CAPTIVATING SOUND

THE ROLE OF AUDIO FOR IMMERSION IN COMPUTER GAMES

by

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Captivating Sound

The role of audio for immersion in computer games

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Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

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ABSTRACT

This thesis explores the relation between game audio and (computer) game immersion. The main contribution in this research is a framework for the conceptual design of game audio in relation to immersion.

A model for game audio is presented defining the communication by means of game audio during active gameplay. This model, named IEZA (Huiberts & van Tol, 2008), defines four conceptual domains of communication of game audio. IEZA was developed to enable a more detailed and consistent investigation into game audio and has been evaluated as a design resource in educational, academic and practical settings.

Immersion is considered to be one of the key factors making games worthy to play. The unity that seems to exist in the fact that many parties value this phenomenon is more apparent than real: there is a lot of dispute on the scope of immersion. Several classifications of immersion are compared for a better understanding of the nature of an immersive experience. The three-dimensional SCI-model by Ermi & Mäyrä (2005) is considered as valuable representation of the multi-dimensional character of immersion.

Audio is an important constituent of most games and its role for immersion in games has hardly been investigated. In this thesis, audio is studied using the IEZA-model and the SCI-model, and several design issues are described. This yields a conceptual framework that describes various audio design issues that can be used to reflect upon conceptual decisions relevant for the design of audio in relation to immersion. This framework can be used for a *conceptual analysis of design* and is relevant for audio designers as well as game designers.

PREFACE

It all started with a quick email reply in the year 2000 to a tempting request to participate as an audio designer in a project that focused on developing games for visually disabled children. Not only did this introduce me to the field of development of applications and games for the blind, it also made me aware of my primary fascination: the experiential value of sound and music. In an interactive process, sound and music can provide a **captivating** experience: we forget ourselves, stop noticing time and the experience is all that counts: the experience becomes alive. In my personal opinion, computer games excel in this process and were therefore chosen as the second field of study of this thesis. A pervasive experience in game play, whether caused by audio or by another medium, is usually described by the term immersion. Audio plays an important role for immersion, and in this thesis, useful concepts and points of view in order to better understand this concept will be examined.

Before continuing, two general matters need to be explained. In the text, a player is always referred to as 'he', although 'she' could apply as well. This is only done to maintain consistency and because the vast majority of respondents were male. A note on the term game audio: this is the current and most frequently found term to define sound and music in games. Whenever a paragraph refers to music or sound only, these words will be used.

Sander Huiberts

1. INTRODUCTION

1.1 MOTIVATION AND BACKGROUND

The field of computer games has developed enormously over the forty years of its existence.[1] In the very beginning, game designers were only able to draw simple pixels on a screen and synthesise very basic sounds, but currently, most games feature highly detailed game worlds.[2] While playing games, players often become immersed, which is an important aspect for the game experience (Brown & Cairns, 2004, p. 1).

Understanding immersion is important for game developers (Varney, 2006, p. 2). The greater part of the game designer's aim is to create pleasant or impressive games, whether for commercial reasons or because of idealistic convictions (the 'art of game design' (Crawford, 1982, pp. 1-4)). While immersion is considered an important component of the game experience (Brown & Cairns, 2004, p. 1), it is still not really understood how players become immersed and how audio can contribute to immersion.

Most current video games use audio to give feedback to the player and to enhance the user experience. Current game platforms are capable of high quality audio playback[3] and the technological standards are continuously being improved (cf. Collins, 2008b, pp. 1-10).

Along with the graphical side of games, audio has developed rapidly. Game sound finds its origin in the small analogue hardware synthesisers that were capable of producing simple beeps and bleeps in the early 1970's (Cf. Collins, 2008b, p. 2). Initially sound was used to attract the attention of the audience in the arcade halls, where the first video games were installed. However, as more and more games produced sound, more sophisticated technology was needed. A more flexible way of producing different types of sound with the same hardware was made possible by using small sound chips implemented into the various game platforms. The Atari 2600, released in 1977, was

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[1] The first arcade installations using sound date from the early seventies of the 20th century are Computer Space (1971) and Pong (1972) (Collins, 2008a, p. 8).
[2] This is very apparent observation when comparing more recently published games with the first games that featured audio. Also see section 4.2.1.
[3] In April 2008, Sony announced new versions of the Playstation3 which are capable of DTS-HD output. Eric Lempel, director of the PlayStation Network operations wrote on the Sony PlayStation Blog: "DTS-HD Master Audio is literally bit-for-bit identical to the studio master recording and makes movie soundtracks and sound effects truly come to life." (Lempel, 2008, p. 1)

one of the first consumer game platforms with a three-channel sound chip (McDonald n.d.; Collins, 2008b, p. 3). Soon afterwards, innovations in the music-technology industry were to be introduced in game platforms, such as analogue components and FM sound chips (Sanger, 2004, p. 176; Collins, 2008a, p. 10) which later responded to MIDI control information, allowing great flexibility programming sound and music (cf. Collins, 2008b, p. 4). PCM technology (cf. Collins, 2008b, pp. 4-5) allowed recorded audio samples to be integrated with corresponding control information, for instance in the MOD files on Amiga computers (cf. Collins, 2008a, pp. 57-59). When sound cards such as the Sound Blaster became available for home computers, games were able to play back CD-quality recorded material (cf. Collins, 2008a, p. 11). Over the last few years, many of the current platforms have become capable of producing multiple channel surround sound with real-time signal processing (cf. Bridgett, 2007, pp. 1-3). This brief summary of game audio history, while far from being a complete representation of the developments in this area, indicates how drastically the field of game audio has evolved.

As can be expected, these developments have had a great influence on the workflow and the size of production teams. In the beginning, when the first game platforms started featuring sound, the engineers who constructed the arcade systems were the sound designers for games as well, but as both quantity and quality standards became higher, it was, in most cases, no longer feasible to have all the sound files and music designed by one person, and at present most commercial game developers employ large audio teams to produce the necessary quantity of sound and music files. For example, the production of the game Halo 2, released in 2007, involved the creation of 4000 sound effects and 80.000 lines of speech, requiring a substantially larger audio team.[4]

New challenges arise from these continuous changes, such as the development of systems for locating the numerous audio files (asset management), as well as the attempt to maintain coherency in the dialogue samples.[5] Audio teams currently consist of audio directors or lead audio designers, audio or sound designers, composers, music producers, recording engineers, mixing engineers, mastering engineers, implementers, audio programmers, technical audio or sound designers, artists such as musicians or

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[4] The exact size of the audio team is unknown, but these numbers were presented to show how substantial a part of the game development process audio can be. The numbers are obtained from a tutorial lecture at Game Developers Conference (GDC '06):
Brian Schmidt. *Audio Boot Camp (tutorial), Next Generation Console Audio Solutions*. March 21, 2006.
[5] In a lecture at the Utrecht School of the Arts (March 18, 2008), Mario Lavin, sound director at Guerrilla Games, stated that dialogue design "is HUGE" and that separate companies specialise in dialog recording for games.

voice actors, Foley artists and music directors.[6] Moreover, record labels and legal departments are now frequently involved in the production process of game audio, as games can be an efficient way of marketing music.

As it is no longer possible in many production teams to have only one sound or music designer with all the expertise, there is the need for the **conceptualisation of audio** in a cooperative context; an articulation of concepts, structure and the functioning of audio. This thesis aims at contributing to this conceptualisation in the field of game audio.

Although the audio teams are becoming substantially larger, many companies in the game industry still focus strongly on the visual aspects of games,[7] or in other words, that video is dominant over audio. For instance at the Game Developers Conference (GDC) 2006, game audio was discussed as a game feature which has the capability of making games more real, engaging and immersive. Yet, due to the visually-oriented focus, the audio designers and composers often considered themselves to be limited in their design choices and stated they had to 'claim' memory and processing power for a game.[8] The work described in this thesis will, it is hoped, contribute to a more equitable distribution of these system resources for audio developers.

As the game industry continues to search for more pervasive experiences, sound offers many possibilities that have only marginally been investigated.[9] Incorporating audio designers into the conceptualising team can lead to innovation and new concepts. At the GDC'07, a panel consisting of sound designers stated that they believe the role of the sound designers will eventually change: from only producing content they will engage with defining game design elements that are based on audio.[10]

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[6] This statement is based on Rabin (2005, pp. 785-789) and on observations at the GDC'06/GDC'07. It is important to notice that there is not a fixed or standardised composition of an audio team, as its size depends on the complexity of the tasks that have to be done. Many of the job descriptions are often loosely described (Brandon, 2005, pp. 38-39) and the properties of a job title can differ among different companies. What is clear from this enumeration is that audio design and the production teams are becoming increasingly complex.

[7] For instance, in a session at the GDC Audio Boot Camp (tutorial) March 21. 2006: Next Generation Console Audio Solutions (Jason Page/Brian Schmidt). Wilde (2004, p. 1) writes that video is dominant and that the audio generally gets about 10% of the resources. Rabin (2005, p. 789) mentions that although audio is equally important to visuals and design, it is often treated as post-production and that the audio designers often have to convince others of the importance of audio. In a lecture at the Utrecht School of the Arts ('Emotion & Sound & Games') on September 28, 2006, Charles Deenen, senior audio director stated how he once had to convince his superiors of the impact and importance of sound and music by comparing the music of the game to the heartbeat of the player.

[8] As these so-called system resources are currently shared with other features of games, such as video, audio designers often need to put a lot of effort into acquiring processing power or data storage.

[9] Cunningham, Grout and Hebblewhite (2006, p. 8) state that 'the diversification of audio in games can lead to new and innovative products which can stimulate interest, and moreover, be useful to a variety of users some of whom might not have full access to traditional games due to some impairment.' They justify their claim that audio needs to be further investigated by mentioning that many more experts acknowledge the importance of audio in relation to innovation.

[10] Audio Panel: 'The importance of audio in gaming, investing in next generation sound' by Katy W. Bush, Martin H. Klein, Stephen Root, Sarju Shah. Game Developers Conference '07, 9 March 2007.

1.2 DEFINITION OF RESEARCH AREA AND METHODOLOGY

APPROACH

This thesis attempts to make a contribution to the field of game audio design focusing on issues relevant for *conceptual audio design*, i.e. the decisions that are made before the actual design of the assets takes place. These decisions are relevant for audio designers as well as game designers as they concern issues as, for instance, '*what are we going to design with audio and on what grounds do we make this decision?*'. The practical design of the assets comprises questions as '*how are we going to record, produce and reproduce this sound asset?*'.

Although the conceptual and practical design of game audio are separated here, it must be emphasised that both can have a crucial impact on immersion in games; eventually players experience the conceptual design *through* the actually designed audio assets. The conceptual decisions allow for the description of general properties, tendencies and insights that are relevant for most contexts. The practical design decisions are depending on for instance genre-specific conventions or the talents and experience of the designer. Here, we will focus on the conceptual decision-making in order to provide a resource for reflecting upon design: analysis before, during and after synthesis, instead of the act of design itself (synthesis).

This study only deals with single-player computer games. A distinction between single-player games and multi-player games is important as the design, as well as the user experience, can comprise fundamentally different components.[11]

This study deals with three interrelated topics that together form a framework for the analysis of conceptual design of game audio in relation to immersion. Firstly, a model for game audio (IEZA) will be described (Chapter 2). This model was developed between 2003 and 2008 (Huiberts & van Tol, 2008) and has been introduced to various groups of designers and researchers during this period[12] which was used to verify and improve

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[11] One participant of the user-questionnaire specifically mentioned the fact that in some cases, there might be a fundamental difference between single-player and multi-player experiences: 'All this was mostly aimed at single-player experience. MMO's tend to use sounds differently (emotes as well as built-in voice-chat).' (q104:r30).

[12] For instance, exposure to second year game designers, second and third year audio designers, peer researchers, professional designers and conference audiences. It has been used in MA-projects at the Utrecht School of the Arts (e.g. Zoomworld (2007), Sound Conceptions (2007), Adapt-IT (2008)) and in personal projects, such as the Audio Game Maker (Accessibility Foundation, 2006).

the coherence of the model. The model is intended as a conceptual tool for conceptually designing and reflecting upon designing game audio and in this thesis its main function is to provide a coherent vocabulary for the definition and typology of game audio and to provide a conceptual model for understanding the functioning of game audio in relation to immersion.

Secondly, the nature of the phenomenon of game immersion will be studied in depth (Chapter 3). Based on current theories of immersion and the responses of participants to a user survey (see below), the properties of immersion will be described, resulting in a working definition and classification for examining this component of the game experience from an auditory perspective.

Thirdly, the model for game audio and the classification of immersion will be used to identify the enhancing and disruptive effects of audio on immersion (Chapter 4). Several design issues related to the enhancement of immersion by audio will be addressed, that have been found in literature and in sources from other fields of research, as well as in user responses to user surveys. These sources also give designers insights in how audio can positively of negatively influence immersion.

SURVEY METHODS

A user survey was held in 2007, using the UCCASS survey script.[13] Through the general discussion rooms of non-genre-specific gaming forums, regular gamers were asked to participate in this user survey about game audio. A total number of 139 gamers responded to the survey.

The responses to the questions in the survey are included in Appendix 8. In-text citations that refer to these responses are formatted as 'q1:r2', which in this case refers to the second response to the first question. The respondents could answer in Dutch or English. An added –t to the response code mentioned above (q1:r2t) means that that particular citation has been translated by the author from Dutch to English. Spelling errors are corrected in the body text of the thesis; the original text is listed in the Appendix. More information about this survey can be found in Appendix 8.

In November 2005, several preliminary user surveys were held for this study with the goal of obtaining a first indication of the role of audio for an immersive experience. Ten

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[13] More about this system can be found at http://www.bigredspark.com/survey.html (last accessed February 20, 2010).

gamers were interviewed about five different games. After ten minutes of game play, a digital questionnaire was presented. Screen and audio output was recorded using Fraps game capturing software in order to be able to consult the game information when needed. One case of these user interviews is used in the discussion. More about these user interviews can be found in Appendix 2.

As a second way of involving game players, the website **P**retty **U**gly **G**amesound **S**tudy (henceforth: PUGS) was created for this study. PUGS was developed by Richard van Tol and the author to obtain an understanding of the role of audio in the game experience. On the website of PUGS – accessible via www.prettyuglygamesoundstudy.com - gamers are asked to embed videos hosted on YouTube that illustrate examples of 'pretty' and 'ugly' game audio. The subjective terms 'pretty' and 'ugly' were deliberately chosen for this qualitative study, as the objective is to gain an insight in which specific elements of the auditory soundscape individual players appreciate or dislike. In addition to the video file, submitters describe the reasons for valuing that case as 'pretty' or 'ugly' game sound. Up to now, PUGS features numerous cases showing game fragments with player descriptions which explain how the sound was experienced during the actual game play. It has delivered several interesting cases for understanding the experience in relation to game audio and will remain open as a resource for fellow researchers and game audio designers.

The included data-DVD (Appendix B) contains some of these video examples, and reference points with numbers in this text refer to the video numbers on the DVD. An example reference is (PUGS:001), which points to the first video file on the DVD. The original descriptions of the respondents are included in Appendix 1 (the text appendices are considered as Appendix A). Please note that these video files are used only for academic purposes and the original material is property of the copyright holders.

Figure 1: The logo of Pretty Ugly Gamesound Study.

2. GAME AUDIO: THE IEZA MODEL

2.1 UNDERSTANDING THE STRUCTURE OF GAME AUDIO

Practically oriented sources in the field of game audio are commonly found, for instance on the resource website Gamasutra or at Game Developer Conferences.[14] These discuss topics such as audio programming, implementation techniques, sound recording for games and the production processes, and have been mainly published in the last ten to twelve years.[15]

More recently, academic research into game audio is starting to become more common.[16] As the field gradually matures, typologies that describe the structure and functioning of the auditory soundscape form a contribution to the improvement of conceptualisation and communication in game audio design. For the sake of a clear description of the relation between sound and immersion central in this thesis, a coherent and usable typology, that offers an insight into the conceptual structure and organisation of game audio, is essential.

At the very beginning of this research, in 2002, a general typology for game audio was not yet available. Since then, a few models and typologies of game audio have been presented in the academic literature, which will be discussed below. In 2003 and 2004, the principles were developed for the IEZA model for game audio, after which the underlying theory and terminology have been refined and extended (Huiberts & van Tol,

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[14] The audio feature articles on the Gamasutra website can be found at http://www.gamasutra.com/category/audio/ (last accessed March 17, 2010). The annual Game Developers Conference generally features two audio tracks with practically oriented sources. For more information, visit http://www.gdconf.com/ (last accessed March 17, 2010).
[15] To give an example, the first feature on game sound on developers' resource Gamasutra (founded in 1997) is Bernstein (1997).
[16] In 2003, Stockburger (2003, p. 1) mentioned that a theoretical approach to game audio is hardly featured in current game literature:
'(...) if we agree that the majority of games are audiovisual artefacts, it is curious why sound is given so little attention in the literature. This does not necessarily come as a surprise if we remember that it took decades in the field of film studies to develop a deeper knowledge of the inner workings of sound practice. Indeed, the marginalization of sound and the concentration on vision as the dominating sense can be found in theoretical approaches to all audiovisual media systems.'
Game audio designer and researcher Folmann (2004) writes in 2004 that the academic resources of game audio are 'sparse, to say almost non-existing'.
As recently as in 2008, Collins (2008b, p. 6) mentions that academic research into game audio has been slow to develop and mentions that only a 'handful' of academic articles have been published, often in conjunction with film music.

2008). Furthermore, it has been used as a design model in various applications, such as the projects of students at the Utrecht School of the Arts and other design processes.[17]

2.2 GAME AUDIO TYPOLOGIES

Almost all the typologies that have been found in the literature aim to provide insight into the structure of game audio. They can help to understand and improve the functioning of game audio, and to define the elements that are found in the auditory soundscape of games. Generally, five types of distinctions are used to categorise game sound, and some typologies combine these types.

A first approach that can be distinguished in classifying game audio is **production-based**, which often relates to the three types of audio: *speech, sound* and *music*. In game development, these basic categories are distinct paths in the production process of game audio that generally deliver three types of assets: voice recordings, sound effect files and music files (Brandon, 2005, p. 24). This is the most common method of classifying sound in games, even though there is little connection with the functioning of audio in games, as the focus is on the original source of the recorded material and less on how it functions within the game. To give an example, although speech often has a different in-game function than music, speech-fragments can also be used to form music or can be used as sound effects. Thus, a distinction based on the source of the material can have negative implications for the coherency or precision of a model for the functioning and structure of game audio. Even though a production-based typology is still used in the field for the production of game audio, only a limited amount of properties can be addressed with it. For example, music in games is mostly used as a background to add extra atmosphere, but sometimes it can also be used as an in-game element, such as the sound belonging to a piano that is placed in the game world. This distinction between the two functions of music cannot be made in the production-based typology.

Game music composer Folmann (2004) extends this classification and discerns the four dimensions *vocalisation, sound-FX, ambient-FX* and *music*, which form 'the four main dimensions of Game Audio'. Folmann points out that 'vocalisation' contains all speech instances including non-linguistic sounds, such as screams or singing. The latter, singing, can also be considered (a feature of) music and the other non-linguistic sounds are often

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[17] For instance, game sound design assignments, several projects on adaptive audio and music and game design projects. See the conclusion at the end of this thesis.

difficult to separate from sound effects, which makes the distinction between these four categories less coherent. Yet, by defining a difference between sound-FX and ambient-FX, Folmann adds a separation of the background layers from the directly reactive sound effects, which is connected to how sound effects in games are implemented.

A second approach that can be distinguished in attempts to categorise game audio is that of structuring according to the **organisation of sound assets in a game (-system)**. This concerns how different groups of sounds are implemented in a specific game. Friberg and Gärdenfors (2004, p. 4) developed several blind-accessible games within the TiM project and underline the importance of a typology for game audio during the design of audio-only applications, as the increased insight of the developers results in a richer and more understandable game environment. The categorisation system is based upon the organisation of sound assets within the games of the TiM project and consists of *avatar sounds*, *object sounds*, *(non-player) character sounds*, *ornamental sounds* and *instructions*. The category instructions chiefly consists of speech recordings that explain the objectives of the game, which is often needed in audio games. Most video games use visual clues (often presented as text or icons) to give extra instructions to the player, although audio instructions by another game character are used as well. In audio games, instructions are often given beforehand. Many of these games use extensive manuals and even explain the different sound effects (often provided as the option 'learn game sounds' in the game menu). When a player does not seem to understand the goals or objectives during game play, an elegant way of providing this information is by playing speech recordings, as most information is too complex to be conveyed with simple auditory icons.[18]

The categories of this typology show considerable overlap and the distinction can be rather ambiguous in practice. For example, the distinction between object sounds and non-player-character sounds can be rather arbitrary, as both are not directly linked to the avatar,[19] but tend to respond to the actions of the player. Further, limiting factors of this categorisation are that no specific information is provided about the difference in functionality and that it is not general enough for all types of games, although – it must be admitted - this was not the purpose of this classification.

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[18] A very clear example of an audio game that uses spoken instructions during gameplay is *Leap of Faith* (2008). In this game, a game character helps the player to understand (the first) level of the game.
[19] Rollings and Adams (2003, pp. 36-37) discuss the avatar: the character that is controlled by the player. For example, in Nintendo's Mario games, the avatar is Mario.

Stockburger (2003) combines the approaches of discerning different sound types and **the origin of sound within the game environment** within the soundscape, linked to the *diegesis*. This classification is one of the first to incorporate the term diegetic, which is mostly discussed in the context of film sound.[20] Although a fuller explanation can be found in section 2.2.1, briefly, diegetic sound in this context refers to objects belonging to the game world in which the character operates, thus belonging to the character space, while non-diegetic means exactly the opposite. The categorisation contains five categories of 'sound objects': *score*, *effect*, *interface*, *zone* and *speech*, which form the game environment. Combining sound types (score[21] and speech) and categories which represent the origin of sounds within the game environment can be considered inconsistent: music and speech can be used in the other three categories. To give examples: speech could be used in the Interface category and music could be placed in the game world as Effect. Yet, incorporating the concept of diegesis is a very valuable aspect for categorising game audio.

Another principle for the categorisation of game sound is based on the **meaning of sound** for the player. Ekman (2005) describes a framework for understanding the meaning of sound in games, which contains four main types of signal-referent relationships: *diegetic sounds, symbolic sounds, masking sounds* and *non-diegetic sounds*. Basically, this framework divides game audio into two categories: diegetic and non-diegetic sounds and both can represent diegetic or non-diegetic events. For instance, a symbolic sound can be found when (background) music is used to accompany the player's actions. In this case, the actual signal of the music is non-diegetic (it does not belong to the game world) while it represents actions that do belong to the diegesis. In this framework, the relation between the origin of sound from the game environment, expressed in a diegetic dimension, is related to the event it corresponds with, which is related to the diegesis as well. The notion that the difference between diegesis of the signal and the represented actions can differ can be valuable, for instance for sound programmers or implementers. Yet, using this framework as a general typology of the types of sound used in games is difficult as it defines the usage of sound instead of the expression or communication. Furthermore, a distinction between the occurrence of a sound object within the diegesis and the diegetic property of its referent might not be

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[20] Film theory probably engaged the terms from theory on literature.

[21] Score is presented as an equivalent to the term music (Stockburger, 2003, p. 6).

transparent and little can be said about the implications for the experience of the player. Ekman (2005, p. 3) describes an instance of a masking sound which can cause a confusing perspective on the use of game audio:

> 'when a player triggers a monster in the game and is notified of this by, for example, a growl or shout from the monster in question. The sound is, essentially, played because the player has entered a certain hot spot. In many games, the reason for the sound is not related to whether the monster actually can see the player, or vice versa, so the signified event is nondiegetic. However, the sound is masking this technicality and notifying the player of the event with a diegetic, ingame growl.'

It is obvious that when conceptualising a game experience for players the most important element of this case is the presence of the monster in the game world which works as a threatening and stimulating feature. The reason for triggering the sound file - whether in range of vision or as the result of triggering a hot spot – is irrelevant for our purposes in this thesis.

The meaning of sound for the listener is also found in film sound categorisations. As the field of film sound is related to game audio it is often found to be relevant up to certain extent (Cf. Collins, 2007b, p. 1). Payne (1985, p. 357) describes a categorisation by Walter Murch. Here, the meaning of sounds for the listener is taken as a starting-point. The categorisation describes different layers of attention that help the sound designer to emphasise different sound aspects for the listener. Sound is divided into foreground, mid-ground and background. Foreground is meant to be listened to, while mid-ground and background are more or less to be heard sub-consciously. Mid-ground is used for providing a context to foreground and has a connection with the subject, while the background layer is used for the setting of the scene. This three-stage taxonomy is interesting, since it is a useful technique for addressing different types of focus or attention to the designed sound assets in a game. New developments in game audio design explore the possibilities of real-time interactive or adaptive mixing,[22] where the designed system applies focus to the several auditory elements that are important for the player while fading other elements to the background, just the way the sound

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[22] Brandon (2005, p. 91) discusses interactive mixing ('mixing game-audio content while the game is playing as part of the final stage of sound engineering'). Sound director Mario Lavin states that more advanced adaptive mixing is considered one of the next steps in the Killzone franchise ("Killzone 2 Recording", 2009).

designer in film makes decisions which elements will be made audible. Yet, using this typology for game audio does not help to define clear categories, as the category a sound asset belongs to can vary in time if, for instance, when a designer has chosen to fade it from foreground to mid- or background.

Grimshaw (2007a, pp. 226-227) presents 'a conceptual framework outlining the acoustic ecology' in the context of First Person Shooter games. The framework itself does not contain a true classification of game audio, but Grimshaw does define several categories of auditory icons in the 'soundscape' of the game, which is defined as a set of dynamic sounds the player hears (Grimshaw & Schott, 2007, p. 476). Diegetic audio samples are further refined with the terms *ideodiegetic* (sounds the player hears) and *telediegetic* (sounds produced by other players with significance for the player). Finally, the category ideodiegetic comprises *kinediegetic* (sounds triggered by the player's actions) as well as *exodiegetic* sounds (all other ideodiegetic sounds). Non-diegetic sounds (which were not the main focus of Grimshaw's work) are defined as sounds that belong to the interface of the game and background music. A valuable aspect of this typology is that it explicitly deals with multiple player sound design, or at least incorporates a relationship with the sounds of other players, which can indeed be an important aspect of first person shooters. The framework is not exclusively limited to first person shooters, as Grimshaw states, but the applicability for other genres has not been examined yet in his research.

Jørgensen (2006, pp. 48-52) classifies game sound based on the functionality of the different categories of sound. Again, the distinction between diegetic and non-diegetic is used for a division of the game audio, and the distinguished categories represent important functionalities of sound in games. Five main functions of sound in games are defined: *action oriented, atmospheric, orienting, control-related* and *identifying* functions. Jørgensen states that these are closely related to each other and serve usability as well as the experiential quality of games, thus supporting fiction as well as providing the information necessary for the player. As there are multiple functions for each sound instance in games, this limits the use of this overview as a clear classification of game audio. On the other hand, it provides five important types of functionality of game audio.

Finally, there is the approach of distinguishing **different types of interactivity**. Collins (2007a, pp. 1-2) defines a classification based upon the participatory and non-linear aspects of game audio. As opposed to the context of film with static audio, audio in games is often dynamic, as it reacts to changes in the game environment or to the user's

actions. In this classification, audio can be linear (e.g. a non-interactive asset), adaptive (reacting to events rather than the user) or interactive (reacting directly to gameplay of the user). Again, the distinction diegetic and non-diegetic is used. Three categories of diegetic can be distinguished: *non-dynamic diegetic audio, adaptive diegetic audio* and *interactive diegetic audio* and the non-diegetic part of the soundscape consists of *non-dynamic linear sounds and music*, *adaptive non-diegetic sounds* and *interactive non-diegetic sounds.* The distinction of three types of response is valuable for the implementation process or descriptions of interactivity in games, but mainly from a technical point-of-view. As this classification defines types of response of game sound, it is probably more valuable as a classification for technological applications, as opposed to a classification that defines how designers can communicate game information to the player.

In conclusion, it needs to be mentioned that the value of the classification of information is that it helps to 'discover similarities, contrasts and patterns.' (Murray Schafer, 1977, p. 133). All the above mentioned models have their specific value and can be used in distinct fields. However, a design-oriented model for the functioning of audio and the various ways of communicating to the player are hardly addressed. In the next section, a model will be described which offers an alternative approach and a coherent structure for understanding the communication of audio during game play.

2.2 THE IEZA MODEL FOR AUDIO IN GAMES

Audio is one of the means of conveying information about the game to the player (cf. Jørgensen, 2006, p. 50). The IEZA model[23] incorporates two conceptual dimensions that describe the communication of meaning with game sound. A difference with the previously discussed frameworks is that IEZA links two dimensions that both relate to what is communicated with the auditory soundscape, which offers four different domains.

The initial focus of the model is to provide a useful categorisation of game audio within the context of interactive computer game play. The term 'game audio' also applies to sound used during non-interactive parts of the game, for instance the sound that is used

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[23] IEZA is also presented as a framework (Huiberts & Van Tol, 2008). For the consistency in this thesis, IEZA will be referred to as a model to keep it separated from the conceptual framework described in Chapter 4. In future publications however, we will keep mentioning IEZA a framework.

in the introduction sequence and cut scenes, and even other contexts. Four different occurrences of game audio can be distinguished, which form the current scope of game audio:[24]

- Audio during the interactive gameplay.

- Audio during other interactive moments, or when the game is paused, for instance during the pause option, different menus and save dialogues. In these cases, there is an interactive process, but gameplay as part of the interactive process is mostly not present.

- Audio that is part of the game when the game is active but the player is not interacting, for instance, during an intro or cut scenes.

- Audio outside the context of the game. During the installation of some games, in-game sounds – often ambient backgrounds – are played.[25] Music and sound are at times present in trailers and commercials. Some game music scores[26] are sold separately on CD or are available as music download. There are even (streaming) radio stations playing game music only.[27] In this case, game audio can be used outside the game as a symbol to refer to the game.

It will be clear that for immersion, the actual interactive gameplay is most important, as the player is able to fully concentrate on the experience by participating. In the non-interactive parts of the game, the player is mostly a spectator and is not actively participating with the game itself.

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[24] This scope was defined in cooperation with Richard van Tol for lectures at the Utrecht School of the Arts.
[25] This is for instance, found in *Doom 3* (2004).
[26] To give an example of a available soundtrack: for the game *GTA: San Andreas* (2005), a double CD and an 8 CD box are available: http://www.gtasanandreas.net/soundtrack/ (Last accessed June 30, 2008).
[27] For example, GamesFM (http://www.gamesfm.nl/) and 8bitFM (http://www.8bitfm.com/). Websites last accessed on March 5, 2010.
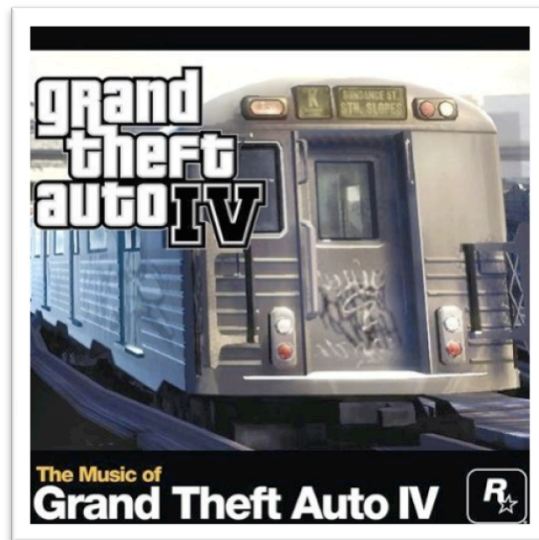
Figure 2: Album cover of the Grand Theft Auto IV sound track.

IEZA is primarily applicable to game audio during the interactive game play. It has not been developed to describe the use of audio in these non-interactive contexts. For these contexts of game audio there might be other, more suitable, frameworks or models, as previously discussed; for instance the film sound typology might be more useful for an analysis of sound in cut scenes (cinematics).

The IEZA model distinguishes two intersecting dimensions and four domains, which will now be discussed in more detail.

2.2.1 THE DIEGETIC DIMENSION OF GAME AUDIO

From the perspective of the designer, IEZA bases its classifications on the communicating modes of game audio. When the communication by means of game audio is examined, the game environment produces sound that is linked to sound sources that exist in the fictional game world. These are used to communicate the world within the game and the objects that are present in that world. Examples of these types of sounds are the sounds of car engines in a racing game, footsteps of a game character in a first-person shooter and the rain and thunder of a thunderstorm in a survival-horror game. All these sounds belong to the story of the game and could – conceptually - be considered to be heard by the 'avatar'.[28] These are the diegetic sounds. Opposed to

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[28] This might seem strange, as it is uncommon to consider the avatar as a hearing person, but for explaining IEZA to game and music design students at the Utrecht School of the Arts this showed to be a good method of dividing the different sound objects in games that feature a 'living' avatar. Rollings and Adams, (2003, pp. 36-37) discuss that not all games

these sounds within the game world are those with sources outside of the fictional game world, such as the background music and the interface clicks when pressing buttons in the Head-Up Display (HUD). This 'HUD' often contains interface elements such as progress bars, different guiding indicators, health bars and available weapons and the score. These objects as well as the background music communicate on a different level in the game environment and are not to be perceived by the avatar. In other words, they are used to express a different part of the game environment, which stands in opposition to the fictional game world. These are the non-diegetic sounds.

This distinction – diegetic and non-diegetic - is described by Stockburger (2003) and is also seen in the other frameworks and models that were developed after 2003. The theory of diegesis originates from the theory on literature, but is also used in film sound theory, for instance by Chion (1994, p. 73). In the past years, these terms have become more or less standard in game audio theory, and refer to the fictional world in which the events and story occur (Cf. Ekman, 2005; Grimshaw, 2007a; Jørgensen, 2006).

When these terms are related to game environments, it is important to note the fact that games often contain non-diegetic elements like buttons, menus and health bars that are visible on screen.[29] These elements are also seen in films, but not as regularly as in games. These non-diegetic elements are not native to film, but, possibly influenced by the techniques used in games, non-diegetic references in series and films, such as text indicating the current location or certain progress, are becoming more common.[30]

Stockburger (2003, p. 4) was one of the first to relate the term diegetic to game audio theory, although he scarcely defined it. Bordwell and Thompson (1985, pp. 191-192) classify a sound as diegetic when the source of a sound is a character or object in the story space of a film. Non-diegetic sound does not originate from a sound source in the story space.

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have an avatar. In games such as chess, the player is said to be omni-present. Yet, the distinction diegetic and non-diegetic can still be made.

[29] When the terms diegetic and non-diegetic are used in the context of games, one has to acknowledge the fact that non-diegetic information can influence the diegesis, because of interactivity (Cf. Jørgensen, 2006, p. 48). For example, a player controlling an avatar can decide to take caution when noticing a change in the non-diegetic musical score of the game, resulting in a change of behaviour of the avatar in the diegetic part of the game. In some cases, this 'trans-diegetic' process needs to be taken into account when using the terms diegetic and non-diegetic. Yet, diegetic and non-diegetic have more or less become the established terms within the field of game studies to describe this particular distinction in the game environment.

[30] For instance, in the BBC-television series Robin Hood (2006) by Tiger Aspect Productions and BBC, text 'flies' across the screen accompanied by the sound of a flying arrow hitting wood.

Jørgensen (2006, p. 48) describes the use of diegetic and extra-diegetic sound in film theory. While diegetic sound has a source in the film universe and could be heard by the fictional characters in the game world, extra-diegetic sound is only part of the film and cannot be heard by the characters, only by the audience. While Jørgensen uses the term extra-diegetic, others use the term non-diegetic, which is used more frequently in film and game theory, and this term is therefore used in the proposed IEZA model. Ekman (2005, p. 2) defines diegetic as 'something that is real within the game world' while non-diegetic is something that 'is not part of the fictive world of the game.' This definition of diegetic possibly connects unintended value judgement to the diegesis, as appearing real is not necessarily the characteristic property that itemises diegetic sounds from non-diegetic sounds. For IEZA, the term diegetic will be used to define sounds that communicate what exists in the fictional game world or 'game space'. The non-diegetic side consists of audio that communicates the sound sources 'outside of' the fictional game world.

