic profile and mass profile of the sound generated by the creatures of darkness even though the player character performs a descent which, if it were scaled, would be equivalent to a little less than a hundred meters. In this case, the designers intentionally reduce the quantity of information carried by the sound in a way that limits the gamer's interpretation of space and time, as it is impossible to evaluate the distance between the player character and the monsters. However, this tweaking of the spatial and temporal functions of the sound allows for an emphasis to be put on its forewarning purpose, which is bound to influence the progression function of the sound. Preventing the easy localization of the source/generator of the sound has an effect of reinforcing the suspense established by the forewarning while simultaneously forcing the gamer to take a more prudent approach while going down the stairs.

Many horror game strategies rely on creating a certain level of ambiguity regarding the origin of sounds within the gameworld. While this can be achieved, as suggested by Daniel Kromand (2008), by blurring the frontier between the diegetic and non-diegetic parts of the game, similar exercises can be performed between instances within the diégèse. This partly explains why I chose to

structure my analysis of horror computer game sounds around the concept of sound generators and functions of game sound. Indeed, those notions are best suited to describing the relationship between the different instances of sound, in that there is more in horror computer games than meets the ear.

Ambiguity Between Sound Generators

A study of the relations that exist between the different categories of sound generators allows me to put forward some of the sonic strategies of horror computer games. One of the most basic strategies of those games is to design sound in a way that creates ambiguity between the different sound generators of the game. Indeed, if two or more generators manage to produce sounds of a similar nature, it will directly affect the cognitive process of the gamer, making it harder to localize the sources but also harder to classify the cues as more or less important regarding the game context. For the most part, these ambiguities will concern the spatio-temporal and preparatory functions of sound and will generate fear through anticipation.

The first technique consists of blurring the line between the sounds generated by the player and those generated by enemies. If these two generators manage to produce similar sound cues through a common source, it is possible to believe that, for example, the movements of the gamer's player character through space might nourish the suspense. I must admit that this technique is not widespread in horror computer games but, seeing as the game *Dead Space* manages to create such a doubt, it is worthy of being mentioned as similar modus operandi might be exploited in future horror games. Indeed, in *Dead Space*, the sounds emitted by the player character's footsteps on the viscous organic matter which often covers the floors of the spaceship are very similar to the sounds produced through the interaction of the substance and the deformed limbs of the grotesque monsters roaming with intent to kill the player character. After hearing the monster's footsteps for the first time, the gamer's perceptual readiness will augment regarding these sounds. However, since the sounds emitted by the gamer's player character are so similar to and blend with those of the enemies, the movement of the player character on the gooey surface might signal a potential presence in the player character's surrounding environment. The gamer will then be forced to adopt a more careful approach and look around more often than he would have normally done.

The flesh covered sections of the spaceship also encouraged the designers to establish a similar relationship, much more common to horror computer games, between the sounds generated by the enemies and the gameworld. The game environments are often designed to generate ambiences that imitate the sounds generated by the threats of the games. As mentioned by Kromand (2008): "The [gamer]'s understanding of affordances can help to perform better [...] as certain sounds pass information regarding nearby opponents, but at the same time these exact affordances are mimicked by the ambiance." (*Welcome to Rapture* section, para.4). Once again, this way of conceptualizing sound in the game favours the creation of doubt in the player regarding the real provenance of the sounds. To get back to our *Dead Space* example, the organic matter is sometimes surmounted by excrescences which randomly squirt blood when the player character passes by. The excretion sound is also reminiscent of the sound made by enemies and tends to mislead the gamer as to what generated the sound. Similarly, other ambiance sounds, such as the creaking of the ship's hull, the rumbling of the machinery, and other metallic impacts are used to simulate the prowling of a necromorph in an air vent or in one of the ship's corridors. Of course, *Dead Space* is not the only game that makes use of such strategies. As Ekman and Lankoski (2009) noted, in "*Silent Hill 2* and *Fatal Frame*, the whole gameworld breathes with life, suggesting that somehow the environment itself is alive, sentient, and capable of taking action against the

player" (p. 193). This way of introducing "event sounds with no evident cause, sound not plausibly attributed to an inanimate environment" is, for that matter, the trademark of the *Silent Hill* series. This way of conceptualizing sound even extends to the atonal, extra-diegetic music of the game. This aesthetic choice allows me to introduce one last case of ambiguity between sound generators.

Some horror games aim at creating ambiguity between the game system, the gameworld, and the enemies, the emphasis being put, as suggested by Kromand (2008), on blurring the line between elements that are part of the diegesis and others that are not. By choosing to exploit atonal music, which is closer to *musique concrète* than traditional orchestral or popular music, that blends and often merges with the ambient and dynamic sound effects of the game, designers manage to lure the gamer into thinking that there are more threats than there actually are. This technique also often succeeds at diverting the gamer's attention from the real threats in the game. The most flagrant example of such a scrambling between the sounds emitted by enemies and the game system comes from *Silent Hill*. During a gameplay sequence in the alternate town of *Silent Hill* (Konami, 1999), the non-diegetic music, which is mostly constituted of metallic, industrial sounds, also includes in its loop a sound that is very similar to the sounds generated by the flying monsters of the game. Since the flying demons' sounds are mixed very low within the music, the gamer, who is concentrated on his activity, probably won't notice that this cue is repeated on a fixed temporal line and will be bound to associate this sound to an oncoming monster.