2.2.2 THE SECOND DIMENSION: INTERDEPENDENCE OF GAME AUDIO

While the diegetic dimension distinguishes domains belonging to the game world (diegetic) and those who are not belonging to the game world (non-diegetic), the dimension of 'interdependence' contains two poles: the *Activity* (Interface and Effect) and the *Setting* (Zone and Affect) of the game. The Activity communicates events occurring in the game environment, while the Setting provides a background or context for the Activity. Generally, the Setting does not respond directly to the actions of the player, while the Activity is usually directly reactive to the player's actions or to the events belonging to the Activity. The Setting in many games is related to the Activity, for example, by gradually changing the contents of Zone and Affect according to parameters such as level of threat and success rate, which are controlled by the Activity of the game. More concretely, the Activity is used to communicate to the player what is going on and what can be interacted with, while the Setting merely communicates the surroundings, feel, mood and atmosphere.

2.2.3 THE DOMAINS OF THE IEZA MODEL

The two intersecting dimensions of the model establish four domains. In figure 3, the dimensions and domains are represented.
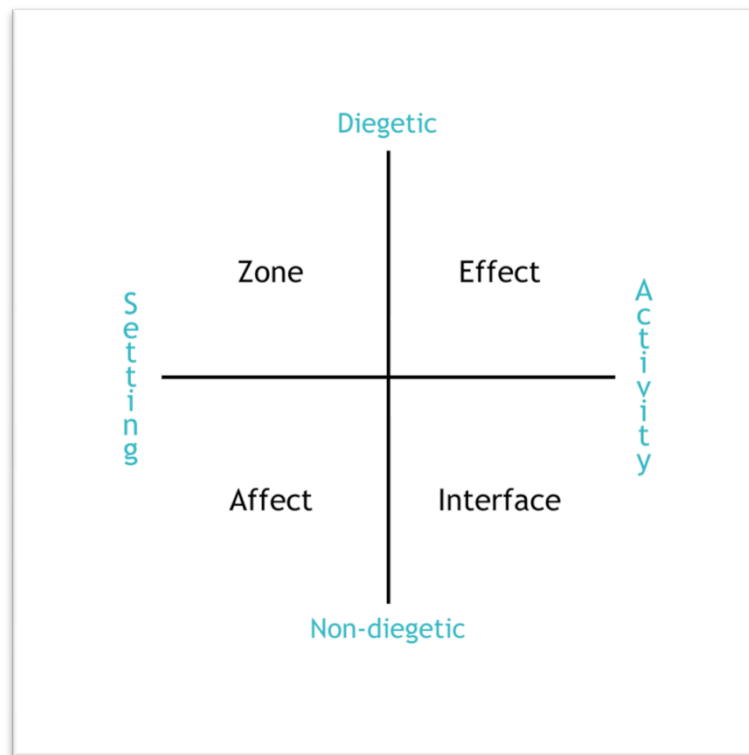
Figure 3: A representation of the IEZA model.

Effect

When the diegetic side of IEZA is examined, two domains can be distinguished. The first domain, named *Effect*, contains sound objects that are perceived as being produced by or attributed to sources that exist within the game world. By communicating Effect to the player, the designer incorporates sounds belonging

to instances and actions within the world of the game. Sounds of the Effect domain can be either on-screen (i.e. visible) or off-screen, meaning present in audio only, not accompanied by visuals (Bordwell & Thompson, 1985, p. 192). Common examples of this domain in current games are the sounds of the avatar e.g. footsteps, breathing, the dialogue of different characters, weapon sounds such as gunshots and swords, vehicle sounds, and colliding objects. These examples belong to games that feature a rich virtual world, but sounds belonging to the Effect domain are also seen in less realistic games, for example, games such as *Tetris* (GameBoy, 1989), *Rez* (2002) and *New Super Mario Bros* (2006). The latter features only a few samples of speech (that of the characters Mario and Luigi) while the rest of the audio consists of synthesised 'bleeps,' 'beeps' and 'plings.' These synthetic sounds refer to the activity of the avatar Mario and events or
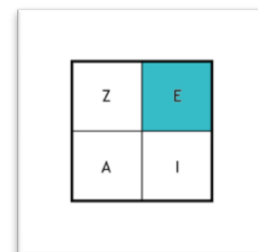
sound sources within the diegetic part of the game and are therefore part of the Effect domain. The use of Effect in non-realistic or less-realistic games is not only limited to synthetic sounds, for instance, the sounds belonging to the colliding balls in *Zuma Deluxe* (2003) are more realistically designed, and sound more like the way a collision would sound in the real world.

Effect generally responds to the player's activity in the diegetic part of the game environment but also contains sounds that are triggered by the game within the diegetic part of the game which are not controlled or influenced by the player. Sounds belonging to this domain are often designed to react to the player in a way that refers to sounds in the real world, and are often dynamically processed using techniques such as real-time volume changes, panning, filtering and acoustics.[31] Exceptions to this general property can be found in cases where designers deliberately create a world that differs from our real world. For example, *Rez* (2002) is a good example of a game where the audio design is very different from our world, as the Effect sounds also form the musical rhythmic soundtrack of the game.

Zone

The second domain of the diegetic part of the auditory game environment, *Zone*, consists of sound sources that clearly originate from the diegetic part of the game and which are linked to the environment in which the game is played. In many games, like *Grand Theft Auto: San Andreas* (2004) and *Half-Life 2* (2004), such environments form a virtual representation of the environments found in the real world. The zone is also distinguished by Stockburger (2003, p. 6) as 'a different spatial setting that contains a finite number of visual and sound objects in the game environment, whether it is present during a whole level in a given game, or part of a set of zones that constitute the level.' Zone corresponds with what game designers often refer to as ambient, environmental or background sound: it is used to provide a background to the game, giving information about the environment the game is situated in and surrounding the user with an ambience. Examples of the Zone domain are the

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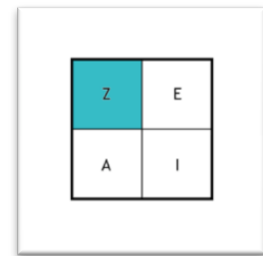
[31] These examples of real-time sound processing are found in many sound engines. Panning involves changes in the stereo image by making a sound go from one to another speaker (for example, from left to right in stereo systems or around the listener in 5.1 sets). Filtering affects the frequencies in real-time (for example, a high-pass filter eliminates the low frequencies) and acoustics refer to the reverberation that is added to simulate the reflections of an environment. These techniques are, for instance, discussed in Brandon (2005, pp. 73-75).

weather sounds of wind and rain in *Worms 3D* (2003), city noise in the *GTA*-series (1997-2009) and the background sounds throughout the different levels of *Half-Life 2* (2004). Zone differs from the Effect domain because it is mostly perceived as one layer of sound instead of separate specific sound sources, even though it might consist of different sounds. For instance, a Zone that corresponds with a level that is located outside, might consist of wind sounds, environmental noise and occasional thunder. In general, these sound sources are not meant to involve a direct interaction with the player (it is not common to shoot at the wind) but they add a feel to the world of the game. Also, in many of today's games, the Effect domain is directly synchronised to player activity and game events in the diegetic part of the game environment, while Zone mostly does not respond directly to the player's actions.

The Zone domain generally corresponds with how environments sound in our real world. When Zone is compared to Effect, it is more often linked to off-screen sources, as one important property is that it is often designed to make the game world 'bigger' than only the screen. Furthermore, it is often used as 'set noise', the minimal feedback of the auditory game world, just to prevent the occurrence of complete silence when no game activity is present (Huiberts & van Tol, 2008).

Although Zones started out as being non-responsive to the player - static background layers[32] - possibly because of the limitations of resources,[33] Zones can also be reactive to the player. When a Zone is constructed of different layers of sound, the balance between these layers can, for example, depend on the location of the avatar or time-related factors. The response is currently often linked to player activity but can also include adaptivity according to the presupposed emotional state of the player, attributing more attention of the player to the meaning of the Zone (Huiberts, van Tol & Went, 2009, p. 3). A key factor for defining a Zone is the intended meaning for the player: communicating an ambient, background layer, which forms an auditory setting for the game world.

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[32] Bernstein (1997) is one of the first to plead against the use of non-responsive seamless loops as ambience and for trigger-ambiences (interactive or responsive background sound).
[33] Using one sound sample as background for a whole level requires less resources than using several samples which have to be mixed for in-game playback.

Interface

The non-diegetic side of the IEZA model can also be divided into two domains. The first, *Interface*, consists of sound that belongs to sound sources outside of the fictional game world. The Interface domain is used to express activity in the non-diegetic part of the game environment, player activity as well as game events. In many games, the *Interface* domain contains sounds related to the Head-Up Display, such as the sounds that are used to communicate the status of parameters such as the level of health or the score. Sound from the Interface domain often represents 'more abstract' sources of the activity which are often designed using signs, for example the sounds in *Half-Life 2* (2004) which indicate that certain actions are not possible.[34]

At times, designers choose to match sound belonging to the Interface domain with the concept of the game. In such cases, references to the diegetic concept can be incorporated into the design of the non-diegetic sounds. To give an example, in *Tony Hawk Pro Skater 4* (2002), Interface sound instances of the in-game menu consist of the skidding, grinding and sliding sounds of skateboards. In *Zuma Deluxe* (2003), the sounds belonging to the menu items sound like hitting wood inside an old temple. In some cases, reverberation is used, for instance because non-reverberating sounds might sound unprocessed. This reverberation often is primarily aesthetic and is not intended to make these sounds appear to originate from the virtual world.
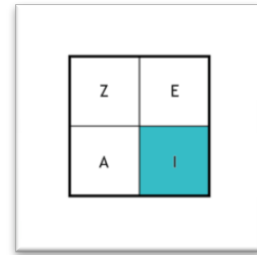
Affect

The second domain of the non-diegetic side of the model, *Affect*, consists of sound that is linked to the non-diegetic part of the game environment and specifically that part that expresses the non-diegetic setting of the game. Examples of Affect are the orchestral music in an adventure game and punk music in *Tony Hawk Pro Skater 4* (2002). Sounds of the Affect domain are not always constructed of music, as many games use horror sound effects or synthesised sounds, which do not

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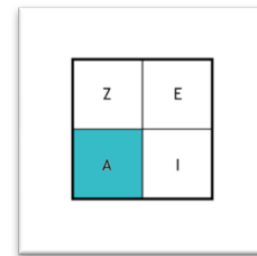
[34] Pressing the 'E-key' in *Half-Life 2* (2004) on a random moment when there is nothing to open will cause this sound to be played.

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originate from the game world.[35] While this domain often features music, music can also be present in the other domains, for instance when a character is playing a piano in the game world.[36] The piano and the game character produce music, which is part of the diegesis.

A large difference between Interface and Affect is that the Interface domain provides information of player activity and events triggered by the game in the non-diegetic side of the game environment, while the Affect domain communicates the setting of the non-diegetic side of the game environment and is used to add or enlarge social, cultural and emotional references. In *Tony Hawk Pro Skater 4* (2002) the punk music refers to a specific sub-culture and is meant to appeal to the target audience of this game.[37] In many first person shooter games, the 'horrific' sound layer communicates the feeling of threat and horror. The Affect domain often features affects of sub-cultures found in modern popular music,[38] but the references to other media are also found in many games, and will be discussed further in Chapter 4.

2.3 TWO FUNCTIONALITIES OF GAME AUDIO AND IEZA

As far as active gameplay is concerned, there are two main perspectives on the expression of in-game audio aimed at the player's experience.[39] On the one hand, audio is used to **optimise** game play, in such a way that it is helping the player to play the game by providing necessary gameplay information. Optimisation serves usability and concerns the use of audio to make the player understand the game, for example by adding interface sounds that inform the player about essential events. Examples of these sounds are found in the HUD of *The Legend of Zelda: Ocarina of Time* (1998, PUGS:037). On the other hand, sound in games is used to **dynamise** game play, in other words, to make the gameplay experience more intense and thrilling. This is found in *Left 4 Dead* (2008), where 'creepy' sounds make gameplay very intense (PUGS:036). With the help of music that stimulates the player at certain moments in the story, for instance, designers can dynamise the gameplay experience. Jørgensen (2006, p. 49) also makes

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[35] The use of this type of Affect is found in, for instance, *Doom 3* (2004).
[36] This example was found in *The Sims 2* (2004).
[37] Mentioned as positively influencing immersion by bringing the player in a 'skater mood' (q87-88:r102).
[38] Inherent to pop music is the implicit social or cultural reference, which can be used to make players identify with an identity or subculture. This is for example discussed in Ter Bogt (2003, pp. 14-15).
[39] More roles can be attributed to the context of game audio, for instance attracting players in other contexts by releasing soundtracks on CDs. However, this does not concern interactive game play.

this distinction by discerning sounds that are aimed at improving usability or experiential quality.

Audio assets in most games are not always exclusively designed for only one of these two perspectives; on the contrary, many are designed and implemented to serve both functions at the same time. For example, an event which presents information, such as the sound of a weapon is designed for the communication of important information about the weapon itself and the Activity of the game as well as making the experience more exciting.

Both optimisation and dynamisation can have a positive influence on the game experience. Usability improves because of good optimisation through game audio, therefore contributing to the overall experience of the game. Designers can choose to add dynamising properties to sound instances that are primarily aimed at optimisation. For instance, a notification about specific game data presented as a simple audio signal or sign belonging to the categories Interface or Effect of the IEZA model, could be disturbing when designed as an ambiguous and intrusive 'beep'-sound. Although the sound instance is primarily aimed at the optimisation of game play, the aesthetic properties are added in order to fit the player's experience. Other sound instances are primarily aimed at the dynamisation of game play. Their role is mainly the enhancement of the experience of the game. Yet, optimising functionality can be combined with dynamising functionality as well; functional cues about threat in the music within the Affect domain that is mainly intended for stimulating the experience are an easy way to inform players as well without disturbing immersion. Although these two roles are highly intertwined, distinguishing these two roles of audio for the game experience makes us aware of the possibilities of combining and separating these two functions. Often, the optimising role is more applicable to the Activity side of the IEZA model, and the dynamising role more often accomplished with the Setting side of the game, but not exclusively.[40]

The optimising role of game audio makes the game understandable and can have a positive influence on immersion by improving understanding of the game information and lowering barriers (this will be discussed in chapter three). This is a very functional side of game audio, and is discussed in sources on game audio functionality (Jørgensen,

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[40] In the user questionnaires music and ambient background are often mentioned for having a positive influence on immersion. However, Effect sounds, such as weapon sounds, approaching explosives or voices of the game characters are also mentioned as dynamising aspects of the game.

2006; Collins, 2007b). The dynamising role can have a positive influence on immersion as it is aimed at making the game more stimulating.

When these two perspectives are related to IEZA, it shows that, usually, the Interface domain is mainly oriented to the optimisation of the game followed by Effect domain and lastly the domains that form the Setting. In other words, it is generally more difficult to communicate factual information with the Setting side. The dynamisation of the game is principally done by the Affect, followed by the Zone. The Activity mostly contributes less actively to this functionality. In figure 4, these two perspectives are represented in the IEZA model.
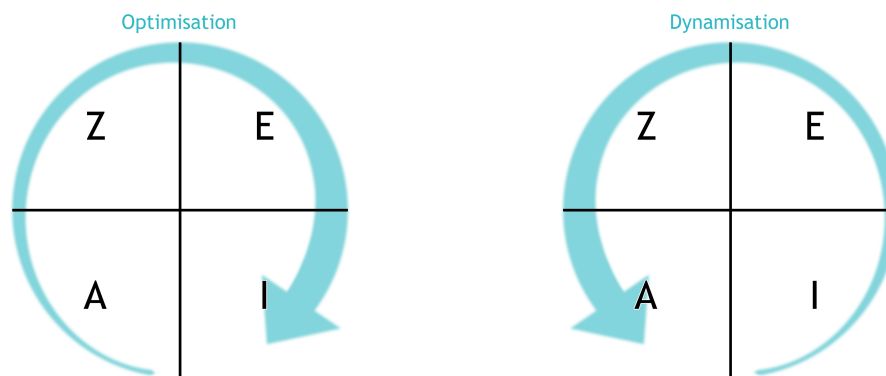
Figure 4: The two perspectives on the functionality of game audio, optimisation and dynamisation, represented in the IEZA model. Generally, the Interface domain is primarily aimed at conveying information. Affect is primarily used for the stipulation of a mood, thus making the game more intense.

2.4 DESIGN PROPERTIES AND IEZA

So far, the communicative properties of the domains have been addressed. With IEZA, it is also possible to address general design properties within the domains. Figure 5 shows eight areas (indicated with arrows) within the domains where the properties link to the adjoining domain.
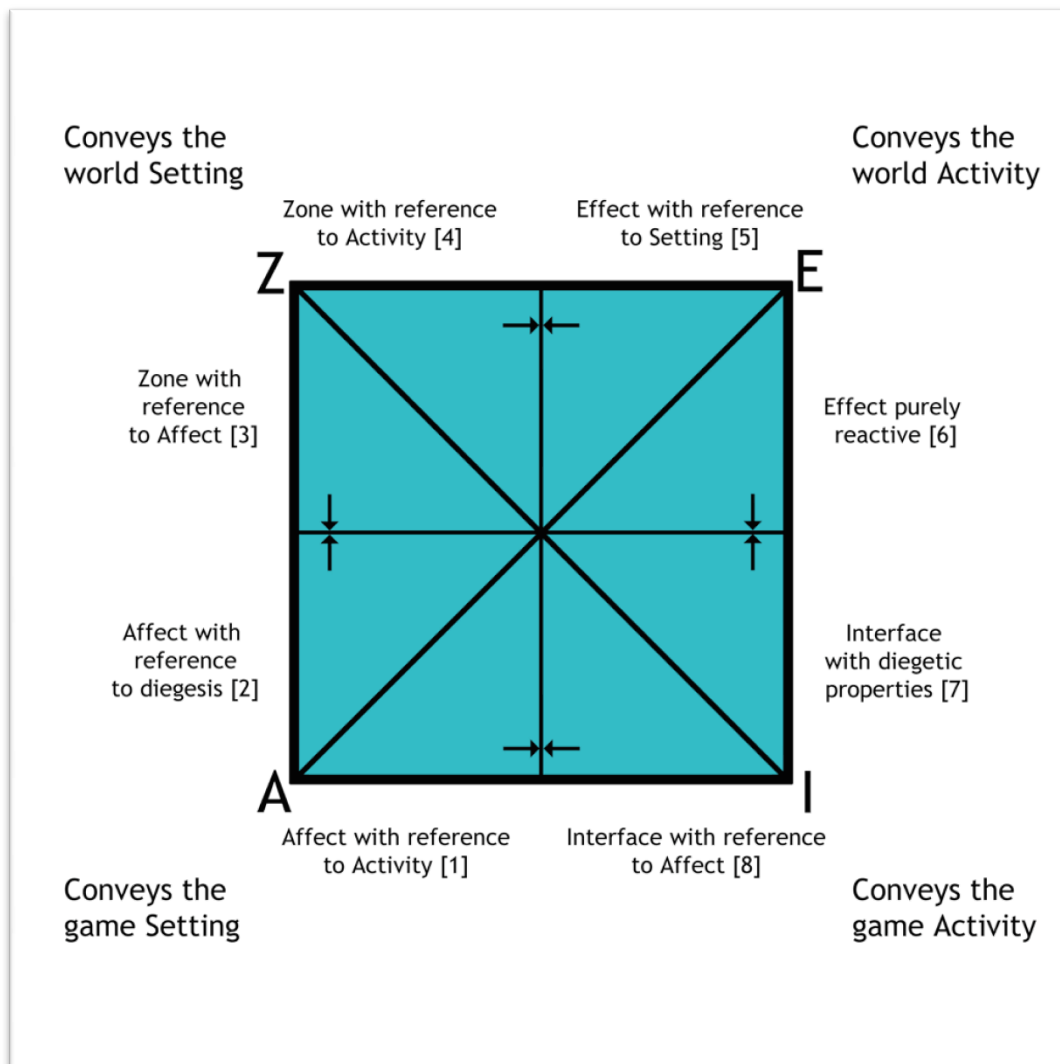
Figure 5: IEZA with general design properties.

In the **first area** [1], Affect with a reference to the Activity is found. Especially in action games, Affect is designed as reactive to the Activity by letting the Setting respond to the actions of the player. To give an example, if the player starts fighting after a phase of

exploration, the music changes accordingly.[41] Moving round clockwise, in **area 2** a connection to the diegesis is applied. A property of this area is that designers can refer with the Affect to the diegesis. This is done by adding atmospheric sounds that are not clearly diegetic, but also less clearly recognisable as music. Examples are *Left 4 Dead* (2008, PUGS:036) and *Doom 3* (2004, PUGS:037). In **area 3**, audio is recognisable as diegetic but designed in a way that refers to Affect. In the mentioned examples *Left4Dead* and *Doom 3*, we find all kinds of scary sound sources (primarily screaming persons) that have no clear origin but are primarily aimed at conveying the setting. In **area 4**, Zone that more clearly responds to the Activity is found. To give a fictional example: the sound of a seashore can respond to the player's Activity but is considered as Setting, as it communicates the Setting of a game. In **area 5**, Effect sounds that have a connection with the Setting are found. For instance, weapon sounds refer to the Setting of War. In **area 6**, sounds belonging to the Effect domain are found that are purely reactive. The sound of hitting a stone with a wooden stick only refers to the action belonging to that sound. In **area 7**, non-diegetic sounds are found that have a reference to the diegesis. This is found when the sounds of the HUD have diegetic properties. The examples that were given in section 2.2.3 apply to this area: *Tony Hawk Pro Skater 4* (2002) and *Zuma Deluxe* (2003) feature Interface sounds that have diegetic properties. **Area 8** contains the sounds belonging to the Interface domain that have a small connection with Affect. This could for example apply for the interface sounds that fit in the musical background track, which is seen in the music game *Vib Ribbon* (1999, PUGS:049). Also, when Interface is designed with the properties of old arcade games, there is a connected to the Affect of classic games.

In Chapter 4, these design properties will be connected to immersion.

2.5 SUMMARY

The IEZA model was developed in 2003 and 2004, refined between 2004 and 2007, and was published on Gamasutra in 2008 (Huiberts & van Tol, 2008). It has been used at the Utrecht School of the Arts for six consecutive years as a conceptual design tool for game design students and audio design students.

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[41] In the user survey participants mention music that changes according to the actions of the player, for example, q87-88:r3.

IEZA introduces two dimensions that describe what the designer communicates with game audio. It yields four domains, Interface, Effect, Zone and Affect that can be used as a typology to define four domains of communication by means of game audio. It can show the structure and association of game audio.

In addition to the four domains, two dimensions are discerned in the IEZA model: diegesis and interdependence. The diegetic dimension orders game audio in relation to the game world introducing diegetic and non-diegetic opposites. Diegesis is used to describe the origin of sound in relation to the narrated game world and is a degree of relation with the game world or the rest of the game environment. Diegetic sounds belong to the world or space the avatar is (virtually) situated in, and communicate events that occur in the world of the game. The opposing non-diegetic sounds do not belong to the game world and communicate the other aspects of the game. It is argued that diegesis is in fact a dimension and not a set of two classes. However, concerning the design of game audio, designers can vary the extent to which a sound belongs to the game world, for instance by adding diegetic properties to the non-diegetic side of game audio, 'placing' these closer to the middle of the dimension. This means that although this is a dichotomy (something belongs to the world of the game or not), it can conceptually be seen as a gliding scale: the extent to which a sound object belongs to the game world can be changed gradually by alternating the design properties.

The second dimension, interdependence, orders game audio as to what it expresses. The dimension consists of two opposites, Activity and Setting. The first expresses the direct events and occurrences of the game while the latter communicates the 'feel' of the game. Interdependence is used to define the way the expression is linked to the actions of the player and is a division in the expression of game audio (factual information versus the feel of the game), which can be also regarded as a sliding scale.

Combined, these dimensions define four domains:

- *Interface* expresses the activity in the non-diegetic part of the game environment. In many games of today this is sound that is synced with activity in the HUD (Head-Up Display), either as a response to player activity or as a response to game activity.
- *Effect* expresses the activity in the diegetic part of the game. Sound is often synced to events in the game world, either triggered by the player or by the game itself. However, activity in the diegetic part of the game can also include sound streams, such as the sound of a continuously burning fire.

▪ *Zone* expresses the setting (for example the geographical or topological setting) of the diegetic part of the game environment. In many games of today, *Zone* is often designed in such a way (using real time adaptation) that it reflects the consequences of gameplay on a game's world.

▪ *Affect* expresses the setting (for example the emotional, social and/or cultural setting) of the non-diegetic part of the game environment. *Affect* is often designed in such a way (using real time adaptation) that it reflects the emotional status of the game or that it anticipates upcoming events in the game.

The four domains that are formed by the two dimensions represent communication of different features by game audio:

▪ The **I**nterface category expresses what is happening in the game.
▪ The **E**ffect category expresses what is happening in the game world.
▪ The **Z**one category expresses the setting (feel, state, culture) of the game world.
▪ The **A**ffect category expresses the setting (feel, state, culture) of the game.

The next chapter discusses immersion, before showing (Chapter 4) how the IEZA model can be used to help with this important aspect of the game experience.

3. IMMERSION

3.1 INTRODUCTION

"Immersion is one of the holy grails of game design."

Rollings and Adams (2003, p. 58).

Most people who have ever played a computer game are likely to have experienced certain feelings of being absorbed by it. In this state, which is most commonly called 'immersion',[42] it can be rather difficult – or at least undesirable - to react to stimuli from the real world. The connection to the game generally is stronger for players that are immersed in the game than for those who are not.[43]

The term 'immersion' is used and discussed in all kinds of areas: it is of importance for gamers, the field of game development and (game) researchers (Garneau, 2001, p. 1). Most players like to be immersed in games[44] and the term immersion is used in online reviews and conversations for describing the capacity that games have to 'absorb' players during game play.[45] A very important reason that explains why immersion is found to be attractive is that it makes players less aware of themselves and the real world the player is in, reinforcing the experience of playing a game.[46]

Immersion is considered to be one of the key aspects that make games worthy to play (Garneau, 2001, p. 1) and game developers attention to the immersive quality of games (Varney, 2006, p. 2). Brown & Cairns (2004, p. 1) state that immersion is a powerful experience belonging to playing games acknowledged by gamers, designers, and game researchers. Varney (2006, p. 2) writes that it is of importance for designers to comprehend what causes immersion. Also, to a certain extent, immersion can prevent that game design problems and mistakes disturb the user during game play (Brown &

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[42] Other terms are, for instance, incorporation (Calleja, 2007a) and flow (Csikszentmihalyi, 1997).
[43] In Appendix 6 (The Symptoms of Immersion), immersion is found to be increasing the connection with the game.
[44] In the survey performed for this study, at least 72% of the players stated to appreciate immersion.
For more information, please refer to Appendix 6: The pleasure of immersion.
[45] Examples of gamers mentioning immersion are easily found in game reviews on the internet, for instance Morgan Romine in a review of Guitar Hero: 'I find the game incredibly immersive, especially when I'm playing multi player with an audience. Hitting all the notes and feeling the music (which always helps my style and accuracy) takes 100% of my attention when I'm playing.' http://flowtv.org/?p=56 (last accessed May 15, 2007).
Another example is a review of Madden NFL 07 (Wii) by 'Mr. A. Moss'. 'It all adds up to a completely immersive experience.' http://www.amazon.co.uk/Electronic-Arts-Madden-NFL-Wii/dp/B000IMBUL8 (last accessed May 15, 2007)
[46] In the survey performed for this study, immersion was – amongst other reasons - appreciated for making the game experience stronger and for being a diversion of daily life. See Appendix 6: The pleasure of immersion.

Cairns, 2004, p. 4). It is obvious that the majority of game designers aim at creating games that are appreciated by players and therefore have to acknowledge the importance of immersion in their communication with players.[47] Immersion is being recognised more and more as being important, by gamers and designers, and researchers investigate the phenomenon as an important element of interaction (Brown & Cairns, 2004, p. 1).

Game audio designers are also confronted with immersion. Yet, there has hardly been developed any theory on the connection between audio and immersion. It is often stated that sound is *also* important for immersion, but a more direct or explicit connection is difficult to find.[48] This is possibly due to the fact that the process of becoming immersed occurs rather unconsciously, making it difficult to define how immersion and sound are related.[49]

Researchers mostly investigate immersion as a phenomenon by examining players (Brown & Cairns, 2004; Ermi & Mayra, 2004). For designers, this provides little design-specific information, so it is important to also have a theory on immersion connected to the design, including insight into the conceptual design decisions that have positive or negative effects on immersion. More knowledge about conceptual design issues concerning immersion is relevant for the designer to develop a more intense game experience. Essential for the enhancement of immersion with audio is a basic concept of what the immersive experience consists of. In the following section, current definitions and the basic aspects of the phenomenon will be examined.

3.2 THE DEFINITION OF IMMERSION

Although the word 'immersion' is often used, definitions are rather sparse (Dansky & Kane, 2006, p. 3; Brown & Cairns, 2004, p. 1; Adams, 2004b) and there is little consensus

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[47] Two examples of communication to players can be found in the following advertisement texts for games:
one referring to GoldenEye 007: 'While the actual game's budget is of course, Top Secret, Rare and Nintendo have spared no expense in creating one of the most immersive gaming experiences ever.'
http://www.mobygames.com/game/n64/goldeneye-007/adblurbs (last accessed May 15, 2007).
and one referring to Counter-Strike for Xbox: 'Counter-Strike for Xbox will be the most graphically advanced version of the series to date, showcasing the technical prowess of Xbox, including immersive and intense multiplayer action on Xbox Live.' http://www.ritualistic.com/games.php/csx (last accessed May 15, 2007).
[48] For example, Garneau (2001, p. 1) states that sound is 'also an important aspect of immersion.' Rollings and Morris (2000, p. 103) describe that sound is important for immersion because it is hardly noticed by the user, which means it can work on his subconscious and draw him into the game world. Grimshaw (2007b) describes immersion in relation to game audio but limits the scope of his research to first person shooter games.
[49] Several participants of the survey indicated that it can be difficult to notice that immersion takes place. Disruption of immersion brings the notion that they were immersed. See Appendix 7: The symptoms of immersion.

within Game Studies literature on the definition of immersion (Calleja, 2007b, p. 8). A reason for this lies in the fact that immersion is a term that defines a state that is also relevant outside the context of interactive media or games. It covers the state of being submerged in a liquid, as well as the state of being deeply engaged with an activity, to give the two most common meanings ("Immerse", n.d.).

Many definitions include properties belonging to the experience of immersion. Patrick *et al.* (2000, p. 479) describe an immersive experience as 'one in which a person is enveloped in a feeling of isolation from the real world', that can occur in both films and games. A similar meaning is found in Dovey and Kennedy (2006, p. 146). They define immersion as 'the experience of losing a sense of embodiment in the present whilst concentrating on a mediated environment.' In games, where the player is interacting, instead of passively experiencing, the player is said to 'lose track of immediate physical surroundings' (Dovey & Kennedy, 2006, p. 146). Rollings and Morris (2000, p. 101) describe the relation between the player and the game and define immersion as 'the player's sense of actually being in the game world.'

Immersion is also connected to absorption in the activity. Dansky and Kane (2006, p. 3) define immersion as 'the state of mind where a person is completely absorbed in what he is doing'. Pine and Gilmore (1999, pp. 50-51) define immersion and absorption as a dimension which describes the relation of a user to the environment. Absorption takes place when the experience enters the attention of the user (e.g. in films), while immersion takes place when the user physically or virtually enters the world of the experience (e.g. in games).

Garneau (2001, p. 1) includes immersion as one of the fourteen key elements in games that are fundamentally entertaining. He describes immersion as 'the pleasure of being in a different environment than usual, the pleasure of living a different life' and states that 'the fun from this seems to come from the pleasure of escaping from one's problems.' Although escaping from one's problems can indeed be a motivation to pursue an immersive experience,[50] it is questionable whether this is the only motivation for the desirability of immersion, making this description of immersion considerably limited. Garneau's view of immersion accentuates realism in games and is mainly based upon

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[50] See Appendix 6: The pleasure of immersion.

sensory engagement that is realised by most of the sensory stimulating features that are listed in his article.[51]

For contexts other than games, for example film, the concept of immersion is also used. Van Leeuwen (1999, p. 207) defines immersion in relation to sound design as taking place when sound is perceived as coming from all directions. Then, listeners become immersed and are 'no longer able to take a more or less detached observer's position towards it'. In games, the user is not a passive observer but an active participant. This limits the usefulness of definitions of immersion in other contexts for game immersion. As the player is actively interacting with the game, it is easier for him to become absorbed in the activity as well, which is also an aspect of immersion. Dovey and Kennedy (2006, p. 8) also state that immersion fundamentally differs across passive media (e.g. films) and interactive media (e.g. games). As the player is an active participant, different emotional effects related to this participation are involved. While the 'loss of sense of self' is likely to occur in many forms of media consumption, the feelings of being immersed in a game world in combination with intense concentration is a distinct property of the experience of game play.

In general, definitions and descriptions of game immersion comprise three basic aspects. Firstly, immersion comprises the feeling of being transported into the game world, or being surrounded by the game world (McMahan, 2003; Garneau, 2001; Dovey & Kennedy, 2006; Rollings & Morris, 2000; Pine & Gilmore, 1999). Secondly, absorption in the activity is often mentioned in definitions of immersion (Dansky & Kane, 2006; Dovey & Kennedy, 2006; Taylor, 2002). Here, the player experiences a strong connection with the act of playing a game, in such a way that he becomes completely engrossed in the activity. Lastly, immersion comprises feelings of identification with the situation or a character of a game (Brown & Cairns, 2004; Rollings & Morris, 2000; Rollings & Adams, 2003; Taylor, 2002). In this case, the player experiences a certain sense of 'reality' while playing the game.[52]

These aspects are not only linked to the player: although immersion is to be experienced by a player, the design has the capability of supporting a sensory or spatial connection, offering engrossment in the activity and making the player identify with the game

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[51] Also referred to as presence or telepresence by Mateas and Stern (2006, p. 649): a 'species of immersion' which is 'the feeling of being physically present in a remote environment.'
[52] Although the term real has to be used with caution, players use this term to define the process of becoming immersed in the situation and they experience that the story 'becomes alive'. See Appendix 7: The symptoms of immersion.

situation or story. As audio can be designed with the intention to stimulate the player to these three aspects, it is useful to keep these in mind as a starting point for examining immersion from the viewpoint of audio.

The three aspects are not only found in the definitions of immersion. In response to a user survey question that examines the appreciation of immersion during gameplay (Appendix 8: question 83-84) players describe gameplay-specific information for appreciating immersion. Some describe the feeling of becoming immersed in the world of the game:

> It just feels right to be sucked into a virtual world and doing things you can't do in real life (q83-84:r63t)
>
> Immersed in a game world makes a game good. (q83-84:r65)
>
> It's probably the #1 reason I play a game in the first place. I want to experience a place and environment that I can't in ordinary life. (q83-84:r121)
>
> I like getting away from real life and getting entirely sucked into a different (more pleasant) world. (q83-84:r137)

Some respondents mention they like to be absorbed in the gameplay:

> I love it when the gameplay goes so deep it makes you completely forget about the real world. (q83-84:r10)
>
> When immersed into the game, you're totally focused on playing and those are the times it is the most fun! (q83-84:r15)
>
> Immersion is needed to focus on the gameplay and play the best you can. (q83-84:r18)

Others mention immersion with narrative aspects of the game, identification with the character or the importance of the storyline:

> A good game can totally suck you into the storyline or, speaking from a Live for Speed POV, is so intense that it attracts your focus and never let go. (q83-84:r44)
>
> It's cool to be in another dimension, like when you're reading a book. It's nice to feel that you ARE the character. (q83-84:r59)
>
> Same as with reading a good book or watching a great movie: being completely occupied with and experiencing the story (q83-84:r68)
>
> Being immersed is a way to get into the game, into the story in such a way that you are really involved and committed. This is a pleasurable sensation. (q83-84:r106)

In other cases, combinations of the three aspects are found:

> To actually have the feeling that you are right there, emotions felt are those that you would have when actually being there. (q83-84:r25)
>
> I like being immersed, because than the rewards (for example of completing a level or other sort of goal) are far more satisfying: once you "feel" surrounded by the world and "one" with the character - which is what immersion means to me in this context - the game and its goals get more depth. (q83-84:r29)

> Being immersed in the game helps to make the experience more fun. It also helps me to escape from real life and relax a bit. It also makes the game more realistic, as I can actually feel like I'm there with the characters, in the game world. (q83-84:r108)

These observations indicate that these three aspects are distinguished by players. They describe their connection with (elements of) the design which causes them to be immersed.

To summarise, immersion is a broad and at times disputed term. The definitions, however, show a common resemblance because they often refer to three shared basic aspects. It is not the purpose of this thesis to give a final definition of immersion, but to define a pragmatic approach to this aspect of the game experience which helps with the conceptualisation of audio in games.

Therefore, a suitable working definition will be used, based on the consensus of definitions in the field. In this thesis, immersion will be considered as a term to define the state that appears when strong involvement is experienced by a player during game play, often with corresponding phenomena such as becoming completely focused on the game, a feeling of being isolated from the real world or a feeling of being transported into the virtual world.[53] The next section will expand on the three basic aspects by investigating the current theories on classifying immersion.

3.3 CLASSIFICATIONS OF IMMERSION

Over the past decade, several attempts have been made to classify what immersion consists of. By classifying immersion, the aspects belonging to this state are made explicit. In the following section, these classifications will be discussed.

Taylor (2002, pp. 8-12) discerns two types of immersion. Firstly, there is diegetic immersion, caused by the act of playing the game. Secondly, there is intra-diegetic or situated immersion, which means immersion 'in the created virtual space of the game situated through both a character's perspective and an embodied point-of-view.' According to Taylor (2002, p. 14), a player needs to be 'diegetically' immersed before experiencing intra-diegetic immersion, which implies that these two types describe different stages in the process of becoming more deeply involved. In her classification, all three basic aspects can be considered present; the first type corresponds to

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[53] See Appendix 7: The symptoms of immersion.

absorption in the activity while the other includes both a spatial ('embodied point of view') and an imaginative aspect ('a character's perspective').

Ermi and Mäyrä (2004, pp. 7-8) investigated the components of the gameplay experience in order to analyse immersion. Based upon user interviews with gamers, they distinguish three aspects of the design of games that are important for the game experience: 'audiovisual quality and style', 'level of challenge' and 'imaginary world and fantasy'. These correspond with three dimensions of immersion: **s**ensory immersion, **c**hallenge-based immersion and **i**maginative immersion (the SCI-model). These three dimensions describe the three basic aspects of the previous section as dimensions of the game experience.

Another classification comes from Adams (2004b). He relates discrepancies in opinions on the experience of games to three types of immersion. The first type, tactical immersion, is immersion in the 'moment-by-moment act of playing the game, and is typically found in fast action games.' For this type of immersion, larger strategy or the storyline do not have high priority. The second type, strategic immersion, is a 'cerebral kind of involvement with the game.' It concerns the engagement with improving situations or fulfilling goals. Lastly, narrative immersion in games concerns 'absorption in a narrative when a player starts to care about the characters and wants to know how the story is going to end', which is closely related to reading books or watching movies. When these types are compared with the three basic aspects, only two types correspond. While narrative immersion more or less matches with the imaginative basic aspect, the other two types are both related to gameplay. Adams' classification does not include the basic aspect of spatial engagement.

Björk & Holopainen (2004, pp. 205-209) define the following five types of immersion:

- *spatial immersion:* extensive manoeuvring in the game world in real time
- *emotional immersion:* narrative, similar to books
- *cognitive immersion:* abstract reasoning, complex problem solving
- *sensory-motoric immersion:* result of feedback loops between repetitious movements
- *psychological immersion:* immersion outside of the game, confusing real world with game world

Björk and Holopainen offer a more detailed classification than the others listed above. The last type, psychological immersion, can be important to acknowledge when the

impact of immersion on people's lives is investigated, yet for a study of this phenomenon in an in-game context, it is not on the same level as the other types in this classification and therefore (currently) out-of-scope for a relation with game audio. This classification clearly shows immersion from the perspective of a user, and describes the various processes of involvement.

A more recent classification is the Digital Game Involvement Model by Calleja (2007a, pp. 85-88). It discerns six types of involvements belonging to player incorporation:[54]

- *tactical involvement:* related to all forms of plan formulation and on-the-spot decision making.
- *performative involvement:* related to all modes of avatar or game piece control, ranging from learning controls to the fluency of internalised movement.
- *affective involvement:* related to the cognitive, emotional and kinaesthetic feedback loop that is formed between the game process and the player.
- *shared involvement:* involvement with controlling an avatar in a represented environment. 'Anchors the player firmly to the location, both spatially and socially. Covers all aspects of communication with and relation to other agents in the game world.'
- *narrative involvement:* involvement with 'narrative elements like a game world's history and background, or the back-story of a current mission or quest (designed narrative) and the player's interpretation of the game-play experience (personal narrative).'
- *spatial involvement:* 'is related to locating oneself within a wider game area than is visible on the screen. It can take the form of mental maps, directions from other players or referral to in-game or out of game maps and covers aspects such as exploration and exploitation of the game-space for strategic purposes.' [55]

This is the most detailed classification of immersion.[56] Due to the considerable overlap between these types of involvement, it is less transparent when used for connecting game audio to immersion in a useful way. Tactical involvement and performative involvement are difficult to separate because they share similarities. On-the-spot decision making (in contrast to 'all forms of plan formulation'), which is in this

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[54] Calleja avoids the term immersion in game theory with the proposed alternative 'incorporation'.
[55] All citations retrieved from Calleja (2007a, pp. 85-88).
[56] Or actually 'player incorporation', as Calleja (2007a) proposes.

classification a property of tactical involvement, is likely to occur in combination with internalised movement, which is a property of performative involvement. It may be difficult to separate affective involvement from narrative involvement, as it is difficult to address the affective responses to only one of these two types of involvement. Properties of shared involvement can have a close relationship with those of performative involvement, as both involve the controlling of an avatar. The property 'spatial anchoring' that belongs to shared involvement is likely to have overlap with spatial involvement. Other 'agents'[57] in the game world that play an important role for shared involvement can also be considered relevant for narrative involvement with the game. These overlaps make the model less transparent and difficult to use for describing aspects of audio and immersion.

We can conclude that the three basic aspects (transportation into the game world, absorption in the activity and identification with the situation) that were found in section 3.2 are present in most of the classifications. Taylor (2002) and Ermi and Mäyrä (2004) describe types and respectively dimensions that correspond with the three aspects. The classification of Adams (2004b) does not contain a type of immersion corresponding with transportation into the game world. Björk and Holopainen (2004) define types of immersion that depend on the processes that can be distinguished in the player, while the aspects are still recognisable within these types. Calleja (2007a) offers an even more detailed set of types of 'incorporation' (his substitute for immersion) which still correspond with the three aspects of immersion. For this thesis the three dimensions of the SCI-model will be considered suitable for describing involvement of players with the design, as they define immersion as a multi-dimensional phenomenon and present a coherent classification with very little overlap. This model is developed based on user examination but focuses on the general components of the design which enable the dimensions of immersion. Not only are the three basic aspects represented in this model, these findings are also found in the user survey (see 3.2). For an investigation of conceptual design issues concerning audio and immersion, discerning very specific types of immersion – as found in other classifications - can be limiting for a general description of the functioning of audio for immersion. This will be further discussed in Chapter 4. The next section will describe and illustrate the three dimensions of immersion.

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[57] Calleja (2007b) uses "agents" to define other characters (whether computer controlled (AI) or controlled by other humans) in the game.

3.4 DESCRIPTION OF THE THREE DIMENSIONS OF IMMERSION

In this section, the three dimensions will be briefly described, based on the concise descriptions by Ermi and Mäyrä (2004) and illustrated with material from the user survey.

The first dimension of immersion, **sensory** immersion concerns engagement with the sensory rewarding aspects of a game. In games that do feature a game world, the sensory features often stimulate the feeling of being there, in the sense that the game world becomes a new reality for the player and the real world moves to the background. In games without a virtual world, such as puzzle games, sensory appeal can make the virtual experience become a new reality for the player as well, for example when attractive physics and beautiful sounds involve the player.

Ermi and Mäyrä (2004, pp. 7-8) emphasise the importance of 'audiovisual quality and style' and state that 'audiovisually impressive, three-dimensional and stereophonic worlds that surround players in a very comprehensive manner' are most relevant for this dimension.

A good example of a player mentioning how rewarding a game world can be is found in the Pretty Ugly Gamesound Study. A respondent selected *World of Warcraft* (2005, PUGS:028) as an example of 'pretty' game audio and the description lists numerous aspects that are related to the world design. He is able to recall many features that play a role in the sensory dimension, such as hearing crickets and an owl during night, the fact that every zone has its own distinct sound, that every floor substance has a different sound and that the clothing has a different sound for each character. Also, the soundtrack is said to fit exactly with what is seen on screen and to increase the connection to the game world. The spells and skills all have their own sounds and the high quality voice-overs are said to be 'just perfect'. Lastly, he mentions that overall, the sound is warm and 'crispy' and clear at the same time, as opposed to many other games which sound harsh, thus making this game sensorially pleasing.

More instances have been found where players describe the pleasure of experiencing something beautiful or overwhelming. Yet, the power of this dimension of immersion is often in combination with the other dimensions, which is also noted by Crawford (1984). He describes *sensory gratification* in games as an *enjoyment factor* of games and claims that the quality of graphics, animation and sound are highly valued by gamers.

The visual and auditory output of a game can be fundamental in providing sensory 'proof' of the experience, which contributes to challenge-based immersion and imaginative immersion. In other words, the value of sensory immersion is in many cases often in combination with the other dimensions. Some participants of the user survey acknowledge sensory immersion in combination with the imaginative dimension:

> 'My preference absolutely goes to games that are both sensory 'overwhelming' and have a continuous storyline (such as GTA or MOH).' (q40:r29)

> 'best games are a good story line with the right visuals with it (it's like not reading the book but feeling and making the book)' (q40:r80)

> [...] The more senses pleased, the lesser external (real-life) impulses are noticeable. Without sound in games, you notice the ticking clock, the barking dogs outside etc, distracting you from the game. (q87-88:r91)

A relation with gameplay is also mentioned, for instance by respondent 92, who shares Crawford's view that sensory immersion is crucial yet supportive, states: 'Games should make you feel like you are really in control, then comes sounds and visuals'.

The second dimension of immersion in the SCI-model, **challenge-based** immersion, concerns the engagement with a competitive process, problem solving, interacting with the game and competing or cooperating with others. Challenge-based immersion is tantamount to involvement with gameplay, which Crawford (2001, p. 21) describes as an enjoyment factor of games which originates from the combination of pace and cognitive effort required by the game. Ermi and Mäyrä (2004, pp. 7-8) state that this dimension of immersion occurs when players experience a balanced level of challenge and skills, are succeeding and advancing, and are immersed in the 'overall suspense of playing.' It concerns 'sensomotor abilities' such as using the controls and reacting fast on stimuli but cognitive challenges are also involved.

In a review of the game Super Mario Galaxy in the Dutch newspaper SP!TS, priority is given to features that are related to challenge-based immersion, which illustrates that this can be a central aspect of specific games:

> 'Of course there is the same old concept: the villain Bowser who abducts the princess. [...] The jumping, double jumping, triple jumping, the backflip: all famous Maria jumps are present again. This time we can turn Mario back and forward by shaking the Wiimote. [...] Nothing else than we expected, but the game plays fantastic. The control is almost perfect. [...] The challenges are incredible varied. [...] It is a highlight in the platform genre. You can't find a better purchase for the Wii at this time.'[58]

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[58] Simon Zijlemans, review in SPiTS, Your Entertainment, p. 19, November 27th, 2007. See appendix 3.2.

In this review, specific attention is given to the 'performance' actions, such as the Mario jumps and performing with the Wii controller (Wii Remote)[59] which are for this reviewer an integral part of what makes this game worth playing.

The third dimension, **imaginative** immersion, concerns the engagement with the 'imaginary world and fantasy, game characters, worlds and story line' (Ermi & Mäyrä, 2004, pp. 7-8). This dimension is concerned becoming immersed with the story or world, or identification with a game character. Some explanatory responses of participants of the user survey connected to this dimension are:

> 'Story is everything. If it isn't immersive, if it isn't believable, or worse, no significant story at all, I don't enjoy it.' (q40:r32)

> 'Story driven content is always the best, it keeps you interested, more than some nice pictures.' (q40:r56)

In a review on 'The Darkness', the fact is described that in spite of several shortcomings, a game can still have considerably engaging capabilities, which are in this case mainly related to imaginative immersion:

> 'Sometimes you play a game with shortcomings, which still manages to lure you back to the computer. Just because the story keeps grabbing you and you would like to know what is going to happen in the next chapter. That was the case in Chronicles of Riddick by Starbreeze, but also in The Darkness, the latest creation of Starbreeze, we are absorbed by the storyline.

> (...)

> The voice cast of the game is excellent. Mike Patton (singer of the band Faith no More) provides a brilliant voice for the gruesome and now and then amusing Darkness-force and the little mafia men are very much alike The Sopranos.

> Of course, The Darkness is not beatific. It is too short, the loading times are awful, travelling between locations is nerve-breaking and some forces of Darkness are just too simple. But when you are absorbed in such a way, these are minor disadvantages you are happy to overlook.'[60]

The three dimensions of the SCI-model that are described above, will be linked to game audio in Chapter 4.

3.5 THE PROCESS OF IMMERSION IN TIME

Besides classifying immersion, with the purpose of describing immersion as a multi-dimensional phenomenon, there is also the time-based character of immersion. Players become immersed over time and will eventually stop being immersed after a certain

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[59] For more information about the Wii-controller, one could visit http://wii.com/ (Last accessed 10 March, 2010).
[60] Dennis Mons, review in SPiTS, Your Entertainment, p. 8, August 14th, 2007, see appendix 3.3.

period of gameplay (Brown & Cairns, 2004, p. 4). Linked to this is the fact that losing track of time due to immersion is frequently mentioned by players.[61] Gameplay evolves and progresses in time. For game audio design, this time-based character is very important to acknowledge as sound exists in time (Buxton, Gaver & Bly, 1991). To give an example, learning the game and experiencing it happens in time and this can be supported by the music: the player recognises the themes that accompany repeated actions, accentuate certain situations or annoy him by too much repetition in time.

Only a very limited number of sources describe the time-based character of immersion. Brown and Cairns (2004) have interviewed seven[62] gamers about their experience of immersion and conclude that immersion is a process, rather than a state, and is controlled by barriers, such as the player's concentration and game construction. Based on the user interviews, Brown and Cairns define 3 stages of immersion: Engagement, Engrossment and Total Immersion. To reach the deepest stage of involvement, the player has to enter the other stages first. The barriers that are mentioned are potentially disruptive for the corresponding stage of immersion. If these barriers are too high, the next stage cannot be entered and the process of becoming further immersed will be disturbed (see Appendix 5 for an overview). As examples of these barriers: for Engagement the player needs to 'invest' in playing the game (time, effort and attention). For Engrossment, game construction is very important (visuals, attractiveness of tasks, and plot) and the barriers for Total Immersion are empathy and atmosphere.

These stages of immersion describe the subsequent process of a player becoming immersed in time. It shows that the needs of a player between several stages of immersion are different. Unfortunately, there is very little designer-specific information on the different aspects of game construction that are relevant for creating an immersive experience. Some of the barriers listed in the table are more important in specific game genres; others can be considered quite general. To give an example, Browns and Cairns state that a lack of empathy is a barrier for Total Immersion. This implies that when a certain amount of identification with a main character or situation is not present, Total Immersion will be hindered or discontinued. Yet, most puzzle games are unlikely to be subject to identification with a main character.

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[61] See Appendix 7: The symptoms of immersion.
[62] In spite of the low number of participants, Brown and Cairns have found a useful time-based perspective on immersion.

In spite of the limited utility of the already defined barriers for audio design – Brown and Cairns do not mention audio in their work - the three stages of immersion define the process of immersion in time. Time-based alterations, such as progress to another stage, stagnation, or a decline in immersion can be distinguished and are relevant for game audio design.

In Chapter 4, the stages of immersion will be used to define the process of immersion, in addition to the SCI-model which describes the multi-dimensional character of immersion. Also, the barriers regarding game audio will be discussed in 4.3.

3.6 CONCLUSION

In this chapter, an overview of the current theory about immersion has been given. Immersion is a disputed and often loosely defined term (McMahan, 2003, p. 68) and this thesis uses a working definition based on current theory. It will not try to redefine the concept of immersion.

Based on definitions, the following three basic aspects are distinguished: transportation into the game world, absorption in the activity and identification with the situation. These are not only found in definitions, but player responses on the user survey confirm that these three aspects are distinguished by players.

Immersion is classified by several authors. While some define a minimal set of types, others define very specific classes of immersion. In the search for a model of immersion with little overlap between the types, the SCI-model by Ermi and Mäyrä (2005) has been selected. The SCI-model regards immersion as a multidimensional state and defines three dimensions: sensory, challenge-based and imaginative immersion. Not only is this the model with the smallest overlap between the categories, the dimensions have the largest overlap with the three basic aspects of immersion and furthermore, the three dimensions are linked to conceptual design components. It is therefore considered a coherent model of immersion for our purposes.

In addition to this model, the three stages of immersion by Brown and Cairns (2004) will be used to describe the time-based aspect of immersion. The three stages of immersion describe the process of a player becoming immersed during game play. As audio exists in time, it is important to acknowledge the fact that immersion is a time-based process with a beginning and an end. These two models will be used in Chapter 4 as basic theory on immersion.

4. AUDIO DESIGN AND IMMERSION

In this chapter, conceptual game audio design will be linked to immersion. Firstly, the positive or negative influence of audio on immersion in general will be discussed, based on the IEZA model for game audio and the SCI-model for immersion presented in the previous chapters.

The enhancing or disrupting capacities of audio for immersion will then be examined in separate sections. As the purpose of this writing is to provide designers with conceptual insights into the functioning of audio for immersion, the investigation of the role of audio in immersion will be accompanied by several design issues that follow from findings in the user survey, cases of the Pretty Ugly Gamesound Study (PUGS) and literature on related topics. Our aim is to increase insight in the general effect of various conceptual design decisions that influence immersion.

4.1 THE POSITIVE OR NEGATIVE INFLUENCE OF AUDIO ON IMMERSION

As we have seen in section 3.4, several components of the game experience, such as the quality of the graphics or the storyline, contribute to the three dimensions of immersion of the SCI-model by Ermi and Mäyrä (2004, p. 7-8). For the **sensory** dimension, according to them, audiovisual quality and style and the game aesthetics are important and the 'audiovisually impressive, three-dimensional and stereophonic worlds that surround their players in a very comprehensive manner' (p. 7) construct this dimension of the experience. **Challenge-based** immersion occurs when players experience a balanced level of challenge and skills, when they are succeeding and advancing in the game, and when they are immersed in the 'overall suspense of playing' (p. 7). It concerns sensomotoric abilities and involves, for instance, using the controls and reacting rapidly on stimuli, but cognitive challenges are also involved. The **imaginative** dimension of immersion concerns the engagement with the imaginary world and fantasy, game characters, imaginative worlds and storylines. This dimension concerns becoming immersed with the story or (imaginary) world, or the identification with a game character.

Ermi and Mäyrä do not provide examples on how these dimensions of immersion could be realised in the design of a game, nor in the audio used in it. Since audio, alongside the visuals, plays such a fundamental role in the game experience, it can safely be assumed

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that game audio can influence the degree to which players are (becoming) immersed. The major aim of this thesis being increasing the insight in the functioning of game audio for immersion, the results will be presented in the form of design-oriented case descriptions.

Starting from the SCI-model, a logical assumption would be that audio corresponding with the contributing components of the dimensions enhances the immersive experience. A question in the user survey investigated the positive influence of audio on immersion (see Appendix 8, questions 87-88). In fact, as 125 out of the 127 (98%) respondents who filled in this question answered confirmative, we can assume that the vast majority of players have at least once experienced the enhancing influence of audio on immersion. The fact that so many respondents were capable of describing specific cases of audio that made the game more immersive, suggests that gamers do not only acknowledge the importance of audio during gameplay, but that they are also in the position to consciously perceive this influence on the immersive experience.

Analysis of the responses on the positive influence of audio on immersion yields five categories.[63] Some players state that audio enhances immersion when it supports a change in the pace of the gameplay, for instance when the player has to stop exploring and start fighting. Audio is also said to build an atmosphere or a setting that increases the immersion of the player. Furthermore, audio makes the perception of the world in a game more intense, which often contributes to the feeling of being present in the game world. Players also indicate that audio can be effective for inducing or enhancing emotions. Audio can also, finally, increase the player's concentration on the gameplay, contributing to immersion. This happens, for instance, when players need to focus on specific sounds in the game environment.

The instances of audio enhancing immersion in these five categories show correspondences with sensory, challenge-based and imaginative dimensions of immersion, as represented in table 1.

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[63] 125 gamers have answered this question. Some of the responses are multi-interpretable and are included in several categories, making the total *n* higher than 125.

Response category	n	Dimension of immersion
Audio enhances a change in pace, anticipates upcoming events or stimulates action-related tension	44	Challenge-based
Audio constitutes an atmosphere or setting	36	Sensory/Imaginative[64]
Audio contributes to the feeling of presence or constitutes a world	30	Sensory
Audio induces or supports the player's emotions	20	Imaginative
Audio improves concentration or focuses upon 'stealth mode'	7	Challenge-based

Table 1: The positive influence of audio on immersion

Some assumptions will now be stated for the relation for audio and the dimensions of immersion and these will later be examined. For sensory immersion, audio that is positioned at the diegetic side of IEZA is likely to be used for making the player experience a feeling of presence in the game world, because it is the diegetic side that mainly builds the game world. Challenge-based immersion is mainly connected to the gameplay activity, so audio that is positioned at the activity side of IEZA is mainly used for enhancing this dimension of immersion. As imaginative immersion has a strong connection with the narrative aspects of games, it is mainly induced by audio that is positioned at the Setting side of IEZA. In section 4.2, the enhancing influence of audio on the immersive experience for each of the dimensions will be discussed.

Just as the immersive experience can be enhanced by components of the game, immersion can also be disturbed if the dimensions of immersion are hindered, either by audio or by other game components. An absence of game components that induce immersion, among which audio, might also form a hindrance for the immersive experience. In the user survey, gamers were asked to give examples of audio having a negative influence on immersion. In table 2, a general interpretation of the answers is presented. The responses of the players indicate that audio or the lack of it indeed can have a negative influence on immersion:

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[64] Audio that constitutes an atmosphere or setting can be mapped to both World Setting and Empathy, as the terms used in the user descriptions – such as mood, feeling or atmosphere - are ambiguous. Ermi and Mäyrä (2004, pp. 7-8), also connect the world of a game to sensory as well as imaginative immersion.

General arguments	n
Wrong type of music	32
Unrealistic/unconvincing sounds	15
Non-responsive audio or too obvious response to gameplay	14
Issues related to voice acting	13
Unpleasant or 'ugly' sounds	13
Repetitive or 'boring' sounds or music	12
Lack of audio	6
External sounds (parents, partners, phones)	2

Table 2: The explanations of respondents for the negative influence of audio on immersion.

As we can see, these responses are much more specific than the responses given for the enhancing capacities of audio on immersion. Moreover, the players rather consistently use the traditional categorisation of audio into music, sound and speech (see section 2.2). Instead of the dimensions of the SCI-model, the responses will be described, in section 4.3, according to this terminology. At the end of the discussion, the outcomes will be related to the sensory, challenge-based and imaginative dimensions of immersion as well as the IEZA model.

We can assume that sensory immersion is hindered or diminished by audio features that decrease the general appreciation on the sensory level or disturb the player from feeling present in the game (world). It is likely that challenge-based immersion is hindered or diminished by audio features that disturb the feeling of flow of the player. For imaginative immersion, audio features that disturb the player's ability to empathise with the game or the situation might disturb immersion. In addition to these assumptions, it also assumed that immersion can be hampered by a lack of audio elements that players expect in the game. After describing the positive influence of audio on immersion (4.2), the negative influence on audio on immersion will be described in section 4.

4.2 AUDIO ENHANCING IMMERSION

4.2.1 AUDIO ENHANCING SENSORY IMMERSION

4.2.1.1 Introduction

Sensory immersion basically comprises the sensory connection of the player to the game (Ermi & Mäyrä, 2004, pp. 7-8). Over the past thirty years, games have undergone an enormous development. The first computer games were not equipped with extensive virtual game environments. In the beginning, most games did not even look like the real world and generally did not contain world elements. These 'classic' games, such as *Pong* (1972) and *Space Invaders* (1978) render simple visual objects on a black background. The continuous technological improvements enabled game designers to create more complex game systems and to add more world elements to computer games (Bogost, 2007, p. 48). The illustrations in Figure 6 and 7 below show some examples of the developments of the visual aspect of games.
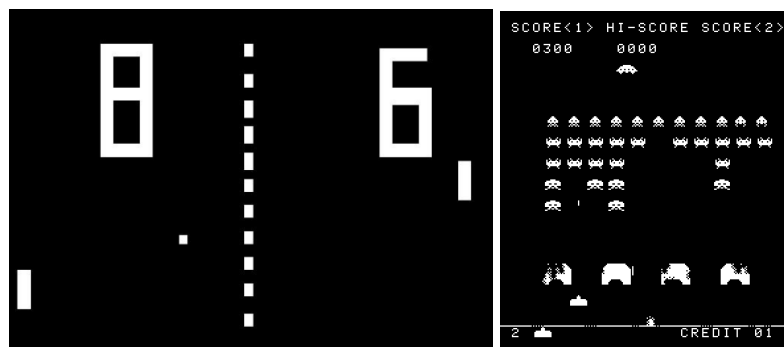

Figure 6: Captures of the classic arcade games *Pong* (1972) and *Space Invaders* (1978).
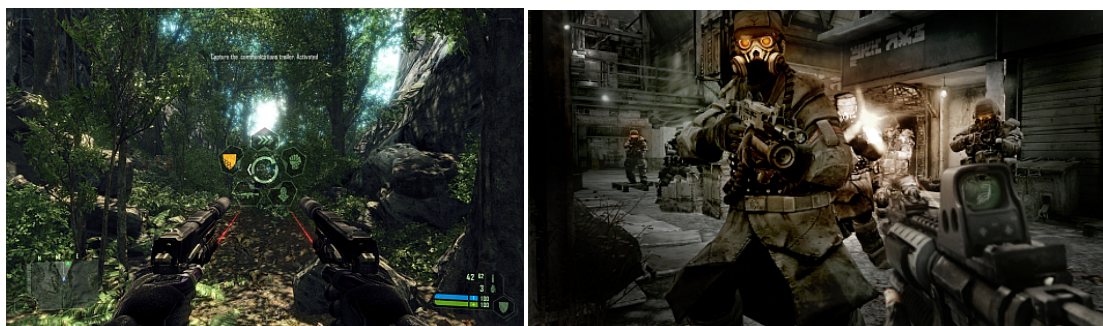

Figure 7: Captures of the in-game video of *Crysis* (2007) and *Killzone 2* (2009).

Audio has undergone an analogous development. When we examine classic arcade games, we mainly find Effect sounds,[65] i.e. sounds belonging to the actions and objects in the game space. Sometimes sounds belonging to the Affect domain – mostly in the form of music with simple synthesised tunes – can be found. Gradually, the auditory side of the virtual worlds of games has become more detailed and realistic, as the Effect and Zone domains were expanded. This is also noticed by Collins (2008a, p. 84), who writes that 'the development of game audio has represented an ever-increasing drive towards greater fidelity and higher realism.' The following examples of cases found in PUGS illustrate how auditory worlds have developed over the years. The first example, *Starsiege: Tribes* (1998) features very few sound instances. *Quake 2* (1999) already has a more detailed world and *Doom 3* (2004) a detailed auditory soundscape. These examples can be seen in PUGS:038, PUGS:050 and PUGS:048.

Generally, we can conclude that the output resolution of game worlds has become higher, both in the visual and in the auditory realm. The sensory side of games has consequently become more in line with the real world and thus more convincing, contributing to sensory immersion.

If we examine the role of audio for sensory immersion, there are two aspects that can be enhanced with audio. Firstly, auditory game worlds can be responsible for inducing a certain sense of presence. As we have seen in the mapping of the positive influence of audio on sensory immersion (4.1), players state that audio can indeed induce a certain feeling of becoming present in the game world. This is partly caused by the highly engaging auditory worlds that provide 'sensory proof' for the game world. To give some examples of player responses on this subject:

> "The soothing ambient sounds sort of ease you into the game world" (q87-88:r1)

> "The ambient sounds in GRAW 2 enhance the experience of the surroundings and the feeling you are actually there" (q87-88:r18)

> "The background sound in World of Warcraft gives you the feeling that you are really in an environment" (q87-88:r23t).

These players describe a certain **feeling of presence**,[66] which is the first aspect for audio enhancing sensory immersion. The second aspect will be defined as **sensory**

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[65] For example, *Pong* featured sounds that belonged to the ball bouncing to the walls and the (pong) bats. *Space Invaders* featured various Effect sounds and four tones constructing non-diegetic music (Affect) that slowly sped up while the game progressed (Collins, 2008a, p. 12).

[66] Respondents of the survey as well as participants of PUGS mention a certain *feeling of presence*. (Tele-)Presence in games is defined by Mateas and Stern (2006, p. 649) as a 'species of immersion' which is 'the feeling of being physically present in a remote environment.' The concept of presence is more often found in sources describing immersion.

gratification; the auditory elements engage the player because they are a sensorially pleasing aspect of playing a game. Crawford (1984, p. 22) describes 'sensory gratification' in games as an 'enjoyment factor' of games and states that the quality of graphics, animation and sound are highly valued by gamers. To exemplify this aspect with some descriptions of players:

> "Some songs in Medieval 2 were beautiful and I really liked some of the songs in LOTR BFME. Don't know why, they were just nice to hear." (q87-88:r46)

> "Very impressed by the sound of call of duty"(q87-88:r37)

> "Loud rock music during racing really fast has an effect on me."(q87-88:r45t)

In summary, two main aspects concerning the enhancement of sensory immersion with audio can be defined: feeling of presence and sensory gratification. The feeling of presence will be dealt with in the sub-section 4.2.1.2 and sensory gratification is described in more detail in the second sub-section (4.2.1.3).

McMahan (2003, p. 68) states that presence and immersion are more and more frequently used interchangeably, probably due to loose definitions of the terms. Presence is mentioned in sources that discuss the experience of video games (cf. Mateas & Stern, 2006; Brown & Cairns, 2004; McMahan, 2003).

Yet, some academics are of the opinion that presence cannot be compared with immersion in video games. Patrick et al (2000, p. 479) state that presence is different from immersion, but that it is just as well 'related to the virtual experience' and occurs when 'a person's cognitive and perceptual systems are tricked into believing they are somewhere else than their physical location.' While immersion is often used to refer to a certain belief in the virtual game world, Patrick et al. point out that the feeling of presence in relation to a virtual experience can cause severe symptoms in the perceptual system, such as simulator sickness, although these mainly appear when devices are used that are aimed at improving the sense of virtual reality. This thesis will not aim to find a view upon the differences between simulations and games and the extent to which games can trick our cognitive and perceptual systems, as this is a study at itself. As immersion is the topic of this thesis, we will refer to 'a feeling of presence' as players describe the feeling of becoming absorbed in the game world during immersion.

Sensory Immersion and Game Audio	
Feeling of presence	Sensory gratification
Rich and detailed auditory world which absorbs the player	*High quality auditory output which makes the sensory experience more intense*
Section 4.2.1.2	*Section 4.2.1.3*

Table 3: Two aspects of the sensory immersion in which audio can play a role.

4.2.1.2 Sensory immersion: Feeling of Presence

As shown above, the feeling of presence can be stimulated with audio. Three topics can be distinguished in relation to the enhancement of the feeling of presence:

- ▪ Stimulating the feeling of presence with details in world design
- ▪ Stimulating the feeling of presence with spatial audio
- ▪ Stimulating the feeling of presence with audio-only assets

Enhancing the feeling of presence with level of details

As indicated in the previous sections, sound can induce or contribute to the feeling of presence in a game. High quality auditory worlds in games can engage the player while masking the sounds in the user environment.[67] This often has the effect on the player that the world becomes a new reality and players refer to this state as 'being there', 'feeling present' or 'feel like you are there' (Brown & Cairns, 2004, p. 3).

Positive user comments on audio in the user survey and PUGS often mention a high level of detail and high quality sound design of the auditory world. This suggests that the creation of a detailed auditory world will generally have a positive influence on the experience of a feeling of presence of players.

If we look at the user responses, we find examples of players referring to the level of details in the worlds. One respondent of PUGS classified the game *Grim Fandango* (1998) as pretty because of the level of detail in this game:

> I also liked that the smallest things had their own sounds. Walking on different materials brings various sounds for each material, but also for example taking an item out of the pocket of the main character. All sounds are very distinct and really make the game complete. (PUGS:001t)

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[67] For instance, mentioned by respondent q89-90:r130. Also, players state that sounds from the user environment can disturb immersion (see Appendix 4 and 7). Cf. section 4.3 on audio disturbing immersion.

Another respondent mentions the real-time strategy game *Company of Heroes* (2006), because of the amount of details that manage to 'suck the player into the game':

> What I like about CoH is that everything has its own sound. You hear GI's walking, the sound of their armour going up and down. Weapons sound true to life and you can even hear the empty cartridge-cases falling and the sound of weapons that are reloaded. Tanks are creaking and the tracks are cracking on the floor. The impacts of bullets and grenades sound different depending on the material they hit. Walls collide, bullets that reflect on a tank, explosions, the whirr of air planes flying over...
>
> You also hear muffled sounds at distance of fights that occur elsewhere. All is combined with the excellent voice acting of your army units, they scream for help, yell when they have made a 'kill' and cause you to be sucked into the game completely. [...] (PUGS:002t)

This respondent describes an impressive amount of details present in the world of the game and also mentions the absorbing quality of the voice acting. A similar case is the description of *Settlers II* (1996)*.* Here, the rich auditory world conveys a feeling of a busy atmosphere to the player:

> The reason that I find the sound of Settlers II very good is not necessarily that it adds something to the game mechanics, but really to the atmosphere. The game has a high 'cuteness' factor, with many happy characters, doing their jobs. Every building and character has its own sounds. Other objects also make sounds. From that, there is always a lot on screen which makes all kinds of sounds. Because of good connection and consistency, the game has a nice busy atmosphere. [...] (PUGS:003t)

What we can conclude, is that a detailed game world often contributes to a stronger connection with the game as the 'finesse' makes the world more convincing and pleasant.[68] Detailed worlds can be accomplished, for instance, by implementing many sound sources in the diegetic side of IEZA (**Effect and Zone**). Randomised triggering of alternative samples or synthesis can be used to keep the world interesting to listen to, while preventing the player to hear the same repetitive samples.

Enhancing the feeling of presence with spatial audio

In order to induce a feeling of presence in the game world, audio can be used to surround and thus immerse the player with sound. Although this might seem almost too obvious, multi-speaker setups are indeed mentioned by participants for their impact on immersion. As many players use 5.1 speaker systems for gaming purposes,[69] designers can utilise these systems to make the player feel immersed in the virtual world while

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[68] For instance the respondent who submitted (PUGS:019) appreciates the in-game sound design in *Bioshock* (2007).
[69] Unfortunately, statistical evidence on how many gamers have multiple channel surround systems available have not been found. In lessons with game students (not an average user group!), the majority admitted to have a surround set connected to the game computer (years 2007, 2008 and 2009).

preventing intrusion from sounds of the user environment - the space in the real world the game is played in - during game play.[70]

Players mention the surrounding qualities of audio in relation to immersion. A respondent is of the opinion that surround sound is the next step in game sounds, which is 'already taken but still not good enough' (q104:r103). Another participant mentions that surround sets can help the player to become immersed more easily. As he explains, 'a busy living room provides a more difficult immersion environment then an empty room with well-placed surround kit,' and he adds that a good pair of headphones might also help to increase immersion, because the user environment is actively excluded from the game experience (q104:r106).