A similar type of conception was also privileged in the sound design of *Dead Space*. As Don Veca, the lead sound designer of the game, underlined: "We […] approached the entire sound-scape as a single unit that would work together to create a dark and eerie vibe. [...] In this way, Dead Space has really blurred the line between music and sound design" (cited in Napolitano, 2008, *First Question* section, para. 2). Therefore, as mentioned by Kromand (2008), "the constant guessing as to whether the sounds have a causal connection put the [gamer] in unusual insecure spot that might well build a more intense experience" (*Conclusion* section, para. 2), which has the effect of augmenting the level of fear in the player.

As a unit, the techniques which aim at creating ambiguity between sound generators are based on the different circuits a sound can perform between the on-screen, the off-screen and the extra-diegetic. Indeed, it is by regularly making sounds pass from on-screen (which allows the player to identify the cause of the sound) to the off screen (where the sound serves as a forewarning of a threat) to the extra-diegetic (where sound simulates the presence of a threat), that videoludic sound manages to condition the gamer to be wary of everything he hears.

Fear and Context

Of course, fear will not only be induced by the morphological nature of a sound, by its fixed relation with its cause or the constructions of strategies. Fear, horror, and terror mostly depend on the context in which the sound is heard. At this level, many parameters will influence the perception the gamer will have of a sound: the spatial configuration, the general difficulty of the gamer, the number of enemies, the available resources, the available time and so forth. The global situation related to the perception of a sound will have a determining impact on the attitude a gamer will adopt towards this sound. A videoludic design favouring such game mechanics will therefore be an accomplice to the sound strategies.

CONCLUSION

In an attempt to scare their gamers, horror computer games utilise different strategies of *mise en scène*. Testament to the dialogue between the

production and reception of the games, these strategies, to be efficient, must play with the gamer's expectations—regarding the reading and listening constraints imposed by the genre and paratext—and exploit the cognitive schemes that help them to classify the information they receive during their gameplay sessions. In this line of thought, the games must create situations that will generate negative emotions such as fear, horror, and terror. As only the gamer gets access to these emotions, I privileged an approach oriented on the reception of sound in a gameplay situation rather than a mere analysis of technical data. It is consequently with a terminology that does not reference directly the game code or algorithm, but instead focuses on the gamer's mental reproduction of the videoludic universe, that I attempted to explain the importance of sound in the development of horror computer game strategies.

The gamer's first objective being to insure the survival of their player character, their tasks mainly revolve around detecting all the intrusions that might become hazardous for their character. In these circumstances, gamers must structure the sounds they hear and extract from them all the information they need to properly respond to a given situation. This cognitive process has been broadly presented with the help of Arsenault and Perron's model (Figure 1). More precisely, the gamer must determine the origin and the cause of the sounds. To do so, they must first determine if a sound is generated by an event present within the videoludic world or overhanging this world. The gamer must then refine this categorisation to establish more precisely what, between their actions, the enemies, the game environment, and the game system, is the generator of the sound. At the same time, they must pay attention to the affordances (their functions) of the sounds which might communicate information about the space, the time, the enemies, and the events occurring in the game environment. The gamer must then evaluate which affordance must be prioritised according to the circumstances.

To feel safe, the gamer must be able to quickly find answers to their questions. To arouse fear, horror games block this process. While the morphologic nature of a sound is sometimes enough to induce a strong feeling of discomfort, horror computer games mostly rely on sound strategies to reach their goal. From the startle effects to the creation of ambiguity between the sound generators, the games trick the gamer's listening by limiting the information the sounds carry. Plunged into a universe of "un-knowledge" (Kromand, 2008), the gamer can only be scared by their gameplay experience. To be really effective, the sound strategies must be part of a whole and integrated into a global staging of fear, which also depends on the relationships between the sound and images, the gameplay, and the game's narrative. In the end, it is the pressure applied by the genre, and the deconstruction of the structure and the functions of sound by the different in-game situations, that will determine the true impact of the sound strategies on the gamer.

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KEY TERMS AND DEFINITIONS

Allure: It is the amplitude or frequency modulation of a sound.

Comprendre: According to Schaeffer, comprendre means grasping a meaning, values, by treating the sound like a sign, referring to this meaning as a function of a language, a code.

Dynamic Profile: It is the temporal evolution of the sound's energy.

Écouter: According to Schaeffer, écouter, is listening to someone, to something; and through the intermediary of sound, aiming to identify the source, the event, the cause, it treats the sound as a sign of this source, this event.