Multiple speakers that are placed around the player, surround headphones[71] or other devices that emulate three-dimensional sound (Simpson, 2000) are useful for suggesting that the game world is more compassing than what is displayed on the screen. In traditional game setups,[72] the screen of the PC or console in games is placed in front of the player, showing only a limited range of the visual world of the game. In contrast to vision, hearing has an omni-directional character (most humans are able to hear sound sources that are behind them) so the separate speakers can be used to situate the player in the middle of the action and - depending on the perspective - make the player aware of what is behind him. In games with virtual worlds, such as *Half-Life 2* (2004), sounds of the **Zone** domain, which communicate the virtual environment of the level, are often present in the front and the back speakers to give the impression of an active world setting that is placed around the player.[73]

The feeling of presence can also be stimulated by suggesting depth in the game world. In many games, this is accomplished with sound by the playback of sounds that are not in close contact with the avatar. To give an example, in *Half-Life 2* (2004)*,* sounds that originate from other locations (from other rooms, from outside or from above the player) suggest that the world is larger than what is seen on the screen.[74] *Battlefield 2*

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[70] Impulses from the real world are frequently mentioned for disrupting immersion. See Appendix 7: The symptoms of immersion and section 4.3 on audio hindering immersion.
[71] Examples of surround (5.1) headphones can be found at the Dolby Corporation website.
http://www.dolby.com/consumer/technology/headphone.html (Last accessed August 25, 2009).
[72] With traditional setups, regular PCs, consoles and hand-held systems are meant. There are virtual reality devices for visual output and more experimental game setups, such as the installation projecting Pac-Man on the ceiling of an exhibition hall at the Robodock Festival in Amsterdam 2006 that use broader viewing angles.
[73] This statement is based on a personal observation of the game. The back speakers add an extra dimension to the sound.
[74] For instance, the helicopter that can be heard outside in *Half-Life 2* in (PUGS:009).

(2005) is mentioned as an example of pretty game sound by a respondent of PUGS because distant sounds enhance the setting of the game:

> Depth in sound design, weapons in the background indicating there is more going on. (PUGS:032)

A similar usage of sound is found in *Medal of Honor: Airborne* (2007):

> the sound of the shootings and airplanes. These sounds enhance the atmosphere and thus the feeling of "actually being there". (q87-88:r29)

In most games, making objects sound distant is achieved by the audio engine, which calculates the correct volume, filtering and reflections of the sound or reverberation of objects at distance (Collins, 2008a, p. 46). A respondent mentioned the EAX system (Environmental Audio Extensions)[75] as having a positive influence on immersion, because it enhances the connection to the world:

> EAX: When I'm inside a church I want everything to sound of if I'm actually there (q87-88:r112).

Another respondent explains how three-dimensional audio is capable of making the world more convincing, which increases immersion:

> Hearing the sound of water dripping of stalactites while sneaking around a cave in Oblivion. Hearing it change with my position and speed. It makes the world believable. Getting closer to the source of a sound amplifies its volume, and relative 3D position is the reason we have two ears and not just one. (q87-88:r122)

Quake Live (2007-2009) is mentioned for the Doppler effect:

> The important things to notice are the fantastic audio: rockets demonstrate the Doppler effect when they fly past your head (…) (PUGS:054)

In summary, the feeling of presence during gameplay is often enhanced by the use of spatial sound. It offers sensory 'proof' and convinces the player of the virtual world. In the user responses, we mainly find sounds belonging to the **Zone** domain of IEZA, which provide a diegetic Setting for the game. Players often refer to these sounds as a 'background' and complemented with sounds belonging to the **Effect** domain which indicate that the world is (virtually) alive this makes them experience a feeling of presence.

Enhancing the feeling of presence with audio-only assets

Audio has different properties than visuals, and some audio-specific properties can be used in a complimentary way to the visuals to increase the feeling of presence. In the

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[75] The EAX product website can be found at http://www.soundblaster.com/eax/ (last accessed March 29, 2009).

user survey, we find that players mention the opportunity of localising opponents in the game world based on audio as immersive.[76] This is an addition to the visual scanning of the game world. Players mention these instances as having a positive influence on immersion. To give an example:

> Listening to footsteps in SWAT4. That way you can exactly place your opponent in a level. (q87-88:r34)

The properties of the auditory domain and the visual domain are investigated in Buxton, Gaver and Bly (1991, pp. 85-90). They describe the properties of both domains in the interface from a usability-related perspective: sound exists in time and over space and vision exists in space over time. Consequently, audio is very suitable for presenting time-based information with the advantage that the information is perceived even though the player is not immediately next to the source. With communication based on the visual domain, there is a chance of missing this information because another object on the screen is attracting his attention. Buxton et al. indicate that a difficulty with designing auditory output is that presenting multiple (auditory) messages at the same time is not effective, because users can have difficulties focusing on many sources of information at the same time. While the work of Buxton et al. is mainly aimed at conveying information efficiently in an interface, it also shows us one characteristic that is relevant for immersion: sound is capable of positioning an object that is not visible on screen in the game world.

A respondent mentions that in *World of Warcraft* (2005) relying on audio for specific information is very useful:

> Every skill I use in the game has a different audio sound. This way I can hear what I'm doing without actually looking at all the skill bars and cool downs. Also, I can hear what enemies are doing around me. Each area has a different music theme, and it fades into each other when I fly from one area to another. (...)

The four categories of the IEZA model provide different opportunities for conveying the invisible. **Effect** is, for instance, used to convey the presence of game characters, objects or other instances in the Activity of the game that can be interacted with but are not in range of the avatar, for example, opponents behind the avatar or in other rooms. These Effect sounds belong to objects the player mostly can interact with, despite the fact that they are not visible on the screen. Depending on the game concept, incorporating such Effect sounds of agents that are not visible (yet) can be used in order to create tension or

[76] E.g. q87-88:r34.

surprise, which can make the game more stimulating. To give an example of the Effect domain conveying the invisible:

> In Deus Ex, waiting inside a dark spot hearing the footsteps of a nearby soldier. You had a sense he was near but didn't know where he was and if he could see or hear you (q87-88:r30).

Zone can be used to sonify what surrounds the player and is a very useful category for adding references that are not present in the graphics. For instance, showing a zombie on screen will make the player aware that there is a zombie, and is likely to attract immediate attention. Playing various zombie sounds in a **Zone** can be used to indicate constant threat, allowing the player to imagine what is not within reach yet. The absence of zombies on screen can enhance the impact of the sound, as the player - depending on the role of the zombies in the concept or story of the game - might search for zombies or try to avoid them.

> Vagrant Story's ambient sounds (howling wolves, wind, forest-leave whistling, groans and moans), Half-Life 2's ambient sounds (fires, head crabs, zombies, gunfire) (...). It really helps getting immersed in a way that makes me scared or motivated to play well. (q87-88:r54)

The two non-diegetic domains, Interface and Affect, are usually not used to convey the invisible of the game world, but are rather used to add a reference to it. Since **Interface** is non-diegetic and communicates the Activity, it mostly offers the least narrative possibilities of all the categories, making this category less powerful with respect to increasing the feeling of presence. Yet, it can be used as an alternative for communication of information that is at that time difficult for the player to see on screen (e.g. health status) when the player has to focus his eyes on the virtual world, thus helping the player to fully concentrate on the game world. The other non-diegetic domain, **Affect** is mostly used for adding a (cultural or atmospheric) reference that does not necessarily have to be present in the game and is especially valuable for adding references that are not visible on screen. To give an example, a player mentions the 'City music' in *World of Warcraft* (2004):

> World of Warcraft city music. When you enter a city, certain music plays.
>
> This helps giving an idea about the size of the town for example. (q87-88:r71)

Using sound for non-visible elements in the game world can require an alternative approach to the design of the engine and may require participation of the audio designer in the game world construction process. When the game designers create lists of sound

effects for the sound designer[77] and do not actively incorporate sound as a separate game design element, these invisible references can be easily omitted, as these lists often chiefly consist of the sound effects that belong to visual assets, actions and graphic features of the world.

To summarise, audio-only assets utilise characteristics that differ from those of visual assets. Players mention the specific qualities of audio that compliment the effect of visuals and enhance immersion. The Effect and Zone domains are the most suitable to convey these audio-only objects, although Interface and Affect may be used as well.

4.2.1.3 Sensory Immersion: Sensory Gratification

In this section, design issues related to sensory gratification in games will be discussed. Sensory gratification is the second aspect of sensory immersion and comprises the sensory engagement with the auditory output during gameplay. Three topics will be distinguished in relation to sensory gratification:

- ▪ Stimulating sensory gratification with dynamics
- ▪ Stimulating sensory gratification with spatial audio
- ▪ Stimulating sensory gratification with appealing audio

Enhancing sensory gratification with dynamics

As we have seen in the introduction of the section on enhancement of sensory immersion with audio, an aspect of sensory immersion is the sensory gratification of the player as a consequence of auditory output of games. In order to make the player enjoy the auditory soundscape for a longer time, dynamics are essential.

Current games often feature a soundscape with a large number of sound objects.[78] At times, keeping transparency and clearness in sound playback can be a challenge, as there is not a final mixing phase as seen in the film production process (Kutay, 2006, p. 3; Bridgett, 2008b, p. 131) where a proper balance is made, which ensures transparency and prevents listener fatigue. This relates to the fact that games are interactive: the

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[77] Rollings and Morris (2000, p. 184) describe the workflow of the creation of sound effects in games. The sound designer plays a "fairly autonomous role" and, according to them, creates the sound effects after he receives the list of sound effects made by the game designer. Although this production process is still used, this is not the most common and not necessarily the ideal way of working. Currently, sound designers at large development studios mostly work in teams (Brandon, 2005).

[78] In *Killzone 2* (2009), an estimated total number of 80.000 sound assets is used (J. de Man, personal communication, August, 2009).

designer mostly does not know in advance when exactly the player will perform certain actions. For example, loud and active sounds such as the sounds of firing weapons should be prevented while a non-player game character speaks out valuable information, otherwise the player could easily miss it. Also, when designing an immersive world, preventing the player from becoming tired of sound by keeping the world dynamic can make the gameplay appealing for a longer time. Some cases have been found of players mentioning listener fatigue. The example of the Pretty Ugly Gamesound Study concerning *Puyo Pop Fever* (2004, PUGS:005) is an instance of a game which was mentioned by a respondent because it featured too many sound instances at the same time to him, making further enjoyment of the game with sound switched on impossible.

In this example, the sound can be considered overly present, which almost forms one layer of noise. Kutay (2006, p. 3) describes how such 'Sonic Sludge' by sound designers and programmers can be prevented. He mentions that it is important for the sound programmer to address a priority indexation to the sounds, describing which sounds are most important at certain times. In doing this, the sound designer has to create sounds that fit to all the other sounds that might occur at the same time. Furthermore, Kutay mentions that the creation of dynamics is essential, since otherwise, understanding sounds becomes very difficult and the sound output is not at all pleasant to listen at. Kutay describes a sound design technique that is useful for preventing this issue:

> "The key to preventing sonic fatigue is to create sound effects that vary in volume and frequency in relation to each other. A single sound effect that is loud and contains equal amounts of low, middle and high frequencies may be effective when played alone, but if all the sound effects are loud and contain a similar frequency spectrum, it becomes difficult to decipher one sound from the next."

The accentuation of certain frequencies can be used to separate the sounds that have to be played at the same time, and Kutay writes that high frequencies are used for adding detail, upper middle frequencies for providing 'presence' of sound,[79] and low frequencies for energy. The key to using frequencies is to establish a balanced, yet dynamic soundscape in which sounds complement each other.

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[79] Here, presence does not refer to the feeling of presence of players, but to the technique of boosting upper middle frequencies which enhances the presence of a sound in the audio mix.

With regard to the dynamics of games, designers in the field are currently examining the implementation of techniques such as interactive, dynamic or adaptive mixing.[80] These techniques enable volume or frequency accentuation of the sounds that are more important at a specific moment during the game for the player's experience while irrelevant sounds are less accentuated or muted.

An important, yet often overlooked design feature of sound in game worlds that should be treated here as well is silence (Bridgett, 2008b, p. 127). A 'virtual silence' can be incorporated to accentuate a quiet stage in games. The use of silence can also improve focus and concentration, as a sudden silence can make our hearing very alert (Murray Schafer, 1977, p. 259). Bridgett (2008a, p. 127) describes the necessity of subtlety and silence in games and writes on the use of dynamics in games:

> Well placed silence and subtlety will allow the parts of the game that need to be larger-than-life to be more powerful due to their contrast next to these areas of silence. Also the ability to wander around a virtual environment in the sections of a game where not much is happening and to simply listen to the subtle environmental sounds is extremely enjoyable and engaging.

For immersion, these subtle moments must not be too silent though, as the user environment mostly is not completely silent (for instance, computer system cooling fans, can often be heard in the user environment)[81] complete absence of sounds in the game environment might allow the player to start noticing the user environment, which can have a negative influence on immersion.[82] By adding a minimal amount of background noise, a moment of 'virtual silence' can be accomplished, making the player very alert to the game world, which can increase tension or give the player the opportunity to enjoy the visuals for a moment. One respondent of PUGS mentions *Shadow of the Colossus* (2005) because of the contrast that exists between the act of walking around and stepping onto a 'colossus':

> This is one of few games where I really noticed the audio. Not only does it have a beautiful soundtrack, but the game handles its sound really good. When you're walking or riding around in the world there is no music. Only the sounds of nature can be heard. Chirping birds, wind, the hooves on the ground etc. When you come close to a Colossus the music begins. Within the battle in varies between eerie music and really intensive battle music.

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[80] For instance, prioritisation was discussed by Scott Selfon in the lecture *More Tales of Audio from the Third Dimension!* on February 22, 2008 at the audio track at the Game developers Conference 2008. Also Bridgett (2008b, p. 131) discusses interactive mixing in games, as the technological improvements have enabled the incorporation of a large number of sound instances at the same time.

[81] In the survey, external sound sources are mentioned for disrupting immersion. See appendix 7: the symptoms of immersion.

[82] Players state that immersion is negatively influenced by sounds of the user environment, for instance, computer fans, neighbours or birds outside. (Cf. question 86 from Appendix 8 and section 4.3 on audio hindering immersion).

Generally, dynamics in the auditory soundscape keep the game interesting. Especially when a great deal of hours of gameplay is required, dynamics and the accentuation of intense moments can help the player to enjoy the game for a longer time.

Enhancing sensory gratification with spatial audio

In section 4.2.1.2, the use of spatial audio to stimulate the feeling of presence was discussed. Spatial audio can also be used to stimulate sensory gratification. In games that do not feature a world enabling players to experience a feeling of presence, surround sound can still make the experience more intense. It is important to notice that even though the player might not experience a feeling of presence, the sensory connection with a game can be enhanced by surrounding the player with sound.

In the user survey, we find an example of a respondent mentioning the subwoofer for its immersive qualities. This subwoofer is a part of most of the current surround systems, and it can be used to indicate large or impressive objects in the game environment. The respondent mentioned that low frequency sounds from the subwoofer had a positive influence on his immersion:

> Grenades exploding next to me in a game. The subwoofer goes insane and shakes the ground making you feel it actually exploded right next to you. (q87-88:r10)

In games where objects travel with high velocity, such as racing games or first person shooter games, the technique of making a sound 'travel' from speaker to speaker can be used to enhance sensory gratification.

Enhancing sensory gratification with appealing audio

Generally, high-quality audio contributes to the sensory gratification of players.[83] As discussed in the section on the enhancement of the feeling of presence, the auditory domain has other properties than the visual domain. This also plays a role for sensory gratification: the appeal of specific sounds and music tracks is found to be engaging in PUGS, where respondents mention the 'cute vibes' of some games as engrossing. Some cases will be shortly described here.

A respondent of PUGS mentioned the music and sounds in *LocoRoco* (2006) as a pretty example of game audio for making 'a complete experience.' In this case, the auditory

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[83] In Appendix 8: 94-95 the majority of players states that they almost never mute sound because it makes gameplay more intense and more fun.

components of the game do not contribute to the feeling of presence, but instead these enhance the 'cuteness' of the whole experience of *LocoRoco* (PUGS:008).
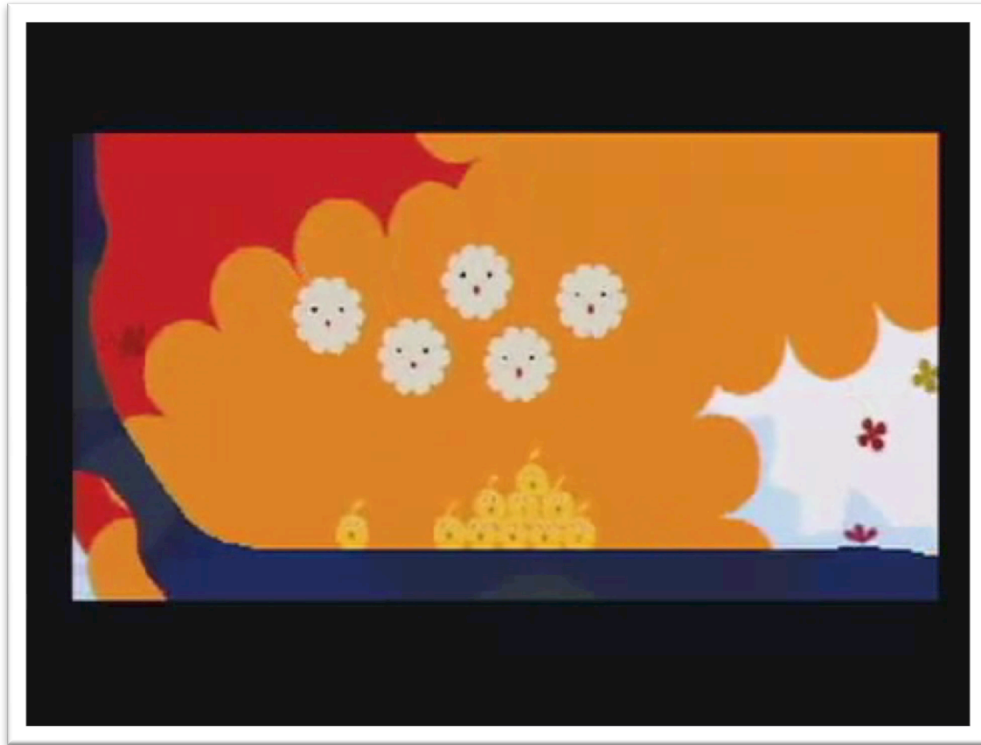
Figure 8: Capture of the *LocoRoco* video submitted in PUGS.

Another respondent also mentions *LocoRoco*, because of the 'vibe' of the game music:

> I have never played a videogame that captured the whole vibe of the game so well in its music. It just makes you want to play some more, while at the same time making me feel happy! (PUGS:008/2)

A similar form of vibe is found in *Katamari Damacy* (2004).

> Doesn't it make you smile? Want to stand up and dance while you play. (PUGS:057)

One respondent of PUGS describes the audio of *Heroes of Might and Magic V* (2006), as enhancing the connection with the game with appealing sound effects and music.

> All Heroes Of Might And Magic versions have good sound effects and music in my opinion. They really know how to make accents on the feeling of the game. It really strengthens the feeling of the game. (…) (PUGS:053)

A last example is *Music Catch* (2008). In this game, the music is played in synchronisation with the actions of the player, who has to collect shapes of the right kind of colour:

> I remember the first time I played this game. The music was something I fell in love with. The game is fairly simple and very abstract, definitely wouldn't have been so awesome without the music. I'm not that into classical music, but this song is wonderful! (PUGS:060)

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In these cases, players mostly do not experience a feeling of presence but the good design of the auditory output is said to be highly appealing.

4.2.2 AUDIO ENHANCING CHALLENGE-BASED IMMERSION

4.2.2.1 Introduction

The second dimension, challenge-based immersion, chiefly comprises engagement with gameplay, where the player is triggered by challenges. For this to be realised it is of major importance that the level of challenge is in proportion with the abilities of the player (Ermi & Mäyrä, 2004, p. 7). This balance has overlap with the flow channel that is explained by Csikszentmihalyi (1997, pp. 30-31) suggesting that keeping a balance will result in a continuous experience of deep engagement (flow).

Audio in games can be a valuable constituent for supporting and challenging the player in this process, since both activity and sound progress in time (Cf. Buxton, Gaver, & Bly, 1991). Especially sounds of the Affect domain, mostly music, are very suitable to support time-based processes, as they share properties such as rhythm, timing, repetition and progression.

The stimulation of gameplay with game music was already present in some of the very first video games. The Arcade classic *Space Invaders* (1978) used simple rhythmic bass tones with an increasing tempo to give a feeling of pressure when the invaders came closer to the space ship (cf. Collins, 2008a, p. 12). *Super Mario Bros.* (1987) on the Nintendo NES used a similar technique for indicating the last seconds of the timer by speeding up the music. It used different rhythmic melodies with various paces for different parts of the levels. For instance, the underground level, where different actions were required (such as collecting coins), altered music indicated the change (Collins, 2008a, p. 28).

Now, the enhancement of challenge-based immersion with audio will be discussed (4.2.2.3).

4.2.2.2 Enhancing challenge-based immersion with audio

Four topics that have been found in PUGS, the user survey and the literature will be examined in relation to the enhancement of challenge-based immersion:

- Audio and the tempo of gameplay

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- Audio and the structure of the game
- Audio-driven gameplay
- Audio-based gameplay

Audio and the tempo of gameplay

As seen in section 4.2.1, audio is mentioned by participants for its positive influence on challenge-based immersion when it corresponds with the player's actions and supports the gameplay. Fundamental to this is the relation between the tempo of (mainly) music and the pace of the gameplay.

The tempo of gameplay varies amongst games. In some games, the actions of the player are continuous and rapid, while in other games the player has to interact more cautiously or reflect upon his decisions. Here, we find two characteristics: **motor skills** (such as reacting rapidly to specific events) and **cognitive challenges** (strategic thinking or logical problem solving in a puzzle game).[84]

Two examples of games that show the difference between a focus on motor skills combined with a quick pace on the one hand and cognitive skills and a slow pace are *Zuma Deluxe* (2003) and *Worms 4: Mayhem* (2005). In *Zuma*, the tempo of gameplay is fast from the beginning and the continuous threat of new approaching balls does not allow for strategic planning, although in the higher levels, some planning is required for creating 'combos' of same coloured balls to be able to continue to play. In *Worms 4: Mayhem* (2005) more cognitive challenges and less rapid interaction is found. In this game, the player can fire the weapon only once or twice during a turn and in order to win it is required to aim attentively in order to cause the largest damage to the opponent. In this game, the player controls a team of worms and the slow moving speed of the worms causes a slower interaction speed than is found in *Zuma*.

The designers of these two games have chosen different approaches for the music and sound design, enhancing the different paces of gameplay. The gameplay of *Zuma Deluxe* is accompanied by a brisk, rapid tune, which fits the state of complete focus on the rapidly moving coloured balls on the screen, and on the selection of the right colours. *Worms 4: Mayhem* is accompanied with rather timid, almost ambient music, which supports concentration on thinking and determining the most successful weapon. The

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[84] Ermi and Mäyrä (2004, p. 7) state that challenge-based immersion comprises both sensomotor abilities and cognitive challenges. The distinction between the two is also found in Adams' classification of immersion (2004b).

Zone of *Worms* can be considered as calm and relaxed. *Zuma Deluxe* does not appear to have Zone sounds. In general, the sound design of *Zuma* is more direct and more stimulating, while Worms has a more 'relaxed' feel. Video examples of *Zuma* and *Worms* can be found in (PUGS:030) and (PUGS:004).

There are games in which the general pace of gameplay is even slower than in Worms, for example in *Defcon* (2006, PUGS:014), a real-time strategy game, which was selected in PUGS for the simplistic yet atmospheric sound design which accentuates the severe act of 'performing' a nuclear war. The slow pace and high impact of actions is supported with the sound design and music and allows the player to concentrate.

Another example of audio matching the slow pace of gameplay is found in (PUGS:056), mentioning *Homeworld* (1999):

> The audio is very serene and non-intrusive which fits the slow paced gameplay and normally silent vacuum of space. (PUGS:056)

Music in particular can alter the perception of the duration of different levels, making them seem longer or shorter (Sonnenschein, 2001, pp. 90-91). Bored or amused listeners mostly have a different (subjective) experience of time and Sonnenschein (2001, pp. 90-91) describes this phenomenon for the field of film sound design with the following example.

> 'A brisk, repetitive march will quicken things, while romantic or New Age music tends to soften stress, relaxing the passage of time, even making it stand still.'

To enhance the player's immersion, music can be used to help the player through the stages of the game that are time-consuming or effortful. For instance, during the Engagement (the first stage of immersion), when the player is learning the controls and rules of the game (Brown & Cairns, 2004, p. 2) the audio can influence his perception of the time spent on this process.

An important factor for the perception of time is the musical tempo. According to Murray Schaefer (1977, p. 227) this tempo is related to the rate of the human heart beat: a normal relaxed heart beat is 60 to 80 beats per minute and music in the tempo of 80 beats per minutes, is mostly perceived as relaxed. The music of *Zuma Deluxe* (2003) is about 102 beats per minute,[85] which stimulates the player to become active. Most film composers carefully choose the tempo of film music (Rona, 2000, p. 10), for instance

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[85] The tempo of the music was obtained by synchronising a click track to the music of Zuma over 4 measures in an audio sequencer.

based on visual cues, such as a marching person visible on-screen. Game composers are more likely to choose a relation with the gameplay or a tempo that supports the actions very well as the interactive nature of video games makes it difficult to predict the occurrence of visual cues.

Not all games have a continuous pace. While some games feature a continuous sound track with a fixed tempo, other games use short fragments of music that are triggered at certain moments. This is for instance found in, *Enter the Matrix* (2003) or *Prince of Persia: The Two Thrones* (2005). For video examples of the music usage in these games, see (PUGS:030) and (PUGS:027).

A respondent of the user survey describes how such fragments manage to stimulate as follows:

> 'When in Ninja Gaiden the rock songs start to play, you're feeling all cocky and tougher then before. It's a fighting action game so fast paced rock is an excellent combination.' (q87-88:r6)

A feature that is not frequently used in games with intense pacing is a slightly varying tempo, but that can nevertheless be a very useful method to increase the feeling of tension between success or failure in the gameplay. Rona (2000, p. 11) explains the value of this technique in film music:

> 'A slow build in tempo can add tension and energy to a scene in which something is gradually becoming more significant, such as danger. A cue can slow down as a sign of winding things up, or to simply give the music a sense of phrasing.'

The game *PlasmaPong* (2007) is one of the few examples in PUGS that features a gradually increasing tempo. The respondent thinks the increasing tempo is what makes this game very stimulating (PUGS:010).

With regards to the tempo of gameplay, we see that many games that mainly require motor skills offer fast music, accompanied with very direct sound signals, such as *Super Mario Bros* (1985), *A2 Racer* (1997, PUGS:043) and *Jet Set Radio Future* (2002, PUGS:044), thus supporting the player to **focus on the activity of gameplay**. What can be noticed in the games that principally require cognitive skills, on the other hand, is that these tend to feature music with a more relaxed mood and more subtle sound design, making the experience more reflective and allowing the player to **concentrate on strategic planning**.

Besides this primary function of audio on the game pace, audio can also help players to focus more on the game by preventing them to become distracted by the real world. In order to keep players concentrated, audio can be used to mask sounds from the user

environment. Collins (2007b, p. 2) describes this as the *environmental functions* of game audio, which contribute to a stronger connection with the game environment. Players in the user survey also mentioned that audio is important for their concentration on the game as it can help them not to get distracted: [86]

> '[...] The more senses pleased, the lesser external (real-life) impulses are noticeable. Without sound in games, you notice the ticking clock, the barking dogs outside etc, distracting you from the game.' (q88:r91).

Another respondent describes that metal music in games generally has a positive influence on his experience of immersion with the game. In this case, the music supports the battles of the game, which excites this player. His description is as follows:

> 'Metal Music. It is easier to concentrate with the music. It gives you a better feeling. For instance, when I'm playing Counter-Strike Source. In that case, there is nothing better than good metal music during a rush.' (q87-88:r42)

This illustrates that music can be beneficial for the player's ability to focus on the activity in quick paced games. In such games, moderate music might cause the player to be disturbed by real-world thoughts, with a consequent decrease in concentration and performance.

The properties of motor skills and cognitive skills and the respective audio design features accompanying them could be mapped as follows:

Motor Skills	Cognitive Skills
Focus on activity	Concentration on strategic planning
Stimulation of action, rapid tempo	Stimulation of reflection, calm tempo

Table 4: Two aspects of the pace of gameplay: motoric skills and cognitive skills.

In conclusion, the musical tempo often helps to support the actions of the player, making the gameplay pleasant and increasing the feeling of flow and thus increasing challenge-based immersion. Just as in film, designers should choose the right tempo for the stimulation in relation to the pace of gameplay. A gradually increasing or an adaptive tempo might be a suitable direction to investigate as a new development in game music. Two aspects can be discerned that are relevant for the enhancement of challenge-based immersion: motor skills and cognitive skills. For motor skills the focus on the activity is highly important, which is often achieved with an appropriate tempo and stimulating

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[86] Examples of respondents in the survey indicating that concentration is important for immersion are q86:r43, q86:r63t and q86:r72 that can be found in Appendix 8.

music. In games that mainly require on the cognitive skills of the player, we see that the player has to concentrate on the strategic planning of the game, which is often supported by a more calm tempo and music with less impulses.

Audio and the structure of the game

Most games have a certain structure, for instance in the form of a division of levels or a storyline. Enhancing the changes in the gameplay can increase challenge-based immersion. Respondents of the user questionnaire state that audio supporting the structure of the game has a positive influence on immersion. When there is certain progression in the levels of a game, players appreciate music that follows that progression. The games of the *Halo*-series (2001, 2004, 2007) were mentioned by users for the effective support of music on the variation of the levels. Several examples of players that describe how music in Halo is able to increase immersion are:

> 'Halo. Hard to explain, up tempo music when things got more tense, slow music in the beginning, inviting you to explore, feel (more) relaxed.' (q87-88:r26)

> 'In Halo 3 when you know its going to get hard to beat all the enemies and the music gets louder. The audio has to be perfectly synchronised with the game itself, then it feels like your in the game.' (q87-88:r16)

> 'For example in the Halo series music is not a standard loop of tones that play from the start till the end of a level. But music is played at certain points in a level to stimulate the gamer emotionally. When music plays non stop it's usually quite boring and repetitive.' (q87-88:r8)

This technique is not only found in the Halo series, but also in other games:

> 'The music and sounds in Soldier of Fortune, they adapt to the moment and the action. The tension of the moment is supported by the music/ambient sounds' (q87-88:r4)

> 'Rhythmic music. You get excited, you know that there is going to be more action, and you get prepared for it.' (q87-88:r7)

> The radio noise in Silent Hill 2: when enemies are nearby, it will make a noising sound. This is good because you know there is danger and it helps making you afraid. (PUGS:021)

In some games, different modes of interaction in the gameplay require different actions from the player. For example, at the beginning of a game, the player is often in a phase of exploration which differs from his activities in the rest of the game. After a certain time, threatening opponents appear or assignments are given. After that, even more difficult situations, such as 'bosses', the very powerful characters at the end of levels in action games, require maximum focus of the player (cf. Rollings & Adams, 2003, pp. 306-308).

Audio can be used to indicate the changes in the mode of gameplay and stimulate the player when new challenges are presented. For instance, in *Half-Life 2* (2004) there are intense fights, during which large numbers of opponents have to be defeated, that are

accompanied by dense sounds and intense music. In a different mode, the player has to find the way out of a confined area, and a relaxed setting enables the player to concentrate and solve this 'diegetic puzzle', supported by a quieter game environment.[87]

Audio that adapts to the mode of gameplay is mentioned frequently by players as a positive feature. This underlines the importance of systems that adapt to the player's activity. Adaptive systems can also be used to stimulate the player to undertake action. This stimulation is, for instance, found in *Prince of Persia, The Sands of Time* (2003), where the music, with rock guitars, calls the player to the battle.[88] In this case, the presence of rock guitars is used as an extra stimulation, preparing the player for a change of activity and bringing extra excitement. Respondents of the user questionnaire found that the anticipation by music increases the feeling of immersion:

> 'The old Ghost Recon series. The musical score indicates that you will enter a battle, in other words, it gives you a prepared feeling of what is coming' (q87-88:r13)

> 'Background music. When the music changes pace you know something is coming' (q87-88:r 53)

> 'Half Life series & Halo series. Both have really great, up-beat music that swells towards a big battle. Mostly I only notice the music after it has been playing for a few minutes but that's when it really works and I get really immersed!' (q87-88:r15)

These alternations in the mode of gameplay can be found in the game design document[89] (Kutay, 2006 p. 3), in which the game designer mostly defines the challenges in the various levels of a game.

In PUGS, a respondent selected *Zuma Deluxe* (2003) as an example of good game audio because of the music. The soundtrack of this game has been constructed using a music file with a total duration of only three and a half minutes,[90] which is generally seen as short[91] for a game that provides many levels which have the same background track. The soundtrack uses several musical loops that vary in time and (the triggering parameter) threat causes a variation in the background music. When the balls enter the 'danger zone' near the hole, which can lead to the player losing a (game) life, the music changes into the more threatening mode. The reason this respondent selected the music of this game as an example of good game audio is that it is:

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[87] Personal observation of the functioning of audio in *Half-Life 2* (PUGS:009).
[88] A video is available (PUGS: 045). Around 2m40s, the fighting starts, which is accompanied by music.
[89] The game design document is a written document that describes the game (e.g. high concept, game treatment, game script) (Cf. Rollings & Adams, 2003, pp. 13-27).
[90] Specified by opening the MO3-file (a MOD file) of the music of *Zuma Deluxe* in an audio player (using Winamp 5.08e).
[91] For instance Sanger (2004, p. 215) states that repetition is one of the biggest problems of game audio.

> 'Music with spirit, with that X-factor, has a very addictive effect on me. I notice that I tend to play games with inferior gameplay more often when the music is good, just because the game experience in general is positively influenced. I remembered Zuma from the first time because of the catchy tune. If that had not been there...'(PUGS:004t)

The constant presence of the tune in *Zuma* provides a consistent and appealing background that supports the action of the player. As there is little change in the music and there are only slightly different patterns used for variation, the music does not distract from the gameplay, while still supporting the flow of the player's actions.

Related to this consistent background track is what Sonnenschein (2001, p. 65) describes about rhythmic sound versus irregular sound in the field of sound design. Rhythmic sounds are more predictable and thus cause "a certain tranquillity and assuredness, or nagging oppression", while irregular sounds can make listeners become "alert, frightened, confused or just make them laugh." According to Sonnenschein, certain repetitiveness of sounds can make players comfortable, as the attention is drawn to new things and the repeated things are already familiar, which works reassuring (Sonnenschein, 2001, p. 116). On the other hand, too much repetition means little new impulses, which can cause irritation or boredom.

To summarise, respondents believe that music that corresponds with the structure of the game often has a positive influence on immersion. Designers can stimulate this by making the music system interactive or adaptive and letting the music correspond with the 'peaks and valleys' of gameplay. For some games, repetition is found as an aspect that can be used in the design to comfort players when gameplay is also repetitive, although too much repetition is best avoided.

Audio-driven gameplay

As opposed to the function of audio to support the tempo of gameplay or structure of the game, as discussed in the previous two sections, music can also actively drive the actions of the player. The numerous 'music games' (also: rhythm games) that have been developed in the past years are good examples of audio-driven gaming, as they use audio as a basic constituent of the gameplay activity. Examples of music games are the *Guitar Hero* series (2005-2007), *Amplitude* (2003) and *Karaoke Revolution* (2003).

In these cases, a **direct drive** on gameplay by audio can be distinguished, which comprehends that the actions are to be performed in the same rhythm of the music.[92] A clear example of direct drive is *Vib Ribbon* (1999), a game played on the Sony PlayStation that automatically generates levels from tracks abstracted from an audio CD that has been inserted into the game console's CD tray. Based on the musical track, the game system generates several shapes connected to a white line (see Figure 9). The player is supposed to press the correct buttons when the different shapes approach, following the rhythm of the music and make the avatar, a white rabbit, jump over the shapes in the line in time. *Audiosurf* (2008) follows the same principle; the player selects an MP3 file from his hard disk and the objects in the level are constructed based on the beat of the music.

Figure 9: A screen capture of Vib Ribbon.

Another example is *Rez* (2002, PUGS: 046). In this 'rail shooter' game, the player starts in a very basic world, built up from lines and grids. As the player proceeds, the world elaborates more and more into a visual spectacle (see figure 10). The sound track is built up in line with the gameplay. At first some notes are played according to the objects the player hits. Eventually, all musical instances are synchronised in real-time to the rhythm of the soundtrack (which is similar to electronic trance music). The player interacts in the rhythm of the music and the Affect of Rez becomes increasingly complete.

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[92] Cunningham, Grout and Hebblewhite (2006, p. 9) call the gaming that occurs with direct drive audio focussed gaming**.**
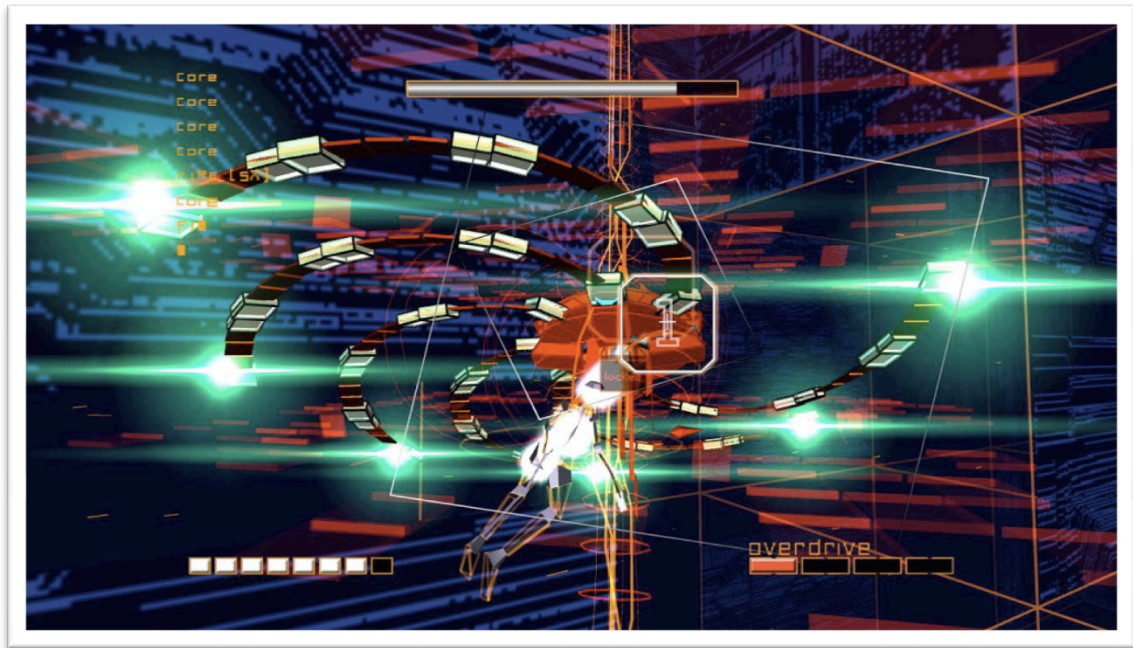
Figure 10: A screen capture of Rez.

When music is synchronised to the gameplay, the pace of the gameplay consecutively is dictated by the tempo of the music. Moreover, the musical structure not only accentuates but also defines the structure of the levels.

Two designers of the Guitar Heroes series have addressed this issue in a lecture at the Game Developers Conference '07 by Daniel Sussman and Eric Brosius[93] (March 9, 2007). In their lecture titled 'Is Jimi Hendrix a Good Level Designer?' they gave a description of the process of selecting the correct score and editing of the levels of *Guitar Hero* (2006) and *Guitar Hero II* (2006). Guitar Hero is a console game using a small plastic guitar (see Figure 11) as the input device to let gamers play songs that are visually indicated on screen using tracks with colour information, which are synchronised to the music the player hears. The Guitar Hero games use regular tracks from commercial artists. During the creation of the game, suitable music was selected and manually translated using MIDI-sequencing software. The selected midi notes trigger coloured objects on five tracks on the screen, challenging the user to play 'notes' using the buttons with the same colours on the plastic guitar.

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[93] Daniel Sussman is producer and Eric Brosius senior sound designer of Harmonix Music Systems, Inc., the development company of the Guitar Hero games.

Figure 11: Two gamers playing Guitar Hero at the GDC.

Sussman and Brosius (2007) noticed that with these specific games, the musical content dictates the game experience, so that in this case, the sound designers also functioned as level designers and the process of selecting songs and 'translating' them into challenging levels with various difficulty degrees was a new step in game design. The team found that the structure of some songs was very suitable for the levels, while other songs resulted in too difficult or too easy levels for the Guitar Hero games. For the selection of songs, they formulated three dimensions for reviewing musical structures in relation to gameplay:

- Repetition versus variation
- Tension versus release
- Pacing versus progression

Repetition was included to help the player to train skills, while *variation* was used to teach new skills and prevent boredom. *Tension* and *release* define the excitement caused by the gameplay as cause of musical phrases: having many successive clusters of notes will increase tension, while a short release can help the player to prepare for new challenges. *Pacing* versus *progression* mainly describes the connection between the

different songs and was included to evaluate whether the supplied levels offer the player enough opportunity to learn as well as progress to new experiences.

For game audio designers, these criteria are useful for the conceptualisation of the enhancement of challenge-based immersion in audio-driven games. During the Engagement (the first stage of immersion, see section 3.5) of a gamer, which is often most prominent in tutorial levels and at the very beginning of the levels, repetition can be very important to become acquainted with the game and the skills required from the player. Experienced users do not appreciate the repetition, as they are already skilled and can easily become annoyed. Controlling these three dimensions of Sussman and Brosius can support the Engrossment (the second stage of immersion) by offering the player relaxation using repetition, tension, and pacing, and challenging the player by using variation, release and progression. When the deepest stage of immersion, Total Immersion, is experienced by a player, the three domains can be varied to stimulate the player and keep the flow of actions.

In this section, the direct drive of music on gameplay has been discussed. This is found in audio-driven games in which gameplay elements are synchronised to the musical tempo. When this is the case, the fields of the audio designer and level designer meet and both parties have to reckon with the complexity of the music in relation to the level construction.

Audio dictating the gameplay

In addition to audio-driven gameplay, where the player reacts to visual stimuli that are synchronised to the rhythm or other aspects of music, interaction directly and solely based on audio is also found in games. This kind of interaction is not as common as interaction on purely visual stimuli or visual combined with auditory stimuli, so the number of available cases is limited. Yet, in this section we will see that interaction based on audio can be a welcome variation in gameplay and that it can enhance challenge-based immersion.

Fast pacing currently often depends on reacting on visual stimuli in the game. In many action games, the player is expected to click on objects with the right colour or press buttons within a time frame. In this case, the visuals are an active element of game play, and audio can be incorporated into the gameplay as a supportive device. The following example shows how sound also can be used as an active central element of game play.

In 2002, the audio game *Drive* (2002) was released at the Utrecht School of the Arts (see figure 12). It was one of the first racing games for the blind and did not include any visuals. The steering functionality of the game was excluded from the game concept, as it made racing games very difficult for blind players, but instead the focus lay on translating the experience of velocity to the auditory domain.

Figure 12: The Drive CD-ROM.

A short description of the gameplay in Drive is as follows:

> In Drive, players have to focus on the sounds and listen for specific auditory cues that represented 'boosters.' These are temporary energy packs that provide more speed in order to reach higher velocity levels. As the complete gameplay system depends on sound, one of the challenges is to listen to the audio for the sound of boosters and taking action in time. When a higher velocity level is achieved, picking up the boosters becomes more difficult as the speed increases. To alternate the process of picking up boosters and make it a little more difficult extra sound effects try to divert the attention of the player. One of the used techniques was playing back audio files at the times the boosters were approaching the player. These sound instances, mainly approaching vehicles with added Doppler effect, attract the focus of the user and make concentrating on the boosters more challenging. Also, a passenger (Bob) talks to the player, making funny comments, to make picking up the boosters more stimulating. Diverting the focus of the player with a sound was possible as there were not too many other sounds at those moments (Van Tol, Huiberts & Verweij, 2002).

Drive fully depends on the process of reacting to auditory stimuli instead of visual stimuli, as do many other audio games, but audio can be more incorporated into the gameplay system of regular video games with visuals as well. In some video games, audio is used as an important element of game play. A respondent of PUGS selected the game *Thief: Deadly Shadows* (henceforth *Thief 3*, 2004) as a good example of game audio and described the special role of audio and sound as follows:

'Sound plays a role in the gameplay – the amount of sound your avatar makes (footsteps, etc) can determine whether you succeed in your missions. Furthermore, there is a very good atmosphere – really a game to listen to during play.' (PUGS:029)

Incorporating sound as an important game element can change the way the player plays the game as he is required to listen attentively, as seen in *Thief 3*.[94] In this game, the player is listening to the sounds in the game world while trying to keep the amount of noise produced by his avatar to a minimum. A respondent of the user survey mentions Thief as a game that features audio effects that enhance immersion, and values this game specifically for 'being able to rely on audio to provide information like in real life' (q88:r129).

In games like Thief, the player is required to react upon visual as well as auditory impulses and the difficulty level is mainly defined by the number of sound assets that require direct attention. Again, as in the case of audio-driven games, the designer has to balance gameplay as the combination of sensory impulses defines the difficulty level. Since the player's attention can only handle a very limited number of sounds,[95] the player is challenged with the number of sounds in the game environment. Then again, the game system can challenge the player by trying to distract the attention of the player but it should also prevent confusion or irritation due to too many stimuli.

Another example described in PUGS is *Patapon* (2008), a rhythm game where the gameplay is fully synchronised to the music. By pressing the game controls in synchronisation to the music, the player commands *Patapons*, the small characters in the game. The music becomes more rewarding when the player makes better combinations. See PUGS:061 for an example of the music in relation to gameplay.

In conclusion, it has been found that in addition to visual stimuli dictating gameplay – which is found in most games – interaction dictated by auditory cues can also enhance the challenges for the player. This provides a different experience and mostly changes the way the player is listening. The number of sound assets dictates the difficulty level

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[94] A similar event can be found in *GTA San Andreas* (2004) when the player has to silently sneak into a weapons deal house to steal crates of guns. Making loud sounds or being caught can cause the mission to fail, so the player has to listen carefully for the presence opponents.

[95] Sonnenschein (2001, p. 80) describes the useful theory about figure (a distinguishable sound object) and ground (a layer of sound) of (film) sound designer Walter Murch, and states that "within one scene our attention can be focused only on a maximum of two sound elements simultaneously, because "three trees [figures] make a forest [ground]." As two sounds can be heard distinctly at full volume, the third can be rising or falling from our attention."

and designers can use this to define the challenges in the game, while preventing the player from becoming frustrated by too difficult gameplay challenges.[96]

Audio-driven and audio-dictated gameplay are relevant topics for challenge-based immersion because of the alternative challenges offered by these forms of interaction, in addition to the ones depending on visual interaction devices. Requiring the player to not only respond to visual stimuli but also listen carefully can expand the gameplay experience as shown in the Drive, Thief 3 and Guitar Hero examples. The increasing popularity of games featuring audio-driven interaction[97] illustrates the engaging capabilities of audio used in relation with interaction.

4.2.3 AUDIO ENHANCING IMAGINATIVE IMMERSION

4.2.3.1 Introduction

'One word: emotion. I want to 'feel' the music, cry over it (I admit), be moved. Simplicity is key, being supportive is a must, storytelling is fundamental, and making me want to hear it over and over… it's golden.'

Charles Deenen ("Interview with Game", 2006)

A key aspect for the imaginative dimension of immersion is the player's empathy with the game. Brown and Cairns (2002, p. 2) state that empathy with the game character is very important during the deepest stage of immersion, Total Immersion.[98] Although it is obvious that not all games provide the possibility for identification with a game character,[99] character identification or the feeling of entering the narrated world are discerned as aspects belonging to immersion (Ermi & Mäyrä, 2004, pp. 7-8).

Music is considered as a constituent for the enhancement of the player's empathy with these imaginative aspects (Collins, 2008a, p. 134) although the topic is barely

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[96] On a final note: as this technique requires the player to be able to hear perfectly, this can lower the accessibility of the game for auditory disabled gamers. To give an example, some auditory clues in *Doom 3* (2004) indicate the presence of enemies behind doors. Gamers with an auditory disability have a disadvantage when playing this game (Cf. Huiberts & van Tol, 2006c).

[97] According to Takahashi (2008), music games have overtaken sports as the number 2 category for most popular video game genres in 2008.

[98] Also mentioned by Adams, (2004a), who states that 'in many games an emotional connection to the game is important. Music helps create this emotion when done correctly (scored like a movie, for instance) and detracts when not (generic peppy game music, licensed music, user-selectable music, and so on).' Cf. section 4.3. on the disruptive factor of music on immersion.

[99] For example, Tetris does neither feature a game character nor a storyline that is present during the game play.

researched into more detail for the game design field. Sonnenschein, (2001, p. 155) describes the value of music in films for making the spectator empathise with the characters:

> "Music helps to hypnotize us into the make-believe world of the film, making plausible all that constitutes such genres as fantasy, horror and science fiction. In all types of films, rather than supporting the realistic image on screen, the music allows us to sense the invisible and inaudible, the spiritual and emotional processes of the characters portrayed."

Game music that is found in the Affect domain of IEZA is often used similarly, with the intention of making the player's connection to the imaginative dimension stronger (Collins, 2008a, p. 134). In a lecture at the Utrecht School of Music ("Emotion & Sound & Games", September 28, 2006) Charles Deenen, senior audio director at Electronic Arts, mentioned the differences between video and audio. According to Deenen, audio has certain capabilities that are underestimated:

> 'Image is getting more and more realistic, but still stays unbelievable. Sound is always believable.'

By stating this, Deenen did not necessarily mean that audio is more important than graphics, but pointed to specific qualities that audio has over graphics in the realm of imagination and credibility.

Three main topics of imaginative immersion will be discerned in this section. Firstly, audio can be used as contribution to the player's empathy with game. Secondly, audio can enhance the setting of the game world. Thirdly, audio can be used to enhance the player's empathy with the story of the game.

Imaginative Immersion and Game Audio		
Characters and events	Setting	Story
Enhancing the empathy with characters and events	*Enhancing the believability of the setting*	*Enhancing the story*
Section 4.2.3.2	*Section 4.2.3.3*	*Section 4.2.3.4*

Table 5: Overview of imaginative immersion.

For these topics, several design issues will be discussed that are related to the enhancement of empathy with game audio.

4.2.3.2 Enhancing imaginative immersion with Characters and Events

Voice Acting

The non-playing characters in games enhance the story or the world and help the player to empathise with the game (Rouse, 2000, p. 13; Rollings & Morris, 2000, p. 10; Rollings & Adams, 2003, pp. 121-122). The sounds belonging to these characters are mostly recorded by human voice actors. Players in PUGS and the user survey refer to these recordings as the 'voice acting' belonging to characters and they are mentioned for their immersive capabilities. Respondents mentioning the good quality of voice-overs in games can be found in (PUGS:002t), (PUGS:019) and (PUGS: 028). When voice acting is found to be believable by players, it is easier for them to empathise with the characters of the game, which contributes to imaginative immersion.

Regarding the believability of voice acting, there are several aspects to acknowledge. Sonnenschein (2001, p. 138) discerns two types of 'meaning' of speech in the context of film sound: a verbal meaning and the intonational meaning. The verbal meaning is the factual information said by the voice actor (what is said) while the intonational meaning comprises the way the actor says the information.

Often, the speech fragments perceived as having a negative influence on immersion concern the intonation of the speaker: the information is correct or relevant, but what is said is still not believed. In a lecture at the Utrecht School of the Arts (March 18, 2008), Mario Lavin, sound director at Guerrilla Games, remarked that recording speech fragments for games can be challenging, as these are often recorded without the context of the game. This explains at least part of the cases found in PUGS, especially where characters talk as if they are in a different setting. At the time voice actors are recorded, the game mostly is not playable yet, so the role of the vocal coach is highly important.

Besides verbal meaning and intonational meaning there is a third related aspect that was found as being of influence on the believability of a game character amongst the cases of PUGS: the general timbre of the voice, which did not fit to what was expected by this player.[100] In another example, the 'singing computer' of *Portal* (2007, PUGS:016t) is mentioned for its appealing timbre, which is very suitable for this type of game.

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[100] A respondent of PUGS mentions the voice of a game character as being too young (PUGS:024). After the atmosphere has been set, the main character starts to talk. According to this participant, the timbre of the voice was not the right type of voice for this setting. The pitch is too high and the voice sounds 'childish'. The 'crying scene' is said to be unbelievable.

Regarding voice acting, we see that three aspects can be distinguished: the verbal meaning, the intonational meaning and the timbre. We find the following challenges for the designer in regard with these aspects. For the verbal meaning, the character should convey the right information. This is designed by the scriptwriter who defines the sentences that are uttered by the voice actor. The intonational meaning mainly depends on the skills of the voice actor; this is the person who has to interpret the setting. In addition, vocal coaching that informs the voice actor of the correct setting is also necessary. The third aspect, the timbre of the voice chiefly depends on the vocal casting: if the verbal meaning and the intonational meaning are coherent, the character could still be wrong for a specific game character.

The disturbance of immersion by voice acting is discussed into more detail in section 4.3.1

Emotional responses to sound effects

Besides the voice acting, also sounds belonging to the Activity side of IEZA can be significant for imaginative immersion, mainly because of the emotional impact they can have on gameplay. Players mainly point to sounds that are important for the state of the avatar, either because the sound scares the player (it is a threat for the avatar) or because sounds are associated with vitality (weapons make the avatar stronger). Often, these sounds induce a specific mood and increase the empathy of the player because the sound source refers to an object in a specific setting. To give examples, howling wolves can refer to a scary location during the night, screaming persons often express pain or fright and grunting zombies mostly threaten the avatar.

For example, sounds belonging to tools that are essential for succeeding in the game can have special meaning for the player. Kutay (2006, p. 4) describes weapon sounds in games in relation to the personalities of the character:

> From a stylistic perspective, weapons are an extension of the personalities of each character and should compliment the character's physical attributes, abilities and in some cases, their heritage or history. For instance, the sounds of swords, knives and shuriken should be as stealthy as the master ninja who wields them. The character of these sounds should compliment the physical qualities exhibited by the ninja and reflect the mastery of the ninja tradition. With this in mind you should expect the sounds to be light but fierce, focused and evoke quickness of movement.

In a discussion during a lecture, different participants stated that they found the voice very suitable for this game. This points to the fact that the believability of voice actors can highly depend on personal taste.

Just as the sounds of tools should fit the characters using them, the sounds of opponents of the avatar can make players empathise with the situation. A participant of the user questionnaire gives an example of these sounds and mentions ambient sounds in *Vagrant Story* (2000) and the sounds of 'head crabs' and zombies in *Half-Life 2* for their impact on immersion:

> Vagrant Story's ambient sounds (howling wolves, wind, forest-leave whistling, groans and moans), Half-Life 2's ambient sounds (fires, headcrabs, zombies, gunfire) and action music (being thrilled, fast paced action music). It really helps getting immersed in a way that makes me scared or motivated to play well. (q87-88:r54)

Another example is found in *Max Payne* (2001):

> Very impressed by the sound of call of duty but even more with Max Payne. 'Darn' if I still think of that sound pfff...The cry effect of the baby in one level still gives me the creeps (q87-88:r37)

Respondent 2 of the *Left 4 Dead* (2008) entry in PUGS mentions the various zombie sounds for their impact:

> The sounds are very functional, every type of zombie has its own distinct sound and you can often hear them coming. You stay focused on the sounds around you. Regular zombies moan (just like every classical zombie) but the sound bytes are very varied. Every time I discover a new horrible sound. (PUGS:036t 2nd respondent)

4.2.3.3 Enhancing imaginative immersion with Setting

While the previous section addressed game audio belonging to the Activity side of IEZA, audio can also be used to induce a specific setting. The setting of games is described by Rollings and Adams (2003, p. 56) as "a fictional component, that aspect of the game that is a fantasy." The Setting side of IEZA can be used by designers to contribute to the game setting.

Affects in Games

As stated in section 4.2.1 the Affect domain can be used to make the player empathise with a game. Often, it is used to induce a mood which is perceived rather unconsciously[101] and manages to convey the Setting instantly.

The Affect is often linked to other contexts and at least four general categories can be distinguished:

- ▪ Affects based on the computer game genre

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[101] Collins (2008a, p. 133) states that mood induction with music – as opposed to communication of meaning with music – controls the player's emotions.

▪ Affects based on films

▪ Affects based on pop music

▪ Semi-diegetic Affects

These four categories, frequently to be found in games, as we will now see, have distinct properties and various implications for empathy.

Affects based on the Computer game music genre

The **computer game music genre** is formed by the repertoire of music found in classic games, such as arcade and action games. The limited amount of technical resources in classic consoles has dictated the sonic qualities of the music and the simplistic tunes that are played with basic tone generators or sound chips forms part of the identity of classic games. Now, this style has (almost) become a musical genre in itself.[102]

Some of the tunes are still very popular,[103] such as the recognisable music and sound in *Pac-Man* (1980) and the soundtrack of *Super Mario Bros.* (NES, 1987) and refer to the repertoire of classic video games. Current games do not feature this type of music very often but some games, such as online games or portable games, still use this genre, particularly in games that feature retro-style graphics. An example is *Jets'N'Guns* (2004) (PUGS: 047). The game features typical '8-bit music.'

With the use of this game music genre an Affect can be created that refers to the act of playing a computer game, originating from the time that computer games had their own unique type of sound. These Affects do not so much increase empathy with the story, main character or situation,[104] but in a sense, engage the player with the identity of the game in most games that primarily depend on challenge-based components. A clear example of this identity is *Tetris* (1989), where the Russian-style music established a part of the Russian identity of the game. For games in the audio games genre, using arcade style Affect, the sound of classic arcade games often is a design principle for making the experience of arcade games accessible.[105]

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[102] There are radio stations playing game music only, such as GamesFM (http://www.gamesfm.nl/) and 8bitFM (http://www.8bitfm.com/). Websites last accessed March 5, 2010.
[103] The music of these games are for instance played with musical instruments or used in theatre performances. To see these examples, one could enter "Mario Song" in the search field on Youtube.com.
[104] Of course, there are exceptions, such as music in *The Legend of Zelda* (1987), which is more than only a cheerful background.
[105] Only the auditory sensory characteristics of old arcade games, retro sounds and music, have specific meaning for blind players, as the pixelised characters cannot be perceived. An example of an accessible (Space Invaders) audio game is *Troopanum 2* (2002): http://audiogames.net/db.php?id=troopanum2

Affects derived from film music

A second category of Affect is based on the **film music** style. The use of this Affect originates from the use of music in films in the Hollywood tradition. When MIDI files and on-board midi synthesisers were implemented into the game systems (Collins, 2008a, pp. 48-57) the game composer had a larger number of instrument tracks at his disposal, offering new timbres for creating different types of scores. Mostly, these Affects try in some way to correspond with the narrative setting and story of the game, in a similar way that film scores function. While films are traditionally linear (there is no possibility to influence the order of events in a regular film), the score in games often requires a more flexible system with fragments to correspond with the interactive character of games; interactive and adaptive systems make the Affect in games correspond with events in the game or the behaviour of the player (cf. Huiberts, van Tol & Went, 2009).

One of the first examples of adaptive music is the iMuse system by LucasArts (cf. Collins, 2008a, p. 51). Based on events in the point-and-click adventure games, the system generates a midi composition based on musical patterns.

A distinct property of this type of Affect is that the music is able to support the storyline, enforcing the empathy of the player. When games are published by a movie franchise, the music often directly acts as a reference to the identity of the original score, whether recomposed or not.[106] Obviously, Star Wars games are (partly) intended to appeal to Star Wars fans and the inclusion of the Affect of the films is an efficient way of referring to the Star Wars concept.[107] Players who have watched the film will recognise the music instantly. The complete style of sound design and composition of *Enter the Matrix* (2003) works in a similar way. In a game review on the International Movie Database (IMDB), players state that the presence of sound, speech and music which represent the same experiential quality as the films, is capable of bringing 'the Matrix experience', even though the game is somewhat disappointing.[108]

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[106] See appendix 3.1 for a description of *Enter the Matrix* (2002), a game published as part of a movie franchise.
[107] For instance, Star Wars Episode I: Racer (1999) features Star Wars music. Respondent 67 mentions in question 87-88 the Star Wars sound in Jedi Knight II and III for having a positive influence on his immersion because it gives the Star Wars feel.
[108] See appendix 3.1.

Pop music

When recorded audio tracks started to be implemented into games,[109] a different type of Affect was imported to the soundtrack: **pop music**. Inherent to pop music is the social or cultural group reference, which can be used to make players identify with an identity or subculture (Ter Bogt, 2003, pp. 14-15). For instance in *Tony Hawk Pro Skater 4* (2002), the addition of rock and punk music is used to appeal to both the target audience and also as a reference to the skater-lifestyle. This type of Affect can be very appealing for specific target audiences, but can also exclude users.[110]

One of the first examples is the game *Journey* (1983) that featured music of the equally named band (Huiberts & Van Tol, 2006d). Nowadays, pop music is regularly used in games,[111] partly because of commercial motivations, referred to as the 'commercial functions' of game audio (Collins, 2007b, p. 2). Its use in games is also discussed, for instance by Adams (2004a) and Deenen ("Interview with Game", 2006), and the latter writes:

> 'Music should enhance the mood set forth by the designer first, and marketability second. This gets tricky in an industry like ours where commercialization, marketing tie-ins and MTV promotion is part of the success of a game. In the end, like with any entertainment product, the combo of creativity, marketability and mood enhancing factors sometimes are dead-on, and sometimes missed.'

This opinion is also found in the user survey: some of the respondents generally appreciate pop music, some disapprove of it. Some respondents state that the use of pop music in games does not contribute to immersion:

> Yeah a lot of games have this problem [that audio has a negative influence on immersion]. Almost 80% of the games. Mostly because they just rip a song from some well known artist. Music should be made for the game, it should not be otherwise. (q96:r139)

> Pick any game with licensed music (video game music should be written for video games). Existing pop/rock songs, or whatever the genre, does not cause immersion because it is basically unrelated to the game you are playing. (q89-90:r43)

The following table shows an interpretation of how the respondents of the user survey value (existing) pop music in games:

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[109] Cf. Collins, 2008, p. 68.

[110] For example the players mention a specific artist of genre in they do not like: 4, 15, 28, 96, 108 of question 96 (see appendix 8).

[111] Pimentel, S. (2006). The 7 Deadly sins of Music licensing. Game Developers Conference '06. The description found in the conference programme of this lecture is as follows: Licensed music has become increasingly important on video games (...) a number of highly acclaimed games have used licensed music to place the player in a place and particular era, brilliantly and this has now become the norm.

Description	n
Works for some games	64
Mostly not fit, annoying	40
Generally ok	25
Game music is usually better	11
Depends on band / style of music	9
Don't care	8

Table 6: The appreciation of pop music in games by the participants of the user survey.

Most of the respondents stated that it depends on which game includes pop music. The use of this type of Affect is not generally undesirable, as it can have great impact on the immersion in games that depend on the identities that are innate to popular music. To give some examples:

> Omikron: The nomad soul... being able to buy records from David Bowie, even a live show... wow!" (q96:r24)

> Good! More realistic than made-up music (...) (q96:r83)

> Depends on the game. Music in GTA or Tony Hawk games just fits right in. Its part of the culture the games are based on. (q96:r93)

One of the difficulties is that this kind of music in a sense includes the attached artist or subculture from the real world into the non-diegetic of the game. Generally, players state that if the artist of the song is able to match with the identity of the game world, the use of pop music has a positive or neutral influence on immersion, provided that the musical style fits the situation or narrative. Some participants mention an inconsistency with music and the Setting of the game:

> 'Pick any game with licensed music (video game music should be written for video games). Existing pop/rock songs, or whatever the genre, does not cause immersion because it is basically unrelated to the game you are playing.' (q89-90:r43).

> 'Devil May Cry: I don't know, it just didn't fit the mood of the game. The game was set in a gothic environment. Rock doesn't fit with that in my opinion.' (q89-90:r47).

> 'Prince of Persia: Two Thrones. Hard rock in an ancient Persian fantasy setting.' (q93:r133).

> 'Dislike pop music in games; Game music should be particularly composed for the game itself and its theme to.' (q96:r25).

> You can't have pop music in a Sci-Fi setting, because it breaks the immersion (q96:r120).

Semi-Diegetic Affect

A fourth type of Affect in games that can be distinguished is the **semi-diegetic** Affect. This is often found in games where the experience of the diegetic world is important and a clearly non-diegetic Affect is found to intrude this diegetic experience. This often concerns first person shooters and the use of this type of sound corresponds with soundtracks of films with tense moments that use sonic layers of sound rather than (orchestral) music. Very distinct for this type of Affect is that its effect is less direct and often blurs with the Zone category, in such a way that the complete Setting forms a background atmosphere.

Fatal Frame (2001), is mentioned in PUGS by a participant who mentions the functioning of the music that resembles semi-diegetic Affect:

> This was the first game where the atmosphere of the game itself (also due to the lack of light and the sounds) offered very scary moments. These sounds, that were more background sounds than a soundtrack, caused serious tension and when something showed up with such a corresponding sound, you were frightened to death. (PUGS:006t)

Another example that incorporates a semi-diegetic Affect is *Doom 3* (2004). The layers with sounds of screaming people and other scary sounds are difficult to attribute to Affect, Zone or Effect, and are mentioned by a respondent for their influence on immersion:

> The game Doom 3: always crying people in distress you get your adrenaline up and think everywhere anything can happen (q87-88:r80).

When this type of Affect is represented in the IEZA model, it is more related to the Zone than clear non-diegetic Affect. Figure 13 shows how this relation can be represented, it is the area where the design properties of Affect blend with the properties of Zone.
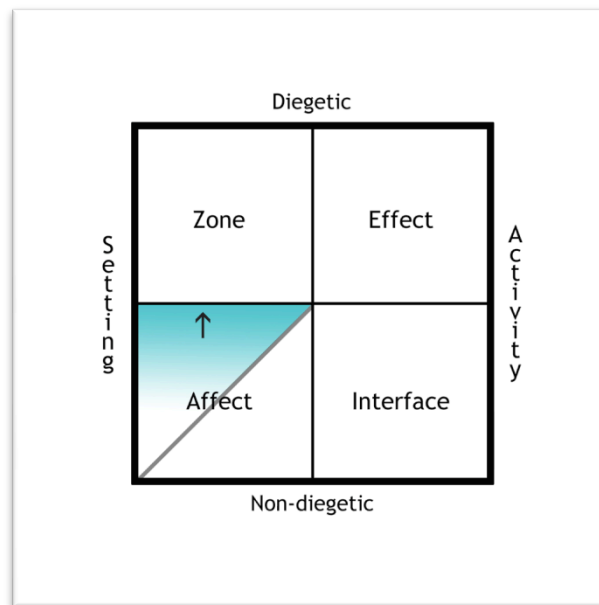
Figure 13: Graphical representation of semi-diegetic

Affect that links to the Diegetic side of game audio.

In conclusion, at least four types of Affects in games can be distinguished. Each of these types has specific properties, which consequently has a different effect of the player's experience.

Affects in games				
	Game Music Genre	Film Music	Pop Music	Semi-diegetic
Properties	distinct sound character: the sound of computer games	Film analogy: support of storyline	social reference	to be felt instead of to be listened to less intrusive
Reference	computer game identity	film identity	pop culture and social identity	horror movies, ambient design
Example	*Jets'N'Guns* (2004). (PUGS:047)	*Enter The Matrix* (2003) (PUGS:030)	*Tony Hawk PS4* (2002) (PUGS:052)	*Doom 3* (2004) (PUGS:048)

Table 7: Properties of the four types of Affects in games.

World Setting

Besides the use of Affect, empathy of the player in relation to the setting can be induced by enhancing the Diegetic Setting (world setting) with audio. Rabin (2005, p. 794) describes the creation of moods with ambience, a term that mainly applies to the Zone domain:

> 'Another extremely important and often overlooked element in sound design is ambience. Ambiences can sometimes create a mood even more than music. Even a small hum from a computer or distant waterfall or wind through trees enhances the experience tenfold.'

An ambience mostly conveys a mood by incorporating elements that refer to settings in the real world, games or in movies. In addition to these world elements, reverberation can be used for mood induction (Sonnenschein, 2001, p. 161). To give a fictional example: the atmosphere of a damp and narrow dungeon induces a different mood than the inside of a church. In general, these two environments provide different associative setting and narrative; in the setting of the latter, one is generally unlikely to find prisoners in pain. Besides real-time reverb that is generated in real-time by the audio engine, the acoustic information that is recorded with the original sample, conveys information and a feeling about the world as well. This is referred to as the 'spatial signature function' (Stockburger, 2003, p. 8) of sound samples, which provides information about the setting in which sounds are recorded.

During the development of audio games that were produced prior to this study, such as *Drive* (2002) and *Dark, a garden Wander* (2002),[112] the engaging properties of 'telling the invisible' were often illustrated when testing the prototypes. Some testers stated they were able to imagine what certain assets looked like, and found these non-visible instances exciting.[113] In this case, by not showing graphics, players could make their own interpretations of the narrative aspects. Using audio in the worlds in this manner in regular games can be a useful feature for the designer to increase the believability of the game and enhance the impact of world elements. Although this case is mainly intended to be explicative, it suggests that audio-only instances are worth investigating in future research.

The mood that is created with audio can be beneficial for the engagement of the player. Carson (2000) relates theory from the theme park industry to environmental storytelling in computer games and claims that a very important task for the designer is to provide an answer to the question 'where am I?' that arises after starting up a game. Carson writes that for an optimal engagement of the visitor, it is best to answer this question within 15 seconds, and thereafter, it is important to give some more information about the relationship to the place the user is in, which is essential for players to know what their role is in the setting. Not meeting this criterion can prevent players from becoming further absorbed as they might have difficulties in understanding the context of the experience.

Playing back auditory clues in the virtual world is relatively easy to accomplish and useful for conveying this information in addition to, for instance, introductory movies. Not only can these be used to provide information (giving information what the player should do), sounds at the beginning of the game can help the player to get in the mood. For instance, a participant describes the "mad laughing sound" in *Killer 7* (2005, PUGS:015) before the game starts.

The Affect domain of IEZA can be used to give these atmospheric clues as well, especially for referring to a geographic location. Not only does Chinese music refer to Chinese culture, but it can also refer to a Chinese location, just as Medieval flutes and harps refer to a world in the Middle Ages (Sonnenschein, 2001, p. 189). Presenting musical clues at the very beginning of the game will help most players to catch the setting instantly.

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[112] This game was an interactive audio drama. A demonstration is included in the Appendix (PUGS:051).
[113] Unfortunately, the statements in tests prior to this study were not recorded.

Summarised, the diegetic side of Setting, Zone, can be used to enhance imaginative immersion. It can be used to stipulate a mood and tell players where they are and inform about possible actions. In addition, music belonging to the Affect domain can also be used to refer to a specific setting.

The Magic circle and audio

Relevant for the functioning of sound and music related to the imaginative dimension of immersion is the concept of the magic circle (Huizinga, 1955), which is applied to the context of computer games by Salen & Zimmerman (2004, pp. 94-99) and is the frame in which a game exists, where the rules of a game create a special set of meanings for a player.

Audio is present in this frame and forms – in a sense – an 'imaginary contract' with the player. This contract consists for example, of the expectations of the player in combination with the properties of the game, for example, certain video game conventions or the style. By participating, the player agrees with the contract that is offered and consequently has specific expectations concerning how things sound in that game. The presence of a sound asset that fundamentally goes against the contract is liable to disrupt immersion, while auditory components in accordance with the contract support immersion. To give a hypothetical example, in a medieval setting, it is likely that players expect a medieval atmosphere. Other music without any reference to the medieval setting, is likely to distract and will often cause the player to wonder why this music is present. With medieval music in the game, the player may not even notice the music and perceive the atmosphere of a medieval setting. In the user survey, music with a conflicting 'origin' was found in particular when the featured artist conflicted with the setting of the game (see section 4.2.3.3: Pop Music). More about the disruptive effect of audio on immersion can be found in section 4.3.

Games that belong to a movie franchise, such as *Enter The Matrix* (2002) have a very strong imaginary contract. The game uses the Matrix as a basic constituent and when playing the game seriously, players agree with the conventions of the Matrix and expect the game to follow the conventions of the Matrix.[114]

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[114] See appendix 3.1.

4.2.3.4 Enhancing imaginative immersion with Story

A component that contributes to imaginative immersion is the story of a game (Ermi & Mäyrä, 2004, pp. 7-8). Rollings and Adams (2003, p. 90) describe stories in games as a fundamental part of game design and state that a game without a story becomes 'an abstract construct'. Audio can be used to enhance the story and this is recognised by players as positively influencing immersion.[115]

Primary & secondary emotions

When sound is used to enhance imaginative immersion, it is important to acknowledge two types of emotional response to the game: primary (character) and secondary (audience) emotions (Sonnenschein, 2001, p. 181). The primary emotions concern the character, the secondary the player, who experiences the primary emotions but is able to feel differently from the reflected emotions of the game character. Players often play games to experience the sensations of emotions and the primary emotions are directly linked to the state of the avatar, for instance when succeeding or failing, experiencing excitement, or the emotions belonging to playing games for relaxation (Lazarro, 2004, p. 7). On the other hand, the secondary emotions have different impact across different games. Although, for instance, Mario has a certain appeal, in general, the designers do not add a lot of emotional meaning to this character. If Mario dies, the player might be annoyed for a short while, but mostly does not empathise with Mario's death.[116] Other games have the ability to add more significance to the game characters and make the player empathise more.