Entendre: According to Schaeffer, entendre, here, according to its etymology, means showing an intention to listen [écouter], choosing from what we hear [ouïr] what particularly interests us, thus "determining" what we hear.

Grain: It can be defined as the microstructure of sound matter, such as the rubbing of a bow.

Mass Profile: It is the evolution in the mass of a sound. For example, from pitched to complex.

Mise En Scène: It is the organisation of the different elements that define the staging of a scene, or, in the case that interests us, the simulation of a gameplay sequence.

Ouïr: According to Schaeffer, ouïr is to perceive by the ear, to be struck by sounds, it is the crudest level, the most elementary of perception; so we "hear", passively, lots of things which we are not trying to listen to nor understand

Videoludic: It is an adjecti.ve linked to videogames. The use of this term opens a door for the utilisation of sonoludic as an adjective for audio only games or computer games in which gameplay mechanics are mostly based on sound.

ENDNOTES

1 It must be mentioned that this chapter does not wish to theorize the perhaps ill-suited notion of videoludic genres—a fertile field of computer game research that should, in coming years, generate quite a debate–but wishes, rather, to use it as a tool to better understand how gamers structure their gameplay session in survival horror games.

2 For space reasons, I chose to limit my analysis of these specific factors. Just keep in mind that the industry and the technology play a great part in the final rendering of the games.

3 Note that the former definition is largely associated with reception issues while the later refers to the productions aspects of the games.

4 Generic issues of survival horror games will therefore be approached as a "constraint of listening" from which the gamer will organise and evaluate the role of sound in a given context.

5 Indeed, while playing a game, the gamer never has access to this code. As Arsenault and Perron (2009) explained, the gamer "only witnesses the [...] result of the computer's response to his action. He does not, per se, discover the game's algorithm which remains encoded, hidden and multifaceted" which means that "the notion that a gamer's experience and a computer program directly overlap is a mistake" (p. 110). While this statement upholds the approach of this paper, it also calls for a use of terminology that can reflect a game audio structure with accuracy and that can be applied directly to a gameplay situation.

6 I find necessary to make this distinction because the notion diegesis, which is now often broadly defined as "the fictional world of the story" (Bordwell, 1986) might be questionable as it sometimes seems to borrow too much from narrative theory. Étienne Souriau

(n.d.), in his original definition of the term, conceptualised the "diégèse" as a "'world' constructed by representation" (Boillat, 2009, p. 223, freely translated) and, as it is possible to deduce, which is not necessarily specific to a narrative theory. Following Souriau's line of thought, "the diegetic level is characterized not only by 'everything we take into consideration as being represented by the film' but also by 'the type of reality supposed by the signification of the film'" (cited in Boillat, 2009, p. 222, freely translated). According to Boillat (2009), Souriau refined this definition by assimilating the "diégèse" to "all that belongs, 'in the indigibility' [...] to the story being told, to the world supposed or proposed by the fiction of the film" (Boillat p.222, freely translated), this "all" making reference to three very important constituents: time, space, and the character. As it is also highlighted by Boillat, this second part of the definition is essential to the concept so as to prevent the "reducing [of] the 'diégèse', as it was often the case [...] to only the 'recounted story'" (p. 222, freely translated). However, in his book *De la Fiction*, French semio-pragmatist Roger Odin makes a clarification regarding the dichotomy between the story and the diégèse. As he explained, the "diégèse" "cannot be mixed up with the story" but "provides the *descriptive* elements the story needs manifest to itself" (cited in Boillat, 2009, p. 234, freely translated).

7 While trying to apply the concept of diégèse to videogames, one must acknowledge that it does not function following the requirement of fictional films and according to a pure "fictionalisation process" (Odin, 2000). The reconstruction of the diegetic stage works differently based partly on a process of "systemic immersion" (Arsenault & Picard, 2008), allowing for more levels of communication between the gamer's world and the gameworld. On these premises, whether certain sounds generated within the "diégèse" seem to address an instance without it or not, does not hold that much importance regarding the construction and integrity of the "diégèse".

8 I personally prefer to use the adjective extra-diegetic instead of non-diegetic because I believe that, for example, survival horror games' music is tightly linked to the events that are taking place in the diegetic world.

9 In *Hamlet on the Holodeck*, Janet Murray (1997) defines agency as "the satisfying power to take meaningful action and see the results of our decisions and choices" (p. 126).

10 For example Jørgensen's (2006; 2008) response functions, even though they play an important role in the actual gameplay of survival horror games are not as important to the construction of the games' strategies. For this reason, they will be left out of this chapter. For more information on sound function, see Grimshaw, 2008; Jorgensen, 2006 and 2008, and Collins 2008.

11 I think "player character state" would be more appropriate as the gamers themselves remain in their living room.

12 Only available in Japan.

13 This allows for the differentiation between horror computer games, which are a broader category of the videoludic horror genre, and survival horror games, which can be referred to as games that maximize the elements of a horrific mise en scène.

14 Following William H. Rockett's line of thoughts.