A striking difference can be found in two versions of the game Hangman. While in the classic version the emotional aspects concerning the hanging are hardly present, the version by Andrew Pepper aims at making the player empathise with the victim by using facial expression and scary sounds (for instance an evil laugh and a church bell). See (PUGS:034) and (PUGS:035).

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[115] Clear examples are q89-90:r32 and q89-90:r43.

[116] Juul (2005, p. 130) describes the fact that there are three Marios available for the player, which can be seen as an applied rule by the designer, rather than fiction. Mario is not reincarnated; a new Mario just appears after dying as the level is too difficult to finish with only one Mario.

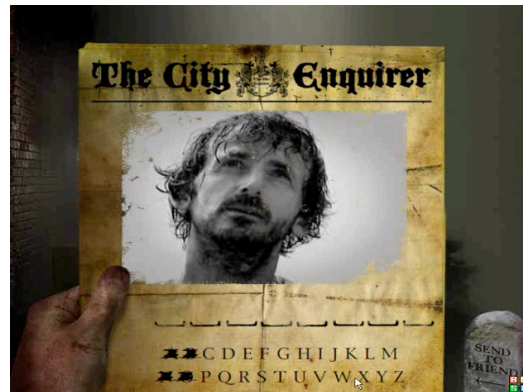**Figure 14: Screenshot of Hangman (n.d.) by Fanatiker Media.**

Figure 15: Screenshot of Hangman (n.d.) by Andrew Pepper.

Concerning these two emotional settings, there are two types of usage of sound: creating empathy with the avatar in the setting of the narrative, and supporting the secondary emotions of the player.[117] These two emotions can be at times quite similar but also completely different, for instance in comic settings, where a character being hit by an object can be very humorous for the player. Typically, Affect for challenge-based immersion relies more often on secondary emotions (the player has won) while for imaginative immersion the aim is to couple the primary and secondary emotions (the story has ended and the player is happy).
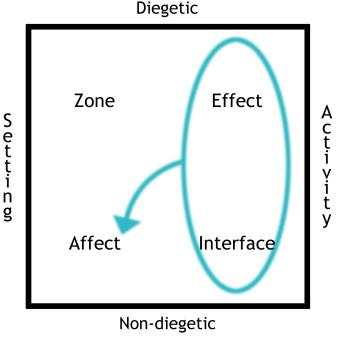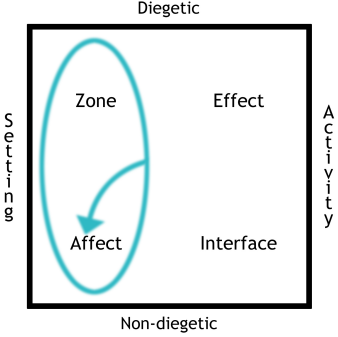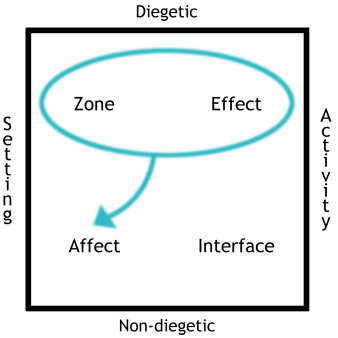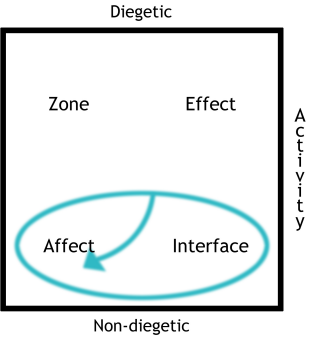
Concerning the expression of these emotions with audio, several connections with Affect can be distinguished. Designers can use the Affect to refer to the emotions belonging to the domains of IEZA. For the Affect domain, this gives the following options:

- ▪ [1] Emotions belonging to the Activity: expressing the emotions belonging to how the player is performing at a specific moment (e.g. frustration caused by not being able to succeed).
- ▪ [2] Emotions belonging to the Setting: expressing the emotions belonging to the feel of the game (e.g. the identity of skater music of a skater world).
- ▪ [3] Emotions belonging to the Diegetic: expression of for instance the emotional responses to the world of a level (e.g. the emotional setting of war, of the emotions belong to a Eastern world).

---

[117] A similar use of music in film is discussed by Sonnenschein (2001, p. 182). He refers to Claudia Gorbman who identifies two modes of music concerning the emotional state: *identification music* (aimed at creating empathy with the character's emotional state) or *spectacle music* (which enhances the secondary emotions of watching the film as an audience).

▪ [4] Emotions belonging to the Non-diegetic: primarily representing the status of the game: the feel of the game (e.g. making a game sound like an retro arcade-style game).

In figures 16 to 19, the expression of different emotions is represented.

Figure 16: Expressing the emotions belonging to the Activity of the game with Affect (1).

Figure 17: Expressing the emotions belonging to the Setting of the game with Affect (2).

Figure 18: Expressing the emotions belonging to the diegetic part of the game with Affect (3).

Figure 19: Expressing the emotions belonging to the non-diegetic part of the game with Affect (4).

Music as evaluation

Affect is often used to evoke a feeling or cultural setting at the beginning of levels or during gameplay. Moreover, music is used to indicate special events that provoke the player to react in a specific manner. Especially in an imaginative context, there is another method, which can be used to enhance empathy: the use of Affect as an evaluative component of the game. Rona (2000, p. 4) explains the spotting of cues for starting and stopping music in film:

> The unwritten rule says that music should come in response to the actions or words on the screen, and shouldn't foreshadow it. This is especially true for scenes that are heavy in dialogue. Watch for facial expressions that show how the characters are feeling, and use those as a guide for beginning a cue.

The technique that is described concerns the response of music in relation to active events. For the longer narrative structure, for instance, adding impact to a very important event in the game, music can be used to emphasise the importance of what has happened. The following gamer describes the use of music that enhanced his immersion:

> In Metal Gear Solid 2 (PS2) there is a variation on the main theme played during a cut scene that greatly added to the scene. The theme starts playing just after a dramatic moment in the story (a loved one died) where the player character and some non-player characters have to keep going. The song enhances the tragedy of the moment as well as build a sense of "we HAVE to continue". There is no text, spoken or otherwise, just the song and slow-mo visuals. Brilliantly done. (q87-88:r43)

In this example, the music expresses what has happened and helps the player to reflect upon this. Yet, it also give the player a new direction and new motivation to continue. William Labov (1972, pp. 362-375) describes the overall structure of narrative (in linguistics) and defines six elements that narrative may contain: abstract, orientation, complicating action, evaluation, result or resolution and coda. Labov elaborates four of these elements. The abstract is optional but quite often used in the very beginning of a narrative to briefly summarise the whole story. This could be seen as a technique to immediately grab the attention of the player. The orientation gives the setting, it provides a method of identification with the time, place and situation. Evaluation is used by the narrator to indicate the point of the narrative, clarifying why it was told and giving context to the listener. The coda is used to bridge the gap between the end of the story and the present. Labov structures his theory into a set of questions:

> a. Abstract: what was this about?
>
> b. Orientation: who, when, what, where?
>
> c. Complicating action: then what happened?

d. Evaluation: so what?

e. Result: what finally happened?

According to Labov, the evaluation is a very important element that is added to the basic narrative clause. When Affect is used to elaborate evaluation in the narrative structure, it not only indicates what is occurring in the game at this moment, or what is going to happen, but is aimed at attributing meaning to what is happening or has just happened, hoping to make the player empathise with the situation.

The following scheme (figure 20) shows a number of components that are available for enhancing the empathy of the player: for example facial expression (highly depending on the style of the video game and the perspective),[118] dialogue (information, intonation, and character), world setting (state of the world at that moment) and story and narrative events. Affect can be used to intensify or evaluate the other components of communication, such as the facial expression of characters, the dialogue or the story.
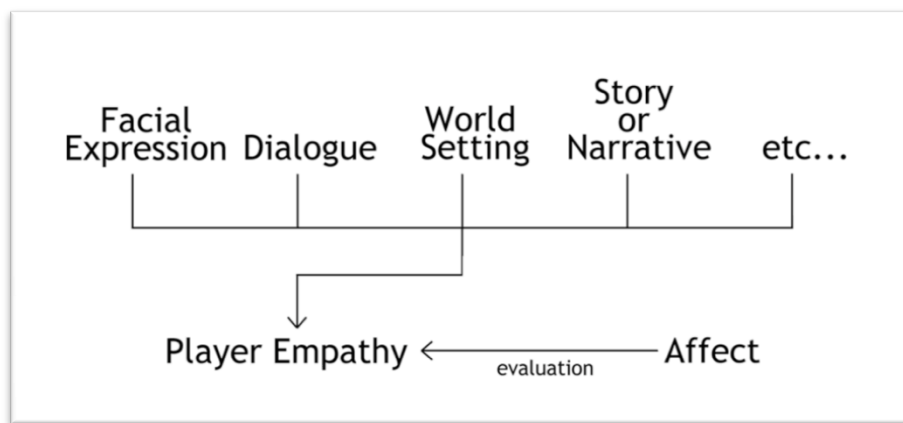
Figure 20: Example of Affect as evaluation in addition to other elements that can be used to convey the information about the narrative of the game.

To give a fictional example: in a setting of war, after something bad has happened in the storyline, there is a moment with less tension. The facial expressions of the characters show anger. They talk about the terrible event, and the voices sound full of anger. Outside, war sounds can be heard. At this moment, Affect can be as evaluation to enhance the emotion of anger, to give more impact to what has happened.

---

[118] Concerning the perspective, the first person perspective is often considered as a very immersive perspective, because the player almost feels one with the avatar (for instance, Garneau (2001) and Dansky and Kane (2006, page 3), although this presumably benefits to presence. Opposed to for instance, the third person perspective, seeing the facial expression of the avatar is generally not possible in a first person perspective (unless the avatar is looking in a mirror) and this makes it more difficult for the player to know how the avatar 'is feeling'. Of course, in this case, sound can be used to communicate the emotions of the avatar, in addition to the other modes of communication.

The usage of music in a storyline is found in *Homeworld* (1999), where it is mentioned as a pretty example of game music:

> The general music also fits this description, but the icing on the cake is Samuel Barber's Agnus Dei, the Choral version of Adagio for Strings. This dramatic score is used during pivotal scenes throughout the game and adds tremendously to the dramatic events in the story. (PUGS:056)

To keep the player in the mood and to help concentration during game play, some of the barriers of immersion concerning the disruption of the flow of the game (for instance due to loading screens), can be overcome with sound. A participant mentioned the role of sound in the loading screens of *Kane and Lynch: Dead Men* (2007, PUGS:022). The audio storytelling during the loading screens keeps tension, presents short flashbacks or creates atmosphere, while keeping the player focused on the story, while preventing the real world or real world thoughts from interrupting.

4.2.4 SUMMARY AND CONCLUSION

As seen in section 4.1, we can safely assume that most players have experienced at least once the enhancing influence of audio on immersion. In addition to the components that are described by Ermi and Mäyrä (2004, pp. 7-8) for enhancing the three dimensions of immersion, audio was confirmed as a component that can enhance all three dimensions of immersion. Three ways of inducing the dimensions of immersion have been distinguished in section 4.2, briefly summarised in table 8.

Audio is capable of enhancing the three dimensions of immersion by enhancing the sensory connection, the feeling of flow and the feeling of empathy of the player.

	Enhancement of sensory connection	Enhancement of flow	Enhancement of empathy
Dimension of immersion	Sensory	Challenge-based	Imaginative
Experiential properties	Making the player feel 'present' in the game world and increasing the sensory engagement.	Enhancing the feelings of flow: enhancing the engagement with the activity.	Enhancing the player's empathy with the game character, the setting and the story.

Table 8: Three ways of enhancing immersion with audio.

The conceptual design issues that have been explained in the past sections are visually represented in the following graphical structure (figure 21), which shows the connection between them. This structure can be used as a map for conceptual game audio design.
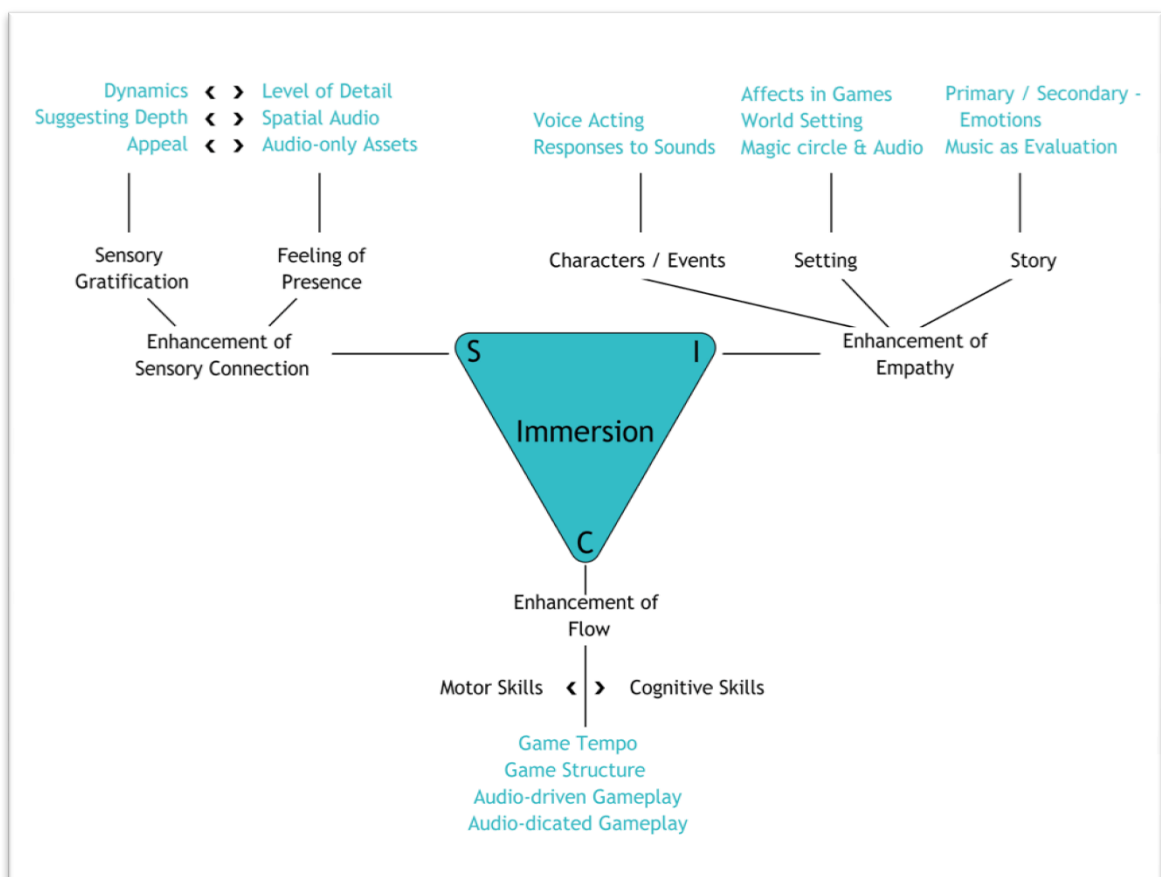
Figure 21: An overview of the enhancement of immersion with game audio.

In the following table (9), the design issues are linked to IEZA. The small drawings in the fourth column of the following scheme show the relevance of the design issues for the domains of IEZA.

Dimension	Using audio for enhancement of:	Design issues	IEZA
S	Enhancement of the sensory connection. Contributors to sensory immersion:		
	Feeling of presence	Level of details Spatial audio: convincing world Audio-only assets	
	Sensory gratification	Dynamics Spatial audio: perceptual depth Appealing audio	
C	Enhancement of the feelings of flow: enhancing and supporting gameplay and challenges		
	Two sides: Support of motor skills (audio: focus) Support of cognitive skills (audio: concentration)	Audio and the game pace	
		Audio and the structure of the game	
		Audio-driven gameplay	
		Audio-dictated gameplay	
I	Enhancement of empathy. Three aspects can be distinguished that contribute to empathy:		
	Characters and events	Voice acting	

		Emotion & sounds	
	Setting	Affects in games	
		World setting	
		Magic circle & audio	
	Story (narrative clause)	Primary and secondary emotions	
		Music as evaluation	

Table 9: An overview of the discussed conceptual design issues for the dimensions of immersion. The right column shows areas of IEZA that are generally used for the design of each issue.

Based on these connections, the design issues can be related to IEZA, which shows the relevance for the dimensions of immersion.
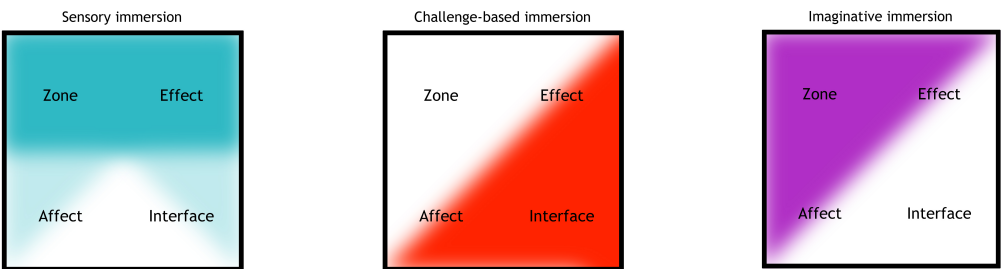
Figure 22: Drawings of the relevance of the domains of IEZA for sensory, challenge-based and imaginative immersion.

In the first drawing of Figure 22 – the use of audio for the enhancement of sensory immersion – we see that primarily the diegetic side of IEZA is aimed at giving the player a feeling of presence. The shaded area in Affect and Interface indicates that the non-diegetic part plays a role for sensory gratification, namely audio that is regarded as 'beautiful' or 'impressive'.

The second drawing represents challenge-based immersion. The parts of IEZA that are linked to the activity are primarily relevant for this dimension of immersion. In the third drawing we can see that mainly the Setting of IEZA (and the side of Effect that is close to the Setting) is used to enhance imaginative immersion.

4.3 AUDIO DISRUPTING IMMERSION

4.3.1 THE NEGATIVE EFFECT OF AUDIO ON IMMERSION

Music disrupting immersion

In the user survey, music in games is mentioned most often for having a negative influence on immersion. In many cases,[119] this occurs when no relation is felt to exist between music and the activities or events in the game. In other cases, this relation is felt to be too obvious, so the player becomes aware that walking across a specific trigger causes the music to play.[120] One respondent mentions that when the music that 'builds up during a rush' stops, immersion also disappears (q89-90:r25). Repetitive music – often because there is no relation between gameplay and musical structure - is also mentioned: short, repetitive and continuous musical loops or too much repetition of musical fragments become obtrusive and easily decrease the player's immersion.[121] Overly happy, too fast or busy music[122] can be annoying and cause frustration when it is not suitable for the type of gameplay.

Music is not only mentioned because of response-related issues but also because of the connected cultural reference or the genre. Players mention that music is able to completely disturb the immersive experience when the cultural reference is incorrect,[123] for instance when hardcore music is featured in a sad or romantic cut scene (q89-90:r95). In this specific case, hardcore music could be considered as conflicting with the romantic setting as the respondent considers it as connected to a different setting in real life. A frequently found aspect that diminishes immersion is the use of pop music, either because the artist or style does not appeal to the player, which generally lowers the pleasure of playing, or because the artist is said to exist in the real world, which is found to be unconvincing or unrealistic.[124]

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[119] See the next footnote.

[120] This does not only mean a link with the activity of the player, but also music that does not adapt at all to changes (e.g. respondents 16, 30, 72, 75, 95 of question 89-90) or when the response is just too obvious (e.g. 1, 110, 122, 128 of question 89-90) or when music interferes with the storyline (e.g. 79, 80 of question 89-90).

[121] E.g. 2, 8, 54, 125 of question 89-90.

[122] E.g. 57, 132, 134 of question 89-90.

[123] E.g. 4, 12, 16, 27, 32, 34, 36, 42, 43, 47, 79, 137, 139 of question 89-90.

[124] See section 4.2.3.3 for pop music in games.

The sonic qualities of music in games are mentioned as well. Often, the relative volume is said to be too loud,[125] which is specifically mentioned in the context of racing games, where it masks the sound of the motor, which is said to be important for racing.[126] The appearance of music in the setting of (professional) racing is also mentioned because it is said to be unrealistic.[127] One respondent does not appreciate the use of 'poor samples' in orchestral music, which decreases the appreciation of the music (q89-90:r57).

There are several reasons why music is frequently mentioned as a barrier of immersion. It is always possible that certain players do not appreciate the style of the music.[128] This can cause them to stop being immersed. Music is in many games continuously present and can become annoying after several hours of game play, especially when it is repetitive.[129] It can give the player a 'rush' during moments with extra tension, but can cause the opposite when it fades away, as it is taking away part of the excitement.

Speech disrupting immersion

In-game speech fragments are frequently mentioned for negatively influencing immersion. This mostly involves unconvincing voice-acting: voice fragments that do not seem to represent the drama of the storyline.[130] One player describes the voice acting in *Hellgate: London Demo* (2007):

> [they]...sound as believable as a Santa tale... I was expecting a darker atmosphere, not a guy that sounds like a shoe salesman. (q89-90:r115)

A similar case is found in *The Elder Scrolls IV: Oblivion* (2006) where a participant of PUGS points to an inconsistent character in the game that immediately breaks his immersion:

> The sound of the voice suddenly changes drastically and breaks all immersion of the game. Makes the complete NPC unbelievable. (PUGS:017t)

Speech fragments are usually recorded by voice actors when the game production is not completed yet. Then, the actors are required to make the right interpretation to correspond with the game setting, which is a critical step in voice recording for

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[125] Mentioned by, for instance, respondents 14, 59, 94, 119 of question 89-90. Not all games allow the sound or music level to be set by the player in the game settings.
[126] Respondent 64 in questions 91-92 and 94-95 and respondents 14, 24 in questions 89-90.
[127] E.g. respondents 14, 21, 39 of question 89-90.
[128] For example in (PUGS:041) the player doesn't like Japanese Rock.
[129] For instance, q89-90:r32. (PUGS:040) features very busy music that was found too repetitive.
[130] E.g. 3, 15, 18, 81, 93, 106, 115, 124, 129 of question 89-90 and (PUGS:007).

games.[131] The immersion of the player can be easily disturbed when a speech fragment does not correspond with the setting of the game.

Characters that keep repeating the same sentence are also found in the user survey and PUGS. In *Enter the Matrix* (2004), some game characters only feature one sound sample and keep repeating the exact same phrase "we need help in here."[132]

Regarding speech recordings in games, the main finding is that incoherency, repetition or the reflection of an incorrect setting makes game characters unrealistic which negatively influences immersion.

Sound disrupting immersion

Problems with sound effects are also mentioned in the user survey as having a negative influence on immersion. Often, this concerns sounds that are failing to convince the player or do not match the player's interpretation of the game world, as shows from the following statements:[133]

> When guns sound like paintball guns... (q89-90:r15)
>
> The car engine sounded more like an ice cream machine then a car engine. (q89-90:r26)
>
> Windows-like sounds (q89-90:r114)[134]

Sounds can also be intrusive, often when they are perceived as too loud or 'ugly'.[135] Players describe these as annoying, and they often want to mute the sound output or stop playing.[136] To give examples, the constant 'one sound footstep' in the old versions of *Resident Evil* was mentioned as a feature that had a limiting effect on immersion[137] and the following reference in PUGS shows a case where game audio makes further enjoyment of the game with sound turned on impossible for this player:

> [The game] Pokémon doesn't have a soundtrack which is easy on the ears to begin with but when your Pokémon [the character] ends up with low health a horrible whiny warning noise is played. To boot it all it doesn't go away when you're trying to select the Pokémon to switch

---

[131] This is also mentioned by Mario Lavin in lecture at the Utrecht School of the Arts (March 18, 2008). Lavin, sound director at Guerrilla Games, stated that it is very difficult to include the correct intonation because the voices are recorded when the game is not playable yet, so the setting has to be carefully estimated.

[132] This can be seen in the video fragment of PUGS: 030. Repetition of sound files and dialogue is also found in (PUGS:022) and (PUGS:039).

[133] E.g. 37, 44, 68, 70, 83, 100 of question 89-90.

[134] Presumably, the respondent refers to interface sounds that sound alike the sounds of Microsoft Windows.

[135] Respectively (10), (12, 133), (13) and (111) of question 89-90. The 'Führer' in *Company of Heroes* in (PUGS:023) illustrates how a single sound source can annoy the player until immersion is stopped.

[136] Respectively, (113), (77, 107), (133) of question 89-90.

[137] Respondent q89-90:r130. Also found as an example of bad audio in PUGS, *Silent Hill 3* (PUGS:007).

it off. It's so annoying that you'll turn off your volume, not to put it back on again. (PUGS:011)[138]

Generally, sound effects are events in the game belonging to the Activity of IEZA. They respond to the player's activity and repetition can easily annoy the player. Sound effects can disappoint the player or fail to convince him.

4.3.1 AUDIO DISRUPTING SENSORY IMMERSION

This section will explain the negative influence of audio on sensory immersion. In the user survey and PUGS, cases are found that suggest that audio indeed can function as a disturbing factor for sensory immersion on two levels: it can diminish the feeling of presence and can diminish the player's sensory gratification.

Audio is found to be diminishing the feeling of presence of players. Often, this occurs when the level of detail is too small and visually different objects have the same sound. To give an example, one respondent mentions that in *World of Warcraft* (2004), the sounds of the deer are not believable:

> A fawn and mature deer make the same sound. That's just not right.... (PUGS:011t)

Other examples of respondents mentioning the disturbance of the connection with the game world by audio are:

> Sudden high tones or sounds that don't match the area or setting you're currently in. When you're running in a jungle trying to catch an objective and some dude is using the voice-chat. You loose all kinds of in-game reality. Makes you understand you're not in a real jungle but just some pixels. (q89-90:r10)

> The old one sound footstep, like in the old Resident Evil games. That always annoyed me. Because repetitive sound is annoying and not realistic. And when it's all you hear, your ears start to try and hear anything else, then they hear the real world around you just to get away from it. (q89-90:r130)

A diminished amount of sensory gratification caused by audio is also described by players. This often occurs when the feedback is unpleasant, irritating or disappointing. Some examples are:

> In Super Mario (version unknown): I have played on a Nintendo, but the bleeps in many of their games made me crazy (irritated).' (q89-90:r13t)

> Rainbow Six Vegas music: It has such an sound loop, doesn't make it good, gets me out my immersion (q89-90:r2)

---

[138] A similar signal sound was found in (PUGS:020) and (PUGS:022). The annoying beep sound in the *Zelda* series was mentioned more frequently.

> Cant remember the name, but is was an arcade racing game: the car engine sounded more like an ice cream machine then a car engine. (q89-90:r26)

> Not specific, but any game that want to be realistic, but the sound isn't. Imagine your (engine –SH) suddenly sounds like a mixer, would you feel comfortable? (q89-90:r68)

> Bad quality audio. Even if the sounds are realistically chosen for the moment, bad quality will always be annoying. (q89-90:r77)

Based on these findings we can conclude that audio can disturb the sensory dimension of immersion which occurs when the connection with the game world is broken by the audio (the feeling of presence is disturbed) or when the audio is not pleasant to listen to.

4.3.2 AUDIO DISRUPTING CHALLENGE-BASED IMMERSION

In the user survey and PUGS, cases are found that confirm that audio can negatively influence challenge-based immersion by disturbing the feeling of flow.

The feeling of flow is often interrupted when the response of audio does not suit the game play, by being overly reactive (audio expresses the Activity too obviously) or non-responsive (audio does not respond to the Activity). For example, a player mentions that music which becomes too obvious and busy is able to break his immersion:

> The more busy and noticeable music in the same Metroid Prime. The music becomes busier with bosses and such, and then you start to notice it more: You are confronted with the fact that this is music coming out of your video game. (q89-90:r1)

Other cases are found in the following descriptions:

> A track or track list that just repeats itself disregarding what happens in the game, like in the Europa Universalis games, or Civilization IV. It doesn't add to the gameplay. (q89-9:r103)

> Background sounds/music of arcade games. They do not support the playing but are there to be sound. (q89-90:r72)

> Audio that does not correspond with the actions of the player and just keeps going on. (q89-90:r75t)

> Combat-style music starting before an actual fight begins. If something hostile has spotted me from a distance, I shouldn't be able to tell just by the music. (q89-90:r128)

> Battle music in Oblivion. The moment an enemy detects you the current music stops immediately and switches to more aggressive combat music. It makes you aware of an enemy before it's even in sight. (q89-90:r110)

> Oblivion. The normal music completely comes to a halt when an enemy approaches (no matter how powerful the enemy really was) and this insanely loud battle music would play. (q89-90:r119)

Concerning the pace of gameplay (motor skills versus cognitive challenges), there are some indications that strategy games offer a gameplay experience that deviates from

other games and which requires other behaviour from the audio. Some player responses mentioning audio in strategy games are:

Annoying background music in Real Time Strategy games. They distract. (q89-90:r84t)

Music in tactical ops (in Counter-Strike as well). It only distracts. (q89-90:r90)

Real Time Strategy games usually fail to immerse me. The sounds, though they fit with the units or buildings, are more functional. They tell you you clicked something. Or that an order is received. That does create an ambiance of sorts, but not the kind I look for in a game. (q89-90:r120)

Based on the findings we can conclude that audio can disturb the challenge-based dimension of immersion. This occurs when the player's feeling of flow is disrupted because audio does not correspond well enough to the player's game play.

4.3.3 AUDIO DISRUPTING IMAGINATIVE IMMERSION

In section 4.1, it is assumed that audio can have a negative influence on imaginative immersion. In the user survey and PUGS, cases are found that confirm that audio can negatively influence imaginative immersion by diminishing the player's empathy with the character, setting and story. Examples of descriptions of players mentioning the disturbance of imaginative immersion:

I hate bad voice acting. Especially voice actors who're (clearly) not speaking their native language. My toes start curling. (q89-90:r3)

Sound that isn't following the story line (weird music choice) (sport games and so). You don't feel you're in the game (q89-90:r80)

Two Worlds, both in-game music and voice-overs. Some in-game songs did not fit the game world because of use of electric guitar in fantasy game. Voice-overs were horrible. (q89-90:r81)

The rock soundtrack of Prince Of Persia: The Two Thrones, or techno / dance music in racing games...It does not belong there and does not fit within the story and atmosphere of the game... (q89-90:r79)

Fable: Loud voices. Don't fit in the world, very unbelievable. (q89-90:r133)

Usually when existing audio's of bands are used in games. Usually they're used in racing games. It does not feel like they're part of the world your in, but part of the real world. (q89-90:r137)

When audio disturbs imaginative immersion, there often is a discrepancy between the occurrence of the audio in the game and the interpretation of the game by the player. For instance, the cultural setting of Affect (mostly music) can be conflicting with the Setting that is interpreted by the player. When imaginative immersion is diminished by audio, this is often caused by a decrease of the empathy of the player with the game.

4.3.4 ABSENCE OF AUDIO DISRUPTING IMMERSION

Cases have been found of players mentioning that an absence of sounds can negatively influence immersion, for instance, when seeing a character talk without the presence of an auditory equivalent.[139] A player mentions that a general lack of audio can lower immersion in the following response:[140]

> ...I often notice that the lack of audio makes me feel less immersed. For example in earlier games, such as Maniac Mansion, the lack of speech (being replaced by on-screen text) was somewhat of an immersion-killer. Having to read what you would otherwise 'hear', doesn't heighten the feeling of 'being there', just 'being behind a computer screen'. Although if the story were good enough (for example Police Quest), it would probably not matter as much. (q89-90:r29)

More examples that suggest that a lack of audio leads to diminished immersion are:

> No audio for example, dull race games contain no music. Hearing a motor and the gearbox for 15 minutes is not really exciting. (q89-90:r5)
>
> Football manager 2008. No audio. (q89-90:r86)
>
> Morrowind. Little to no recorded dialog. Music was bland. (q89-90:r109)

Another instance that concerns missing sounds is a game having too few sounds belonging to the Setting of the game, thus having a soundscape that mainly expresses the Activity (q89-90:r120). The lack of music in *Halo* (2002) is mentioned by a participant of PUGS for 'kicking down the immersion of the game incredibly.' (PUGS:018)

Although the influence of a lack of audio on immersion needs further research, generally, audio can be regarded as critical for immersion. Most players value audio as an important factor for playing games and a silent game soundscape[141] or missing sound objects are likely to diminish immersion, unless the user environment does not allow for audio playback (for instance in public places where game audio could lead to noise pollution).

4.3.5 SUMMARY AND CONCLUSION

It has been posited that audio can hinder or disturb sensory, challenge-based and imaginative immersion. Based upon the described issues, we can conclude that inappropriate audio can indeed disrupt these three dimensions. Sensory immersion is

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[139] Also mentioned by respondents q89-90:r31 and q89-90:r109.
[140] E.g. 29, 85, 86 of question 89-90. *Gangland* (2004, PUGS:026) is mentioned because there is too little sound, when the music is turned off.
[141] For an example of a silent game soundscape, see (PUGS:038).

disrupted when the *feeling of presence* is diminished or when *sensory gratification* is decreased, or in other words, when audio is no longer perceived as pleasant. Challenge-based immersion can disrupt immersion when there are issues with the *response* to gameplay, leading to a diminished *feeling of flow*. Imaginative immersion is decreased when audio is conflicting with the cultural setting or is unrealistic (*believability-related issues*) thus disrupting the empathy of the player. In the next section, connections with IEZA will be made.

The disruption of immersion by audio mapped to IEZA

In order to increase understanding of IEZA and SCI, audio with a diminishing factor on the dimensions of immersion has been mapped to the domains of IEZA. Table 10 shows the domains of IEZA with frequently found examples mapped to SCI.

In this overview, we can distinguish some main issues. For sensory immersion, the non-diegetic side of the model (Interface and Affect) is mainly mentioned for unpleasantly sounding instances, while the diegetic side often is mentioned in relation to the game world. This means that objects that do not convince the player (Effect) or worlds that do not feature Zone objects allow sounds of the user environment to be noticed by the player. For challenge-based immersion we mainly see issues where the response of audio to the actions of the player is concerned. The fact that no instances have been found where Zone is found to be incorrectly responsive lies in the fact that Zone mostly is not directly responsive to the actions of the player. For imaginative immersion, issues have been found where the occurrence of specific sounds or music conflicts with the characters, setting or story.

	Interface	**Effect**	**Zone**	**Affect**
Sensory Immersion	**Sensory gratification / diminished feeling of presence:** Audio is not pleasant and disturbs game play			
	e.g. alerts and alarms	e.g. gun sound that is not impressive enough	e.g. no sound, resulting in an empty world	e.g. unpleasantly sounding music
	(PUGS:020)	*(q89-90:r15)*	*(PUGS:038)*	*(q89-90:r57)*
Challenge-based immersion	**Response:** Audio does not respond well to the gameplay and disturbs flow			
	e.g. interface sounds that keep repeating	e.g. sounds that do not react well enough to gameplay	not found.	e.g. non-supportive tempo, non continuous (flow disruptive)
	(PUGS:011)	*(PUGS:024)*	-	*(q89-90:r25)*
Imaginative immersion	**Believability:** Events that are unlikely to occur or of cultural references that do not convince the player, resulting in a diminished empathy with the situation			
	e.g. 'Windows-like (electronic) sounds' in a medieval world	e.g. sound that is unlikely to occur in the story or world	e.g. a cheerful zone in the setting of war	e.g. hard rock music in a medieval setting
	(q89-90:r114)	*(PUGS:017)*	*(Worms 3D)*[142]	*(q93:r133)*

Table 10: SCI mapped to IEZA with corresponding examples.

The disruption of immersion by audio mapped to IEZA design properties

As the design of audio is involved, linking the negative influence to the design properties of IEZA (see section 2.4) is relevant to present more insight. In this case, the production-

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[142] In preliminary user tests, some players of the game *Worms 3d* (2003) found that the Zone did not reflect the Setting of war. See Appendix 2.

based categorisation of audio (sound, speech, music) is used to address the design properties. Figure 23 shows a mapping of commonly found examples to IEZA.
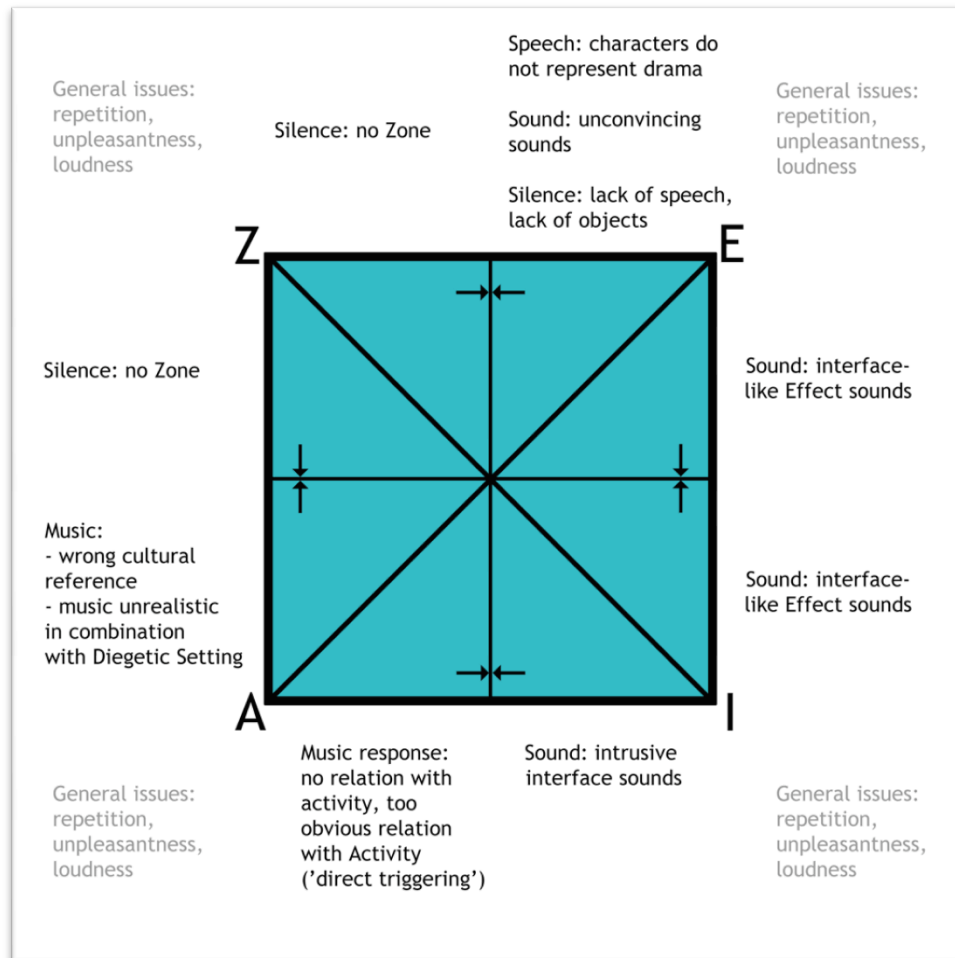
Figure 20: Examples of barriers mapped to the IEZA design properties.

Some general issues concerning the quality can be distinguished in the corners of IEZA. When the *quality* of sound speech and music in the domains of IEZA is not sufficient, these instances are likely to annoy the player, often with a diminishing effect on immersion. Mostly, these issues have their origin in the production phase or the implementation phase of game audio. Repetition is a frequently found general barrier, while loud sounds and unpleasant (often described as 'ugly') design elements are also found.

Silence (the absence of sounds) is mostly found in relation to sensory immersion and imaginative immersion. In the case of sensory immersion it fails to convince the player of a spatial setting - the game does not induce a feeling of presence. In the case of

imaginative immersion, certain in-game elements that are not accompanied by audio fail to induce the player's empathy.

CONCLUSION

SUMMARY

This study aims to contribute to the conceptual decision-making concerning audio in computer games; the area of design that comprises the decisions that are made before the actual design of the assets takes place.

Audio is an important constituent of most games and its role for immersion in games, an issue relevant for audio designers as well as game designers, has hardly been investigated. This thesis examines the role of game audio on immersion on the level of conceptual design. It presents a conceptual framework for that role and treats various audio design issues in order to reflect upon the conceptual decisions relevant for the design of audio in relation to immersion.

In Chapter 2 of this thesis, several ways to classify game audio are discussed. For a study of conceptual design, these classifications are found to be too specific, non-related to games or incoherent. The author has presented an alternative model, named IEZA (Huiberts & van Tol, 2008), a model for the functioning of game audio during active gameplay. In this thesis, it serves as a model to describe audio in relation to the immersive experience.

The two design-related dimensions (Diegesis and Interdependence) yield the four domains Interface, Effect, Zone and Affect that can be used to define four conceptual domains of communication by means of game audio. Each domain can be used to communicate with a specific domain of the auditory game environment:

- The **I**nterface domain expresses what is happening in the game.
- The **E**ffect domain expresses what is happening in the game world.
- The **Z**one domain expresses the setting (feel, state, culture) of the game world.
- The **A**ffect domain expresses the setting (feel, state, culture) of the game.

IEZA was specifically developed and evaluated for the context of games, though implications have been found that it might be useful in other design contexts. This is discussed in Appendix 3.7.

In Chapter 3 an overview of the current theory about computer game immersion is presented. Immersion is a disputed and often loosely defined term (McMahan, 2003, p. 68) and this thesis uses a working definition based on current theory. The author has

not intended to redefine the concept of immersion. Several classifications of immersion have been proposed in game literature and as games continue to develop, it is very likely that more classifications of immersion will continue to be formed. In the search for a design-related model of immersion with clear distinctions between the classes of immersion, the SCI-model (sensory immersion, challenge-based immersion and imaginative immersion) by Ermi and Mäyrä (2005, pp. 7-8) has been chosen. This is a model with little overlap between its (three) dimensions describing components of games that are suitable to be linked to a conceptual level of design. SCI is therefore considered a more apt model of immersion for our purposes and it offers a valuable representation of the experience of immersion by players.

In addition to the SCI-model, the three stages of immersion by Brown and Cairns (2004, pp. 2-3) can be used to describe the time-based aspect of immersion. The three stages of immersion (Engagement, Engrossment, Total Immersion) describe the process of a player becoming immersed during game play. As audio exists in time, it is important for audio designers to acknowledge the fact that immersion is a time-based process with a beginning and an end.

In Chapter 4 it is shown that most players acknowledge the enhancing influence of audio on immersion. Audio was confirmed as a game component that can stimulate all three dimensions of immersion by enhancing the sensory connection, the feeling of flow and the feeling of empathy of the player. Several design issues for the three dimensions of immersion are described in Chapter 4. These are based on findings in the user survey, the Pretty Ugly Gamesound Study (PUGS, see Methodology in chapter 1), and various other sources. In relation to these design issues, the enhancement of the dimensions of immersion is linked to IEZA. The enhancement of sensory immersion is primarily achieved with the diegetic side of IEZA (Effect and Zone), by giving the player a certain feeling of presence. A part of the non-diegetic side (Interface and Affect) plays a role for sensory gratification, namely audio that is regarded as 'beautiful' or 'impressive'. Challenge-based immersion is found to be linked to the Activity side (Interface and Affect) as well as a part of Affect. Imaginative immersion is primarily enhanced with the Setting (Zone and Affect) and the side of Effect that is close to the Setting (see 4.2.4 for a graphical representation).

Besides the positive effect of audio on immersion, it has been posited that audio can hinder or disturb sensory, challenge-based and imaginative immersion. Based on findings in the user survey and PUGS, we can conclude that audio can indeed disrupt the three dimensions of immersion. Sensory immersion is disrupted when the player's

feeling of presence is diminished or when *sensory gratification* is decreased, or in other words, when audio is no longer perceived as pleasant. Challenge-based immersion can be disrupted when there are issues with the *response* to gameplay, leading to a diminished *feeling of flow*. Imaginative immersion is decreased when audio is conflicting with the cultural setting or is unrealistic (*believability-related issues*) thus disrupting the empathy of the player. The findings in this section can be used to analyse the conceptual design of a game and reconsider certain decisions in order to prevent the audio from disrupting immersion.

Altogether, the IEZA model, SCI and the design issues in Chapter 4 form a framework for the conceptual design of audio contributing to immersion.

DISCUSSION

As stated above, this thesis is a resource for thinking about and reflecting upon design (analysis before, during and after synthesis) instead of the act of design itself (synthesis). It describes game-related and conceptual issues and not the actual - often very technical and specific - design parameters in relation to immersion (such as for instance audio frequencies, compression ratios or musical chord progressions), and thus it can be used by both audio designers and game designers. It can for instance help these designers to discuss what kind of music would be suitable for achieving a certain effect in a game. It does not tell composers how to make such music, because highly context-based or genre-specific information is involved in that and the result will also depend on the skills, talents and experience of the sound designers, composers or other audio team members. In future research, design researchers could focus on the various design parameters of audio design in specific game genres (for instance, musical parameters for the Affect domain of IEZA in first person shooter games). In doing this one should consider the fact that many design parameters of sound design and composition – which are mastered by designing in practice instead of reading about it - can be difficult to describe in words. The material of this thesis is implemented in the game and game audio curricula of the Utrecht School of Art & Technology and the Utrecht School of Music & Technology and in these educational settings, the conceptual framework has been used as shared conceptual knowledge of game audio design.

A topic not treated in this thesis is the possibility that audio that is designed to enhance one of the dimensions of immersion could disturb one or both of the other dimensions. Similar issues could occur when players have a specific preference for certain dimensions, for instance based on genre-specific properties. Ermi and Mäyrä (2005, pp.

9-11) have analysed the immersive experience in games, as indicated by players and found that games provide different degrees of immersion for each dimension. For instance, *Half-Life 2* (2004) offers a high degree of sensory immersion, while *Civilisation III* (2001) is mainly rated for its challenge-based immersion. An example that illustrates how this contradictory effect can appear can be found in Appendix 2, which describes the opposite opinions of players towards the audio design of the game *Worms 3D* (2003). A similar kind of contradictory effect is found by Adams (2004a) in relation to immersion, where post-modernistic references in *Metal Gear Solid* (1998) were appreciated by some players, while other players, Adams himself included, consider this a 'direct slap in the face' (Adams, 2004a). According to Adams, this led to different types of immersion that explained the contradictory player opinions: the players that appreciated the post-modernistic references were *strategically* or *tactically* immersed (Adams versions of challenge-based immersion) as opposed to those who did not appreciate these references, who were *narratively* immersed (which corresponds to imaginative immersion).[143] For some more findings on player preferences in the user survey, please refer to Appendix 3.6.

One of the ways in which designers could take into account such individual player preferences is by developing adaptive music systems: systems that adapt the auditory output to suit the experience of the player, thus creating personalised auditory soundscapes that connect to the player's experience.[144] Such a system could, for example, offer players who seem to enjoy intense pacing and rapid challenges different auditory feedback and stimulation from players that approach the game more strategically. Future research into immersion and audio could therefore focus more on the preferences and individual experience of the player, as there are implications that individual preferences are important for the experience of immersion.

An area of research that might benefit from the design issues described in this study is the field of audio games. Audio being a pivotal element of these games, many of the topics that are discussed in this thesis are relevant. Although audio games currently cannot be regarded as a representative development branch in the game industry, there is an active community of (mostly visually impaired) gamers, playing these games because they are unable to play regular video games. The audio-only gameplay experience of these games has inspired some game developers to develop an audio

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[143] A description of the classification of immersion by Adams can be found in section 3.3.
[144] Currently, this is a working definition of the Adaptive Music Systems Research Group under Jan IJzermans.

game or feature a sound-only level in a game.[145] Yet, the quality of the available audio games is generally not to be compared with common video games. Blind gamers themselves also experience these differences in quality and therefore try to play visual games, such as the *Grand Theft Auto* Series (Huiberts & van Tol, 2006b). Even though the visuals cannot be perceived by blind players, the very rich auditory worlds – compared to the worlds in the available audio games – provide enough detail to make these games enjoyable for them. Unfortunately, the auditory feedback alone does not fully support them in fulfilling the missions so that they are unable to participate in the challenges of the game. The author wishes to express his hope that the repertoire of games for these players will soon start developing as rapidly as video games have and that the immersive quality of audio games could be improved with the help of the insight of this investigation.

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[145] For example, *Bit Generations Sound Voyager* (2006) by Nintendo (an audio game with some explanatory visuals), *Real Sound: Kaze no Riglet* (1999)(an audio game) and *D2* (a game with audio-only scenes).

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APPENDIX A

Table of Contents

APPENDIX 1: DESCRIPTIONS FOR THE PRETTY UGLY GAMESOUND STUDY VIDEOS

These are the original descriptions that are submitted with the video fragments (see Appendix A, DVD) of the Pretty Ugly Gamesound Study.

001 Grim Fandango (pretty):

> Persoonlijk vond ik Grim Fandango een erg goed voorbeeld van een game met prima geluid. Het spel weet verschillende geluiden door elkaar te spelen (zoals het typen op een typmachine gelijk met het praten van een personage, waarachter ook nog eens achtergrond muziek gezet is), waardoor het spel meer als geheel aanvoelt.
>
> Ook tof is dat het bepaalde geluiden harder of zachter laat spelen als je er dichter bij in de buurt bent. Het typen van de typmachine (zoals in het filmpje te zien is) hoor je bijvoorbeeld heel erg hard als de camera min of meer op de typmachine zit (in het standpunt wanneer je de lift uit komt), maar zachter in de volgende camerapositie. Hetzelfde geldt voor de muziek buiten het gebouw. Deze hoor je, wanneer je het gebouw net verlaat, erg zacht, maar naarmate je dichterbij de bron van de muziek komt wordt het harder.
>
> Ook erg leuk vond ik dat zelfs de kleinste dingen een eigen geluidje hebben. Het lopen op verschillende materialen geeft per materiaal een ander geluid, maar ook bijvoorbeeld het halen van een item uit de binnenzak van het hoofdpersonage. Alle geluiden zijn erg herkenbaar en maken van het spel echt een geheel.

002 Company of Heroes (pretty):

> Wat ik zo geweldig aan CoH vind is dat bijna alles zijn eigen geluid heeft. GI's hoor je lopen, je hoort het geluid van hun uitrusting dat op en neer gaat. Wapens klinken levensecht en je hoort zelfs de lege hulzen vallen en het geluid van wapens die herladen worden.
>
> Tanks hoor je piepen en je hoort hun rupsbanden kraken over de grond. Kogel/granaat inslagen klinken ook anders afhankelijk van wat voor een materiaal ze raken. Muren die instorten, kogels die afketsen op een tank, ontploffingen, vliegtuigen die overrazen
>
> Ook hoor je de gedempte geluiden in de verte van gevechten die elders plaats vinden. Dit allemaal gecombineerd met het uitstekende voicewerk van je eenheden, die schreeuwen om hulp, juichen als ze een 'kill hebben gemaakt', zorgen ervoor dat je helemaal in het spel wordt opgezogen.
>
> Klein grappig detail is dat tijdens nachtmissies je eenheden fluisteren.
>
> Natuurlijk is dit niet helemaal nieuw in games, maar wat ik speciaal vond is dat dit in een RTS is, zelden heeft een RTS zulk niveau gehad op het gebied van geluid.

003 Settlers II (pretty):

> Ik wilde eigenlijk het originele Settlers II uit 1996 gebruiken maar die kreeg ik niet aan de praat in win xp. En deze remake stond toch nog op mijn harde schijf.
>
> De reden dat ik het geluid van the settlers II erg goed vind is niet zozeer dat het iets toevoegd aan de game mechanics. Maar wel heel erg aan de sfeer. De game heeft een hoge "cute" factor, met een hoop kleine vrolijke mannetjes die allemaal hun ding doen. Elk gebouw en mannetje in de game heeft zijn eigen geluiden. En ook andere objecten in het spel maken geluid. Hierdoor is er altijd een hele hoop tegelijk in het scherm dat allerlei geluiden maakt. En door een goede samenhang en consistentie maakt het dat het hele spel een gezellig drukke sfeer krijgt. Samen met de graphics zorgt het ervoor dat het spel niet alleen een redelijk unieke gameplay heeft maar ook een redelijk unieke sfeer.
>
> *N.B. The video is a remake of the original game which runs on XP as the original game did not run properly on the computer of the respondent.*

004 Zuma Deluxe (pretty):

> Muziek met spirit, met die X factor, heeft een zeer verslavende werking op mij. Ik merk dat ik spellen met inferieure gameplay toch vaker speel als de muziek erbij goed is, gewoon omdat

de spelervaring als geheel er zeer positief door wordt beïnvloed. Zuma is me na de eerste keer spelen altijd bijgebleven vanwege de catchy tune. Als die er niet was geweest...

005 Puyo Pop Fever (ugly):

Om het snel te omschrijven; ADHD met adrenaline en sugarrush. Hier is het nog niet eens erg vergeleken met de DS versie van de game die ik heb gespeeld. Blijkbaar, elke keer als je een "puyo" laat vallen, hoor je de character waarmee je speelt iets zeggen. Nou is dit niet zo een ramp, ware het niet dat die stemmetjes verschrikkelijk gekozen zijn, en dat als het spel druk wordt (wat héél snel gebeurt, zelfs op lage moeilijkheidsgraden) blijft die dus doorbleren, terwijl de muziek op de achtergrond ook hyper wordt. Verschrikkelijk dus.

006 Fatal Frame (pretty):

Het spel was het eerste spel waar de atmospheer van het spel zelf (mede dankzij het gebrek aan licht en de geluiden) ervoor zorgde dat het spel een paar fikse schrikmomenten had. Door het geluid dat over het algemeen meer achtergrondgeluiden warden dan een soundtrack, leek de spanning te snijden, en wanneer iets dan plotseling tevoorschijn kwam met een leuke soundeffect, dan stond je ook echt meteen rechtovereind.

007 Xblades (ugly)

Incredibly poor voice acting.

You can't see it in the youtube vid, but some of the subtitles are different than what is said.

008 LocoRoco (pretty):

Respondent 1:

Loco Roco combines songs sounds and more to create a complete experience. You just can't hate this game =) .

Respondent 2:

Soundtrack of Loco Roco.

I have never played a videogame that captured the whole vibe of the game so well in it's music. It just makes you want to play some more, while at the same time making me feel happy! .

009 Half-Life 2 (ugly):

Personal observation: frustration rose when getting stuck in a level. After a certain time, the sound loop in the background of the helicopter stopped immersion.

010 Plasma Pong (pretty):

Voornamelijk de muziek is hier een goede aanvulling op de gameplay. Elk level wordt intenser, en de pitch van de muziek gaat mee. (Later wordt dit wel erg hoog en klinkt het koor als de chipmunks, wat misschien een averechts effect heeft.)

Bovendien zijn de andere geluiden prettig om aan te horen en passen binnen de stijl. Wanneer de speler de bal te lang aantrekt, klinkt het lanceergeluid ook een stuk platter omdat de blast dan ook niet erg sterk is.

011 Pokemon (ugly):

Pokemon - Low health beep. Pokemon doesn't have a soundtrack which is easy on the ears to begin with but when your pokemon ends up with low health a horrible whiny warning noise is played. To boost it all it doesn't go away when you're trying to select the pokemon to switch it out with or the item to return the health. It's so annoying that you'll turn off your volume, not to put it back on again.

012 Wow (ugly):

Een Baby en een volwassen Hert maken precies hetzelfde geluid....

Klopt gewoon niet..

014 Defcon (pretty):

Good Audio: (Defcon by Introversion)

Simplistisch maar erg sfeervol (let op hoestende en jankende mensen in de achtergrond)

Funtioneel: (geeft het idee dat je een kernoorlog speelt vanuit een interface goed weer)

015 Killer 7 (pretty):

In dit fragment zie je het opstart menu van het spel. Zodra je "new game" kiest hoor je een soort krankzinnige lach, die meteen de toon zet voor het even zo krankzinnige spel. Het is ook HET geluidseffect uit het spel wat ik me het best herinner, omdat het zo apart is, en ook omdat het vaker terugkomt (het is de lach van vijanden).

Je verwacht zo'n geluid ook niet direct in het menu, meestal is het toch standaard "klik" of een ander select-geluidje.

016 Portal (pretty):

Grappige geluiden die je laten lachen en wel in de game passen.

017 Oblivion (ugly):

Stem verandert ineens van klank en geluid en breekt daarmee de hele immersion van de game. Maakt de NPC ongeloofwaardig.

018 Halo (ugly):

Description: - The voices of the aliens are not believable. They're too high and they sound to stupid. When an alien race invades the earth I believe them to be dangerous and cunning, these voices are nothing like it.

Also the voices of the aliens do not even sound slightly scary. This disrupts the gameplay because I do not see them as a threat. Most of the times I'll just stand before them and shoot while I stand still while I should be running all over the place.

The voices of the aliens are more funny or corny then scary, this gives me a ridiculous feeling about the game which tends me to quit earlier then normally.

Aliens talking english? No alien talks english not even if they encountered the human kind before…

Nearly no sound or music, which kicks down the immersion of the game incredibly.

Because of some lack in the gameplay I wasn't grabbed by the game, and the lack of the music didn't really help…

019 Bioshock (pretty):

Ik had bioshock gekozen voor goede ingame audio/sound design voor de onderstaande aspecten:

Description:

good timing, every sound appears when you want them to.

The setting is an underwater city, from time to time you will hear sounds of water trying to burst/break/slide/slip/flow into the city. You will often hear the sounds of dripping water, flowing water with or without an echo, depending on what surrounding it's in

Every object/character/floor etc, has his own shape and structure and surface, in this game you will hear all those differences, every sound is unique.

The old Art Deco feeling of the years 1900 till 1940's is completely merged into this game and gives the game a deeper level of immersion.

Old radios and record players play like they haven't been played on for years, they tend to get stuck some of the times because of their age.

You can hear the old hollow and scratchy sound of jazz songs of the early 20's and such.

All the voices talk like they're really from those times, with their own vocabulary.

If you save a little sister you will hear a sound like its beamed straight down from heaven to your ears, like you're doing the ultimate good thing.

Every sound sounds different in every other surrounding and has a different sound effect. This makes me think the game is even more believable.

020 Zelda: A Link to the Past (ugly)

The Legend of Zelda A Link to the Past (GBA)

"Weinig Hartjes"

Zodra je hoeveelheid hartjes gevaarlijk laag wordt begint er een pieptoon zich te herhalen op de achtergrond. Deze stoort echter, vanwege het tè nadrukkelijke geluid, wat zowieso botst met de achtergrondmuziek en sfeer. Irritant.

021 Silent Hll 2 (pretty):

Wanneer er vijanden in de buurt zijn, gaat de radio storen en ruisen. Dit vind ik goed omdat je zo weet of er gevaar dreigt, en het geluid helpt mee je bang te maken.

022 Spore (ugly):

Description: The audio overall is hectic and constantly changing depending on how far you're zoomed in. The alien voices are often too high pitched and keep saying the exact same thing over and over again, causing me to turn it off in the options menu.

Other audio effects are too intrusive and keep repeating themselves, like the radar or scanner sound effects.

023 Company of Heroes (ugly):

Ik heb ook Company of heroes gekozen voor een slecht voorbeeld,

Company of heroes heeft namelijk een aantal geluiden die naar een keer of 2 al ontzettend irritant zijn.

Voornamelijk zijn dit wat abilities van het duitse team, waar der führer nogal hard door een microfoon schreuwd. Even leuk maar al snel ontzettend irritant omdat het zon pokkeherrie is, je gaat bijna de abilities die dat geluidje triggered niet meer gebruiken erdood.

Ook heeft Company of heroes het zo gedaan, dat als je een unit selecteerd die uit beeld is, je niet zijn normale 'stemmetje' hoort, maar ipv dat door een krasserige radio schreeuwd.

Hoewel dit soms een leuk effect kan hebben, lijd dit vaak ook tot enorme irritaties, vooral als meerdere units tegelijkertijd door een radio aan het schreeuwen zijn.

024 Final Fantasy X (ugly):

Het begint heel erg goed. De "geesten"geluiden zijn goed erin gebracht. Het achtergrond muziekje geeft goed het ietswat verdrietige stemming weer en dan gaat

de hoofdpersoon praten. Hoofdpersoon is de jongen met blond haar die overdreven gebruint is. Zijn stem geeft niet een juist beeld weer. Hiermee bedoel ik dat je niet een hoofdpersoon van een spannende liefde/red de wereld roman kan voorstellen door zijn stem te horen. Zijn stem komt eerder over als een jongeman die net misschien uit de pubertijd probeert te komen. Het is niet een diepe stem maar ook niet een kinder stem. Hij klinkt wel kinderachtig en overdreven schell. Het irriteert enorm. Dan maar te zwijgen over het stukje waar hij zogenaamd huilt, het komt niet geloofwaardig over.

025 Gothic (ugly):

zoizo vind ik het spel zelf al niet lekker spelen, de animaties zijn stroef en de verhoudingen van de characters vind ik raar. het geluid helpt ook niet echt, want ik vind het echt slecht, als je een orc raakt hoor je 1 van de ik denk 3 "pijn" kreten en die zijn al niet om aan te horen. Maar als je de orc nog een keer raakt voor het geluid is afgespeeld begint ie gewoon opnieuw. verder vind ik de voice acting ook slap, het is net alsof het development team alle teksten zelf hebben ingesproken. Het klopt niet, het klinkt niet en zo kan ik niet in de sfeer komen en komt het spel niet geloofwardig over.

026 Gangland (ugly)

Why I don´t like the sound of Gangland:

The sound quality of Gangland is good, but that´s not enough for me to say that the audio of this game is good. As soon as I started playing the game for the first time, I decided to switch off the music because it was particularly bad (I switch off the music in games most of the times). To my surprise, after getting rid of that horrible piece of music, I noticed that the only sounds left were the voices (that happen not very often) of the characters and the sounds of bullets. So, the character is walking in the middle of a street with people and not only you can´t hear the sound of the street, birds, cars... you don´t even hear the sound of your own footsteps!

027 Prince of Persia: The Two Towers (pretty):

De ritme van het achtergrond muziek wordt sneller naarmate de spanning van de achtervolging zich opbouwt. Dit is goed want dan voel je het gevaar steeds dichterbij komen.

028 World of Warcraft (pretty):

Een dwerg loopt door het bos, het is nacht en dus horen we krekels en af en toe een uil. Bijna elke zone klinkt hierin uniek tijdens dag en nacht en er zijn er meer dan 30. Loop je door een spookachtig bos, dan hoor je ook echt de wind door de bomen huilen. Daarnaast hebben de sound designers aan vrijwel elk object in de wereld geluid gehangen. Loop je langs een fakkel, dan hoor je het ook. Loop je langs het water, dan hoor je het subtiel tegen de wal klotsen.

In WoW zijn de sound designers echter bij nog meer dingen los gegaan: Niet alleen klinkt het lopen anders afhankelijk van de ondergrond, maar ook elke soort kleding klinkt anders. Deze hunter heeft lederen kleding aan, en je hoort het door het 'squeeky' geluid. Komt er een warrior voorbij met chainmail armor, dan hoor je het ratelen.

De soundtrack van WoW vind ik toch wel iets bijzonders. Er is voor elk gebied, elke stad andere muziek die overal de typische Warcraft klank met zich meedraagt, zelfs al zijn het de meest uiteenlopende scores. Elke score is weer even mooi en past meestal precies bij datgene dat je ziet. De muziek is er ook echt om je te laten voelen also je je in de wereld bevind en voelt op geen enkel moment geforceerd of opdringerig.

Epische, overweldigende muzikale momenten zoals het betreden van de hoofdstad Stormwind geven mij een gevoel dat ik niet vaak heb in een game. En in tegenstelling tot in veel andere games, komen deze momenten in WoW meer dan eens voor.

Loop je vervolgens door de stad 'The Exodar' (de paarse stad in het filmpje) dan heb je ineens te maken met een compleet andere sfeer. Met compleet ander geluid en muziek, maar toch met die typische Warcraft trademark.

In de vervloekte stad van Lordaeron zullen veel Warcraft fans genieten terwijl ze door de bekende ruines lopen en zelfs het originele geluid van de stad subtiel rond je te horen is. Hoor je vervolgens plots de spookstem van Arthas (een grote bad guy in de Warcraft lore) terwijl je in troonkamer staat, dan is het gevoel toch wel compleet.

Echter is de functie van geluid niet alleen bedoeld om een geloofwaardige wereld neer te zetten. In de Warcraft games is geluid een belangrijk element tijdens de gameplay. In WoW is dit naar mijn mening fenomenaal gedaan. Elke spell, item en vaardigheid heeft zijn eigen geluid. Dit zorgt er niet alleen voor dat het veel leuker en geloofwaardiger klinkt, maar helpt ook enorm mee tijdens combat. Je kunt meteen horen wat je gebruikt, wat goed voelt maar ook meteen duidelijk is, ook om bijvoorbeeld te horen wat vijanden doen. De gevechten klinken dan niet realistisch, maar realisme staat in Warcraft niet boven de spelervaring.

Ook de voiceovers zijn wederom van hoogstaand niveau. Elk ras klinkt precies zoals ze moeten klinken en het maakt de wereld toch net iets levendiger wanneer mensen iets zeggen wanneer je op ze klikt, al is hun praatcapaciteit beperkt.

Ik kan nog vele pagina's doorgaan, maar kort is deze tekst niet echt te noemen (mijn excuses! :p). Om dit veel te lange verhaal af te sluiten, rust mij alleen nog te zeggen dat ik het geluid van Blizzard's games altijd erg fijn vind klinken. Andere games klinken vaak kil en hard, maar spellen zoals Warcraft en Starcraft klinken erg professioneel.

Het geluid is warm, maar tegelijkertijd "crispy" en duidelijk. Geëvenaard door meesterwerken zoals Grim Fandango, waar andere elementen van geluid een grotere rol spelen, maar dat is een verhaal voor een andere keer.

029 Thief 3 (pretty):

Geluid speelt een rol bij de gameplay - de hoeveelheid geluid van je avatar (voetstappen, etc) kan bepalend zijn of je slaagt in je missies. Daarnaast hele goede sfeer - echt een spel om naar te luisteren tijdens het spelen.

'Sound plays a role in the game play – the amount of sound of your avatar makes (footsteps, etc) can determine whether you succeed in your missions. Furthermore, there is a very good atmosphere – really a game to listen to during play.'

030 Enter the Matrix

Added for reference with music.

031 Enter the Matrix

Added for reference without music.

032 Battlefield 2 (pretty):

"Depth in sound design, weapons in the background indicating there is more going on."

033 Worms 4D

Added for reference.

034 Hangman 1

Added for reference. Hangman (online) by Fanatiker Media. Release date unknown. Retrieved March 3rd, 2007, from http://www.hangman.no/

035 Hangman 2

Added for reference. Hangman (online) by Andrew Pepper. Release date unknown. Retrieved March 3rd, 2007, from http://cunning.devstars.co.uk

036 Left 4 Dead (pretty)

[] best to start the vid at 4:08 []
This is an compilation video of 'the Witch' in Left4Dead.

When you approach the witch an erie and creepy noise comes up, which becomes louder and erier when you approach and/or provoke the witch. you can also clearly hear her sob and cry when she's sitting on the ground. And when she's provoked she starts grunting and screaming.

Respondent 2: In dit teamspel moet je overleven tijdens een zombie epidimie. Het spel bevat hele lichte muziek, die nauwlijks opvalt tijdens het spelen, maar toch onder je huid gaat zitten. Geluiden zijn erg functioneel, elk type zombie heeft een eigen geluid, en vaak hoor je diegene al aankomen. Je blijft dus echt gefoccused op het geluid om je heen. Normale zombies moanen (zoals elke klassieke zombie), maar de sound bytes zijn heel gevarieerd. Ik ontdek elke keer weer een ander gruwelijk geluid. Het geluid van de geweren voelt goed. Geweerschoten moeten de juiste oemph hebben, en dat is helemaal het geval. Je teamgenoten geven automatisch aan wanneer ze gewond zijn, of als ze wapens hebben gevonden. De zinnen zijn kort, en functioneel, maar weten toch een groepsgevoel op te wekken tussen de personages.

037 The Legend of Zelda: Ocarina of Time (pretty)

Where to begin… lets start with the ambient sound you hear throughout the dungeon. It fits the environment well. It has this vibe going on that fits the big hallow tree Link's in. Next to mention are the sounds made by the enemies, they're made to fit to enemy and it's state. Auditory and visual feedback work in harmony to provide the player with the information she needs to know what's going on.

038 Starsiege: Tribes

Example of an empty world. Added for reference.

039 Freelancer (ugly)

Incredibly poor voice acting.

You can't see it in the youtube vid, but some of the subtitles are different than what is said. .

040 Alex Kidd (ugly)

Description: The sound of this game is not only horrible but also very repetitive. After playing this for more than 10 minutes you won't be able to get it out of your head. And believe me, you don't want it there!

041 Bloody Roar (ugly)

Description: This is definitely an example of Ugly audio. Why? Well the main problem is that it's terribly irritating. All the background music is terrible Japanese Arcade Rock. I suppose it adds to the whole arcady feel the game has going but it doesn't help me want to play it for longer than absolutely necessary.

Also all the characters have voice clips attached to each attack. This is something you'll see in most fighting games but as this is pretty much a button masher you'll be hearing a lot of "ai ai ai ai ai etc."

042 Fable 2 (ugly)

When you play fable 2 you often visit towns. When you enter a town all citizens will start to interact with you. When a lot of people are standing around you this means that you hear a lot of sound. If there are only two characters talking to you this is fine, but it gets insane when the ENTIRE town will start to talk to you. This creates one big blurry sound and you are unable to listen to the conversation with for example your family. You can't make the people stop talking unless you run away from them. Really stupid!

043 A2 Racer (ugly)

Horrible music made horrible to listen to due to horrible sound effects ruining my horrible mood.

044 Jet Set Radio Future (pretty)

I think the music really matches the style and pace of the game.

For each series of levels there is a list of songs that plays like you were listening to a radio. In the example you can hear music that mostly plays in the city areas. In the sewer areas one would hear a list of darker music with more echos.

045 Prince of Persia: The Sands of Time

Added for reference.

046 Rez

I can't believe this video hasn't been posted here before. How the soundtrack responds to the player's actions is just amazing. It makes this ride a complete experience and the flow is great.

047 Jets'n'Guns (pretty)

Metal mixed with SID tunes.. do I have to say more? .

048 Doom3

Added for reference

049 Vib Ribbon

Added for reference

050 Quake 2

Added for reference

051 Dark, A Garden Wander

Added for reference

052 Tony Hawk Pro Skater 4

Added for reference

053 Heroes of Might and Magic V (pretty)

All Heroes Of Might And Magic versions have good sound effects and music in my opinion. They really know how to make accents on the feeling of the game. It really strengthens the feeling of the game. Also most of the time the music that is played in the battle scenes is the same. Yet it doesn't feel like it's looping or repeating the whole time.

054 Quake Live (pretty)
Sorry about the horrible video quality, youtube messed it up somehow. the important things to notice are the fantastic audio: rockets demonstrate doppler effect when they fly past your head, the hit bleep gives you useful feedback on your accuracy in intense situations and the quake 3 music is just awesome.

055 Donkey Kong Jungle Beat (pretty)

The music in this game isn't really great, but it fits the picture perfectly. Music really keeps you going and makes you excited about playing on. Fast paced at the right times, and the

clapping and drumming makes you feel like you are actually playing a rhythm game, while your not. Great!

056 Homeworld (pretty)

The audio is very serene and non-intrusive which fits the slow paced gameplay and normally silent vacuum of space.

The general music also fits this description, but the icing on the cake is Samuel Barber's Agnus Dei, the Choral version of Adagio for Strings. This dramatic score is used during pivotal scenes throughout the game and adds tremendously to the dramatic events in the story. .

057 Katamari Damacy (pretty)

Doesn't it make you smile? Wanna stand up and dance while you play ^^ .

058 World of Warcraft (pretty)

Everey skill I use in the game has a different audio sound. This way I can hear what I'm doing without actually looking at all the skillbars and cooldowns. Also, I can hear what enemies are doing around me. Each area has a different music theme, and it fades into eachother when I fly from one area to another. There is always some audio in the game, be in the wind, music or just the environment. This makes the game a lot more lively.

059 Shadow of the Colossus (pretty)

This is one of few games where I really noticed the audio. Not only does it have a beautiful soundtrack, but the game handles its sound really good. When you're walking or riding around in the world there is no music. Only the sounds of nature can be heard. Chirping birds, wind, the hooves on the ground etc. When you come close to a Colossus the music begins. Within the battle in varies between eerie music and really intensive battle music.

060 Music Catch (pretty)

I remember the first time I played this game. The music was something I fell in love with. The game is fairly simple and very abstract, definitely wouldn't have been so awesome without the music. I'm not that into classical music, but this song is wonderfull!

061 Patapon (pretty)

The music in this game is a great combination of gameplay and music. By hitting the buttons on the ritm of the music you give your patapons commands. The music gets better when you make combo's. Great example of how to use audio in games.

APPENDIX 2: USER QUESTIONNAIRE 2005 - WORMS 3D

In November 2005, several preliminary user interviews were held for this study with the goal of obtaining a first indication of the role of audio for an immersive experience. Ten gamers were interviewed about five different games. After ten minutes of game play, a digital questionnaire was presented. Screen and audio output was recorded using Fraps game capturing software in order to be able to consult the game information when needed.

Two opposite opinions were found in the answers to the questions about the game *Worms 3D* (2003). The main objective of this game is to control one of two teams of 'vicious' worms on a battlefield and destroy the other team of Worms, using funny weapons. The game has cartoon-based visuals and the sound effects are also linked to the exaggerated style of cartoon movies: funny high-pitched voices and caricaturised weapon sounds. The 'ambient'[146] Affect of the first level in the game differs from the style of the other elements of the game.

When the respondents were questioned about their opinion on the music in the first level of the game, generally two types of answers were found. Some of the respondents answered that the music was not appropriate for this type of game, as shown by the following statements:

- The music is very calm and is something completely different from what you would expect in a game where immediate war is present. It sounds like you should go and search for the place where everyone is and than you can fight
- Music is ambience, does not enlarge immersion
- Music is not suitable for a shooter.

According to these gamers, the setting of the game was the state of war and since their main objective was to kill other worms, the music was found not to be suitable for this game. Also, the sounds of wind and seashore seemed to be misleading: the 'new age' style of sound design of the Setting did not evoke a feeling of action, challenge and threat.

Other respondents did not agree that the music was unsuitable for this game; they considered it on the contrary a layer of ambient music that enabled them to concentrate on their tasks. They stated that the main objective of their gameplay was to become focused on killing the other worms, and that the background music was required to support the activity of choosing the appropriate weapon and aiming at the enemy. Music that is associated with war might not allow for the concentration that some players need in order to perform well in this game.

As we have seen, two conceptions of war were found with the respondents who played the game *Worms 3D* (2003): the Setting of war (imaginative dimension) and the Activity of war (challenge-based dimension).

1. Experience with game
Number of respondents: 7
6 gamers never played the game
1 gamer played many levels

2. Description of the world
The state of the world is interpreted as follows:
War
Calm
End of the world
Sea fight
Awaiting
Nothing is wrong
Evil

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[146] Respondents of this user test referred to this music with the term 'ambient' (see Appendix 2). Ambient music is music that is "atmospheric in nature" ("Ambient Music Definition", n.d.).

Some people interpret the situation of the game as War or "end of the world" while others say it represents "nothing is wrong" or calm. One player mentions:
The music is very calm and is something completely different from what you would expect in a game where immediate war is present. It sounds like you should go and search for the place where everyone is and than you can fight. (9)

Also the wind or sea shore seem to be contributing to this relaxed mood, the "new age" kind of sound design in combination with the so-called "ambient music" does not bring a feeling of action, challenge and threat.

The respondents were asked whether they had an idea of the actions they could begin with, based on the sound alone. Most of the gamers do not have an idea which actions are logical. One gamer answers with "yes" and one gives the possible actions:
To swim (reason: sea shore)
To shoot (reason: explosion at the beginning)

3. Influence sound on immersion:

1 more (music is kind of cool)
1 less (Music is irritating and boring)
5 no influence:
Music is boring
Shooting is difficult, so boring
Music is ambience, does not enlarge immersion
Music is not suitable for a shooter
Game play is difficult

Sounds that increase immersion:
Voices of Worms (2)
Weapons/explosions (2)
Cartoony sounds
Effects (2x) !!! Non-specific

Sounds that decrease immersion:
Music (2x)
Cartoony exaggerated sound: does not work
Environmental sounds (sea shore)
Dialogue

Suggestions for improvement audio:
Music (3)
Environmental sounds
Understandable dialogue
Funny sounds that work, instead of distract
Meaning of the game in audio

Suggestions for increasing immersion with audio:
Music less boring (2)
Worms own character

APPENDIX 3: VARIOUS CASES

3.1 ENTER THE MATRIX

This is a description of the appreciation of Enter the Matrix, based on a review on the International Movie Database (IMDB). It is used as an indicative case for explaining that the experience of games can be very personal. Furthermore, audio is found to be compensating for some minor design flaws.

David Perry, President of Shiny Entertainment writes on the website of the game 'Enter the Matrix' (2002):

'It's not a game about a movie -- it's a game about a world.'[147]

This statement reveals what the developers wanted to convey with the game. Similar to the Matrix film trilogy, the game is designed to bring the sensation of the Matrix universe alive. 'Enter the Matrix' is widely accepted as a game that has a lot of flaws and shortcomings.[148]

The International Movie Database (IMDB) features a section for commercial video games, which enables gamers to add reviews about games. The section with comments and reviews on 'Enter the Matrix'[149] in that database provides valuable information for understanding the role of sound and music in this game. Overall in the reviews, there are complaints about 'poor design' of artificial intelligence, unsound graphical design, weak performance and boring game play in this game.[150] It is interesting that the entry of this game still includes many reviews where sound is mentioned and a great deal of them state that sound effects, dialogue and music compensate a lot for the mistakes of the game[151] and, in particular, are responsible for bringing the same experience as the films of the Matrix trilogy.

Gamer *Fluffis* from Sweden states the following in his review: 'Graphics are cr*p, Gameplay is incredibly boring. The only thing saving this game is the sound. Good voice acting, great music.'[152]
Y-Sly from Hungary agrees: 'I think that the fight and other choreography is very good, but the graphics and the gameplay (Max Payne was a lot better) is too average. The music is very good: it makes a real Matrix feeling for this game. In my opinion, this game is: 8/10!'[153]

The affect category in the game consists of newly recorded orchestral material and some electronic music, which consists of mainly the same musical themes as those in the film score.[154] As the composers have based their compositions on the themes of the film score, they have apparently succeeded in conveying the essence of the Matrix to the game score. *Mashby* from the USA writes the following about sound in his review:

> 'Other than the 1 hour of DVD quality video [...], the only saving grace is the audio in the game. Dane Davis, the sound designer for the Matrix Trilogies used the exact sounds from the movies. So when you're in bullet time and hearing the guns go off, it's just like you're there.

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[147] Quote from the homepage of the 'Enter the Matrix' website. Retrieved January 8, 2007, from http://www.enterthematrixgame.com/
[148] Please see the paragraph on the next page with references from the entry of Enter the Matrix in The International Movie Database (IMDB).
[149] Retrieved October 12, 2006, from http://imdb.com/title/tt0277828/usercomments
[150] For instance, these complaints can be found in the comments 'Total cr*p' by Fluffis on May 21st 2003 and "Utter rubbish" by bottomley83, February 2, 2005.
[151] Comments 'Amazing!' by Star Wars Lover on 31 January 2005 and 'This is not for gamers, but for movie fans' by Mashby on February 27, 2004.
[152] Comment 'Total cr*p' by Fluffis on May 21, 2003.
[153] Comment 'Not bad, but...' by Y-Sly on May 11, 2003.
[154] Buskin (1998).

It's weird when the sound effects are the most notable aspects of a game, but they are that good.'[155]

A characteristic of the sound design is that the designers have chosen to over-exaggerate sounds, while maintaining all conventions in sound design.[156] The stimulating and tension-building film music seems to be quite important for gamers to be able to feel the Matrix universe. *Mashby* continues: 'In addition, there are tracks from Juno Reactor, Chris Vrenna, Fluke, Rob D and others, that add a certain bit of adrenaline to the game play.'[157] The game developers have chosen to adopt the same stimulating use of music in the game as in the film score.

When the user reviews are closer examined, the question arises why some gamers are able to like this game very much, despite its many shortcomings. While some of the gamers clearly enjoyed the experience of the Matrix, others are bored by the game. The differences that are seen in the user comments are in many ways contrdictory and this might reveal interesting information about the experience of the game. Central to *Enter the Matrix* is that there is a connection with the Matrix movie trilogy. If a gamer has appreciated the movie, this is likely to influence his appreciation of the game in advance.

The inclusion of the original voices appears to enhance the quality of the game, because players mention that they refer to the actors in the films, as it enhances the believability of the characters, and imports the player into the world of the movie. User 'beto07' writes in his comment: 'The good thing in this game are the voices of the real actors from Matrix and sound of the weapons, and of course the fighting.'[158] 'Chance911' writes: 'The game has excellent sound, gameplay, music, and just experiencing it is an astonishing experience'[159] and 'VeZGTR' states on May 22nd 2003 in his critical comment: 'There is no game, at least not a good game. Don't be fooled by the Matrix license. It's very beautiful, but becomes repetive (repetitive) and is not really advanced, but as I said it's very beautiful, and whit (with) all the Matrix sound samples it really fells (feels) like you're in the Matrix.'

What is striking about the 42 user comments[160] in general is that some gamers think 'Enter the Matrix' generates an excellent game play experience and is great to play, whereas others say that the game is not pleasant to play at all. Certain disagreement about the qualities of a game is inevitable, but the difference of opinion in the reviews of this game suggests causes other than simple 'taste'. While 'Mashby' is excited about sound and music in this game, the subject of his review is 'This is not for gamers, but for movie fans'. This suggests that there are different motivations for playing a game, which correspond with the different preferences of players and different expectations concerning the experience.

The gamers that did enjoy the Matrix often mentioned elements that were characteristic of the concept of the Matrix film trilogy, for instance, the very characteristic sounds, the voices of the real actors, the use of the 'focus' action (slow motion visuals and action) combined with the fighting capabilities. Some of the gamers even mentioned the names of the composers of the music and the makers of the sound effects. These 'Matrix fans' seem to be more sensitive to the qualities of the Matrix films. These qualities, such as stimulating music, impressive sound effects and the real voice actors, are aspects that enhance sensory and imaginative immersion. However, the players that focus on the gameplay (an emphasis on challenge-based immersion) are easily bored, irritated and disappointed by the repetitive actions, the simple AI (artificial intelligence) and limited objectives.

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[155] Comment 'This is not for gamers, but for movie fans' by Mashby on February 27, 2004.
[156] Buskin, R. 1998. Sound design of the Matrix, The Matrix Young guns, new tricks
Retrieved March 10, 2008
http://filmsound.org/studiosound/post_matrix.html
[157] Comment 'This is not for gamers, but for movie fans' by Mashby on February 27, 2004.
[158] Comment 'Nice game, but...' by beto07, June 4, 2003.
[159] Comment 'Best game I have ever played hands down!!!!!!!!!!!!' by Chances911 on May 25, 2003
[160] Retrieved October 12, 2006.

3.2 REVIEW OF MARIO WORLD

Simon Zijlemans, reviewed Maria World in SPiTS, Your Entertainment, p. 19, November 27, 2007.

Original Dutch text:	Translation to English:
'Natuurlijk is er weer dezelfde hommeles, het eeuwenoude concept van snoodaard Bowser die de princes ontvoert. (...) Het springen, het dubbelspringen, de driesprong en de backflip: alle bekende Mario-moves zijn in Galaxy weer aanwezig. Deze keer kunnen we Mario weer laten draaien door de Wiimote te schudden. (...)	'Of course there is the same old concept: the villain Bowser who abducts the princess. (...) The jumping, double jumping, triple jumping, the backflip: all famous Mario jumps are present again. This time we can turn Mario back and forward by shaking the Wiimote. (...)
We hadden eigenlijk niet anders verwacht, maar de game speelt fantastisch. De besturing is nagenoeg perfect (...)	Nothing else than we expected, but the game plays fantastic. The control is almost perfect. (...)
De uitdagingen zijn ontzettend divers. (...)	The challenges are incredible varied. (...)
Het is een topper in het platformgenre. Een betere aankoop voor de Wii is er op dit moment niet te vinden.'	It is a highlight in the platform genre. You can't find a better purchase for the Wii at this time.'

3.3 REVIEW OF THE DARKNESS

Dennis Mons, review in SPiTS, Your Entertainment, p. 8, August 14, 2007.

Original Dutch text:	Translation to English:
'Soms speel je een game met gebreken, die het tóch voor elkaar krijgt je elke keer weer terug naar de computer te lokken. Simpelweg omdat het verhaal je blijft boeien en je graag wilt weten wat er in het volgende hoofdstuk gaat gebeuren. Dat was al het geval in Chronicles of Reddick van Starbreeze, maar ook in The Darkness, de laatste creatie van Starbreeze, worden we de verhaallijn ingezogen.	'Sometimes you play a game with shortcomings, which still manages to lure you back to the computer. Just because the story keeps grabbing you and you would like to know what is going to happen in the next chapter. That was the case in Chronicles of Reddick by Starbreeze, but also in The Darkness, the latest creation of Starbreeze, we are absorbed by the storyline.
(...)	(...)
De voice cast van de game is voortreffelijk. Mike Patton (zanger van Faith no More) zorgt voor een briljante stem voor de soms gruwelijke en soms grappige Darkness-kracht en de maffiamannetjes zouden zo uit The Sopranos gestapt kunnen zijn.	The voice cast of the game is excellent. Mike Patton (singer of the band Faith no More) provides a brilliant voice for the gruesome and now and then amusing Darkness-force and the little mafia men are very much alike The Sopranos.
Natuurlijk, The Darkness is niet zaligmakend. Hij is eigenlijk wat te kort, de laadtijden zijn een gruwel, het heen en weer reizen naar locaties gaat op je zenuwen werken en sommige Darkness krachten maken het je wel heel makkelijk. Maar als je zo in een game	Of course, The Darkness is not beatific. It is too short, the loading times are awful, travelling between locations is nerve-breaking and some forces of Darkness are just too simple. But when you are absorbed in such a way, these are minor disadvantages you are happy to overlook.'

getrokken wordt, zijn het minpunten die je graag door de vingers ziet.'	

3.4 RESPONSES FORUM

Two responses at the Tweakers forum [gathering.tweakers.net] to the question how players know in advance which games are good enough to play. These two participants stated that they found it difficult to mention games that were not pleasant to play.

Dutch	English
1) 'Van te voren maak je bewust of onbewust al een afweging van welke game je leuk lijkt en welke niet. Dit kan zijn op basis van reviews, de plaatjes en weergave van het doosje of soms zelfs een titel die niet aanspreekt.'	1) 'You make a decision in advance which game seems to be fun and which one does not. It can be based on reviews, the pictures and look of the box or even a title that does not sound appealing.'
2) 'Ik baseer mijn aanschaf voornamelijk op reviews, beelden op de vele game sites en het genre van de game.'	2) 'I mainly base my decision which game to buy on reviews, videos on the numerous game sites and the genre of the game.'

3.5 IEZA AND AUDIO ENGINE ARCHITECTURE

IEZA has not only been applied in student projects at the Utrecht School of the Arts. From 2000-2007, the author was involved in the development of audio game prototypes and other game applications for the Accessibility Foundation in the Netherlands. The following example describes how IEZA helped the development process.

IEZA was used as a designer resource for the Audio Game Maker, an application that was developed to enable blind children to design their own audio games. The insight in the structure of the four domains of the model helped to separate the structure of the engine from the behaviour of sound instances. For instance, the sounds belonging to the Effect domain were considered as belonging to the diegetic environment and were routed to various processing effects (real-time reverberation, pitch response and filtering). Sound instances in the Interface domain were not mixed into the diegetic environment and did not respond to the movement of the player. Yet, these two types of assets in the game shared the same audio channels, making the engine technology more flexible. Since the users of the Audio Game Maker can include their own sounds in the games with self-defined functionality, the designers and programmers needed to have a good overview of the architecture of the game making tool, something which IEZA provided. Furthermore, the sound engine for this application was found to be far more general than the previously developed engines, in such a way that it was suitable for re-use without the need for designing extra functionality. Although this example is very specific, it does illustrate that IEZA can offer insight in the functioning of audio in the development process of a game audio engine.

When designing audio game prototypes and other small game applications for the Accessibility Foundation in the Netherlands, every prototype required a new audio engine with a different structure. This resulted in a very complex and a somewhat unorganised structure of the audio engine, which can be seen in the illustration below, showing a screenshot of the audio engine of the game prototype *Dark, a garden wander* (2002). The screenshot shows an overview in a visual audio programming language (CPS) in the tradition of Max/MSP by Cycling '74. In the audio engine, some sound objects or sound groups always had to be ready for playback and had very specific behaviour (such as Aura, Visor and Shooting in the example), others were variable according to the setting (such as the Atmosphere, Soundtrack and Other, which contained multiple extra sound channels).
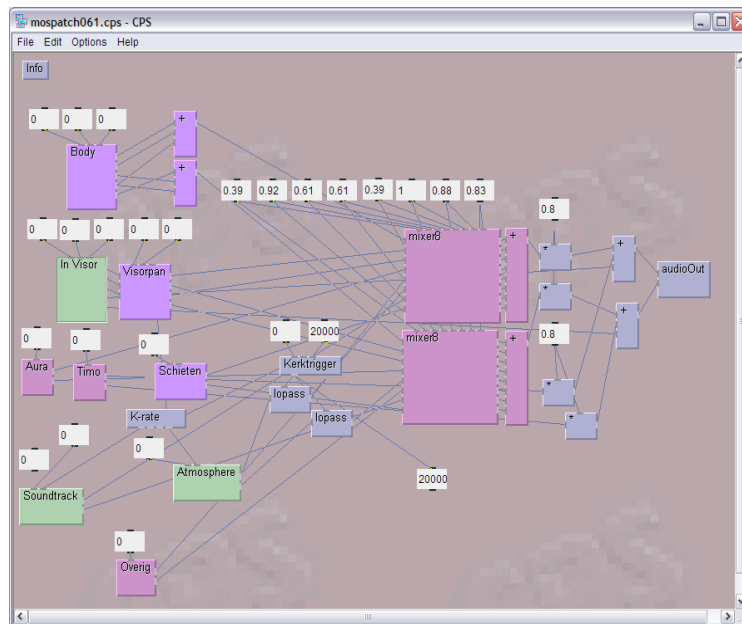
Screenshot of the audio engine for the audio game

***Dark, a garden wander* (2002).**

The programming interface is CPS (by Niels Gorisse, Bonneville)

The other illustration below shows the CPS-patch of the Audio Game Maker, an application was developed at the Accessibility Foundation to enable blind children to design their own games. The insight in the structure of the four categories of the model helped to separate the structure of the engine and the behaviour of sound instances. For instance, the sounds belonging to the Effect domain were considered as belonging to the diegetic environment and were routed to various processing effects (real-time reverberation, pitch response and filtering). Sound instances in the Interface domain were not mixed into the diegetic environment (no reverb) and did not respond to the movement of the player (no panning, filtering and random pitch). Yet, these two types of assets in the game shared the same audio channels. As the sound engine for this application was far more general, it was suitable for re-use without the need for designing extra functionality.
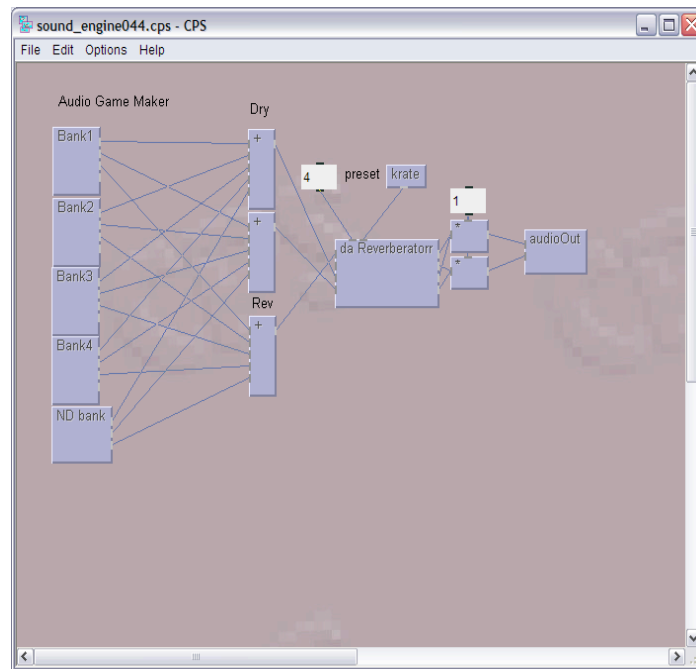
Screenshot of the audio engine in the Audio Game Maker,

an application which allows blind children to design audio games.

3.6 PLAYER PREFERENCES

The user survey held in 2008 showed that players who were asked to define their preference for gaming experiences mentioned different aspects that corresponded to the dimensions of immersion:

- A good game has physical [C] and sensory sensation [S]. (q77:r39)

- I play some games for the skills [C] it involves, usually multiplayer, but for single player I want an experience, I want to live the story. [I] (q77:r110)

- I love games with a well put story [I] and a decent atmosphere [I/S?] that makes the game shine!

- Most important to me is "playing" the game (physical, tactical) [C]. But my personal preference goes to action games (Physical) [C]. After that comes the ambiance a game has (sounds, music, visuals) [S]. Stories in games are usually mediocre at best. [I] (q77:r120)

- Story, believable characters/world, those things are important [I]. But above all; FUN! (126)

- Story is everything [I]. Even in an MMO where you might think it isn't. (...) (q77:r130)

- I love stories [I], I like challenges [C]. Most strategic games aren't really challenging. That's all I can say. (q77:r134)

These statements indicate that player preferences can differ substantially.

3.7 IEZA IN OTHER CONTEXTS

The IEZA model is specifically developed for the context of in-game audio, but during its evaluation phase it has been used in contexts other than games. The project group 'Zoomworld'

at the Utrecht School of the Arts, for example, investigated the possibilities of 'auditory zoomable user interfaces' (AZUIs)[161] and used the structure and dimensions of IEZA during the conceptualisation phase to define different forms of communication of their auditory interface. This has led to the notion that IEZA might be valuable for other contexts where audio plays a significant role. Thus, IEZA can be applied in broader contexts than game audio. When its properties are translated to describe the structure of a different domain, it might be a suitable description tool for e.g. film sound or even visual contexts like comic books (see below for an illustration). To my knowledge, the IEZA model had not been used by designers in similar visual contexts and it is therefore too early to comment on its use or functioning in this field.

The following example demonstrates how IEZA can be used to differentiate between the different elements of an image from a comic book.
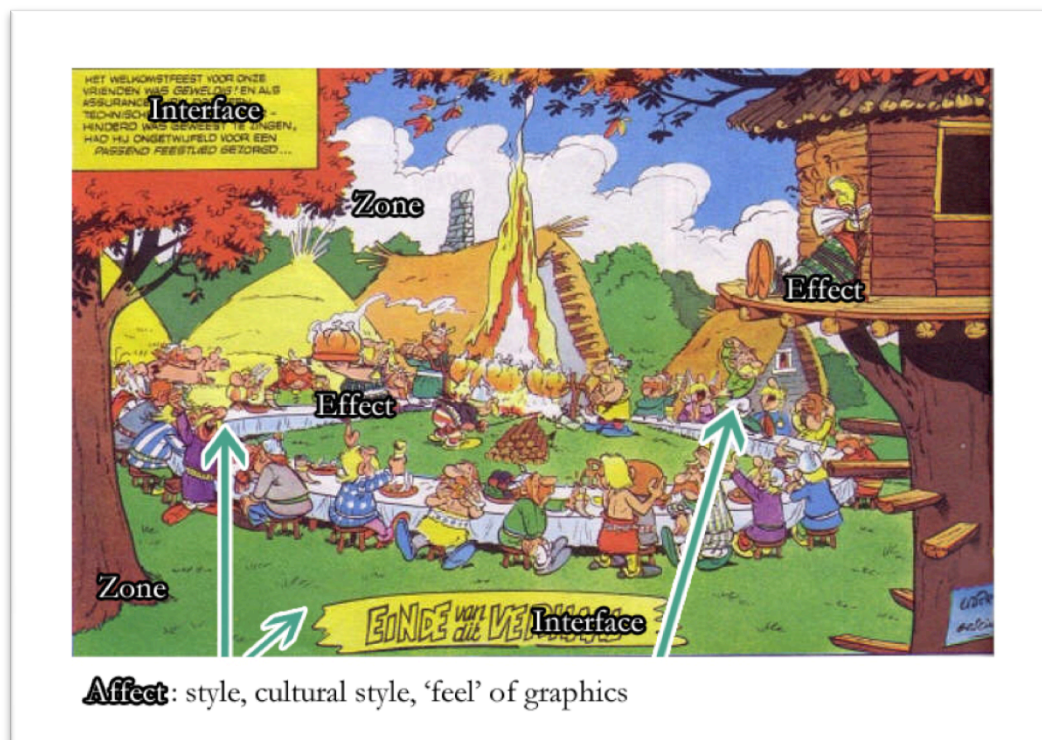
A descriptive application of IEZA on a comic book (Asterix by Goscinny and Uderzo).

In this example from 'Asterix', Interface communicates the events in the comic book, often represented in the frames at the border of the image, which obviously do not belong to the world of the comic. Effect represents the instances that belong to the direct action within the world, such as the characters serving wild boar and the bard who is not permitted to sing. The Zone forms the world in which the story is situated, for instance the blue sky (a bright atmosphere) and the green trees (the location is a forest). Finally, Affect is the cultural style of the comic, which gives a feel to the whole book, for instance formed by the chosen fonts, the thick noses of the characters and the overall style.

Designers are warmly invited to share their experiences with IEZA in game audio and other contexts at www.captivatingsound.com and creativehero.es/IEZA.

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[161] Graphical zoomable user interfaces, disseminated by, amongst others, interface expert Jeff Raskin. ZUIs such as Google Earth and the iPhone interface are mostly based upon graphical interaction. The project explored the possibilities of the development of ZUIs that allow interaction based upon the auditory domain only, with blind computer users as the main target group. Also, AZUIs can have value for applications where the user is unable to perceive visual feedback. The author was a project supervisor in this project.

The Asterix picture retrieved from *Asterix als Gladiator* (1964). R. Goscinny & A. Uderzo. Translation by Frits van der Heide (2002). Hachette, France.

APPENDIX 4: GENERAL BARRIERS OF IMMERSION

As discussed in the symptoms of immersion (Appendix 7), immersion often occurs unnoticed. Some players stated that the disruption of immersion is the main thing that triggers the awareness that they were immersed. This relates to the fact that the causes for disruption are described more easily by the players than the causes for the onset of immersion, although it is not completely impossible for them to mention aspects with a positive influence on immersion.

As described in the previous section, Brown & Cairns (2004, p. 2-4) have indicated various barriers belonging to the three stages of immersion. McMahan (2003, p. 2-3) have addressed aspects of the design which help players to become immersed. Three preconditions need to be met in order to create a sense of immersion in games: the conventions of the game matching the user expectations, meaningful things to do for the player, and a consistent game world. It is arguable whether these are the only preconditions for immersion.

The numbers between brackets after quotes refer to question 86 of the survey: Have you ever experienced that your feeling of immersion disappeared while you were playing a game? What was the reason?
A complete list of responses to this question can be found in Appendix 8.

GENERAL BARRIERS

The user questionnaire of this study contained a question about the general barriers of immersion. An interpretation of the responses yields the following general barriers:

Barrier	n
External factors	26
Believability related issues	22
Getting bored (mostly by repetition)	17
Change in the game (play)	16
Bugs	13
Poor design (mostly 'ugly')	12
No identification with situation or character	8
The game was too difficult	7

Bad or difficult controls	5

Two types of barriers exist: internal and external barriers. The internal barriers are related to the game construction, while the external barriers are related to the player and the user environment.

Internal Barriers

Most of the barriers that are found in the responses to this question are internal barriers, so directly related to aspects in the game. The following scheme shows the barriers that were found:

Main category internal barriers	Mentioned causes
Interruption of game play The pace or flow of the game is altered.	non-interactive moments level completed change mode of gameplay loading screens cut scenes (cinematics) game crash, bugs
Game construction Mistakes or unlikely instances in the game.	behaviour of artificial intelligence weird sounds non-responsive controls unrealistic or unnatural things suspension of disbelieve
Frustration of the player The player is annoyed by something in the game. This often is a result of the two other categories (interruption of game play or the construction) but not at all times.	frustration, irritation or boredom in-game advertisement getting stuck, unable to proceed/succeed

The first internal barrier is the interruption **of game play**. Respondents state that non-interactive moments in games often have a negative influence on immersion. These are, for example, found when the player completes a level (29), when the mode of gameplay changes (8),[162] when loading screens occur (45t, 101), or when cut scenes (cinematics) are started (127). Furthermore, games are reported to crash, which inevitably makes immersion disappear (29, 107, 115). As the flow of the game alters fundamentally, a release of the caused immersion is often experienced. Taylor (2002, p. 14) also notices that system inconsistencies are able to reveal the 'constructedness' of the game world and that these can have a limiting factor on immersion.

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[162] To give an example of a change in the mode of game play, when a fighting scene is over and the player has to switch from a 'fighting mode' to the 'exploring mode'. This is found in, for instance, *Prince of Persia, The Sands of Time* (2003).

Many respondents mention that immersion is decreased when something is 'wrong' with the **game**. Players indicated that, at times, there is a feature or asset that deviates from the total experience and has a substantial, negative influence on the whole experience. Reasons for this are irrelevant behaviour caused by malfunctioning artificial intelligence (112), weird sounds (26), non-responsive controls (79) and unrealistic or unnatural things that cause the player to realise 'that it is all fake' (44). Storyline twists (68, 25, 134), or game-elements that are 'totally out of place' (113) are also mentioned. To give an example:

> 'It's when something happens that's not in harmony with the entire game... could be sound, graphics, AI failures or whatever.' (112)

Frustration, irritation and boredom were mentioned frequently by respondents. Bugs and errors in the design of the game are linked to the third internal barrier, **irritation**, which disrupt immersion (14, 16, and 68). An in-game advertisement was mentioned as a totally disruptive feature that immediately broke suspension of disbelief (2). Getting stuck (108, 115) at a certain point of a level not only causes frustration, it often disrupts immersion because the feeling of flow is broken.

External Barriers

Responses related to external barriers often concern the fact that games are not always capable of keeping the attention of the player, often allowing objects and particularly sounds from the user environment to disrupt immersion due to **distraction**. This is obviously an external barrier, as the game designer is not capable of controlling the present sounds in the user environment, such as the ringing phone of the player or the neighbours listening to loud music. Yet, this external barrier is often related to internal aspects: 'weak' game construction is also mentioned in relation to this barrier. In other words: when the game becomes less interesting, the player is easier disturbed by external factors.

Another external barrier is the **state of the player**. This barrier occurs when the player notices during game play that the game is not able to alter his mood and it is not the right moment for playing. One respondent mentioned that at times there is a lack of concentration that prevents him from becoming immersed: 'Mostly when I'm stressed out due to personal matters or schoolwork I can't seem to get 'into' the game' (30). Other respondents mention the effects of playing a game for a long time, for instance, becoming slightly exhausted (106, 123t), getting muscular pain or 'an empty stomach' (6). It is difficult for designers to control most of the external barriers (regular games can't prevent a player from becoming hungry), but designers can help overcome some of the barriers, because they can have a direct relation with the game play. For instance, it is possible to prevent players from getting muscular pain by inserting short breaks in repetitive game play.

External barrier	Causes (examples)
Distraction (Attention of the player)	external sounds in the user environment
	other people (parents, partners, phones)
State (Mood or physical state of the player)	not in the mood / personal stress
	becoming exhausted
	pain, RSI, hunger

GENERAL BARRIERS LINKED TO SCI

The general barriers can be linked to SCI. The following scheme shows the relation between barriers and the dimensions of immersion:

Dimension	Barrier[163]
sensory: barriers concerning the sensory appeal of the game	External factors that distract from game environment Poor design (mostly something 'ugly')
challenge-based: barriers concerning the flow of the game	Getting bored (mostly by repetition) Change in the game (play) The game was too difficult Bad or difficult controls
imaginative: barriers concerning empathy, identification or story	Believability related issues No identification with situation or character

For the **sensory** dimension of immersion, less pleasant, intruding or unbelievable features negatively influence immersion. Basically, when the outside world manages to disturb the player, the sensory connection or focus with the game environment is broken. This either happens when the game is not convincing any more, for instance due to 'ugly' visuals and sounds, or when the outside world manages to intrude the player's experience. Furthermore, when an element does not sound as the user expected, immersion can be diminished because of disappointment by the player. To exemplify this dimension with some user responses:[164]

> When something around me happens which will get my out of my concentration. Sudden failure in my monitor , sound system. (10)

> Sure, when I get disappointed by a game; for example, when you expect the reactor core to blow up in a big mushroom cloud after you've spent hours placing bombs and it turns out looking like sh*t (91)

The barriers related to the **challenge-based** dimension clearly concern obstructions in the flow of actions, such as lack of skills and repeated failing, but also the opposite: levels that are too easy. Difficult controls can make it rather impossible to succeed and the discontinuity of interactivity can have a negative influence as well. It cannot be said that cut scenes unconditionally have a negative influence on immersion, as they can contribute to character identification and are efficient narrative 'information dumps',[165] but in general, these can have implications for the flow-based aspects of the immersive experience. Some examples of these descriptions are:

> Poor gameplay, not able to do a required - complex - movement or action. (17)

> Yes, when switching levels. (18)

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[163] These are the same barriers as listed in the section General Barriers. The barrier bugs could not be related to SCI as bugs in the game just prevent the player from playing.

[164] Responses to question 86: "Have you ever experienced that your feeling of immersion disappeared while you were playing a game? What was the reason?"

[165] For example,, mentioned by Juul (2005, p. 135).

> If a game is immersive in the first place it usually stays that way until I become too good at it. (103)

> For instance, annoying level or endboss, too long cutscenes. (99t)

For **imaginative** immersion, barriers concerning the narrative aspects are found, for instance unlikely changes in the storyline, characters that are difficult to empathise with, unbelievable events and even clichés are capable of breaking this aspect of engagement. To illustrate these types of barriers:

> When experiencing something I don't like, such as yet another RPG cliché ("You're the hero the prophecies foretold about!") (54)

> No story, no identification with the story or game, [...] (139)

> Yes, usually because either the avatar said I line I wouldn't say, or because a character started talking about the interface or game mechanics (124)

> I have to do something that goes against my nature (e.g. blow up something by taping a bomb to a harmless innocent animal) [...] (32)

> Like the bad guy is making a stupid speech about something, or some minor character is doing something stupid which is supposed to be funny but really isn't, I can sometimes end up just saving the game and do something else. (118)

APPENDIX 5: THE PROCESS OF IMMERSION

Stage of immersion	Barriers and properties

Engagement (Lowest level of involvement)	Barriers:
	    The gamer needs to invest time, effort, and attention
	    'Access':
	    preference of gamer
	    controls

	Property: no emotional level of attachment
The engaged gamer gets interested in the game and wants to continue playing	
Engrossment (Further involvements)	Barrier: Game construction: For instance visuals, attractiveness of tasks, and plot

	Properties:
	    High level of emotional investment of gamer
	    Gamer less aware of surrounding and less self aware than previously.
	    Distraction: game has to compete with the user environment

The gamer gets cut off from reality. Detachment from the real world takes place to such an extent that the game is all that matters!	

Total immersion	Barriers to presence:
	    Empathy (growth of attachment)
	    Atmosphere (development of game construction)

	Properties:
	    Total immersion is presence
	    Game is only thing that impacts the gamer's thoughts and feelings

Overview made by the author upon the stages of immersion, that they discern, from the paper titled 'a grounded investigation of immersion' containing the three stages of immersion and corresponding barriers and properties by Brown and Cairns (2004 p. 2-4).

Appendix 6: The pleasure of immersion

One of the main characteristics of immersion is a connection with pleasure. In the survey, gamers were asked whether they liked to be immersed. And indeed, the majority actually appreciated immersion. The respondents were also asked to indicate why they liked or disliked being immersed.

The numbers...

The online survey was published on some non-genre specific game forums and completed by 139 regular gamers. A vast majority of the respondents, 72%, considered immersion as a desirable or positive element of playing games. 16,5% did not consider immersion positively (or only partly positively according to the comments mentioned in the last paragraph of this section) and 11,5% answered 'I don't know'.[166] The figures thus clearly demonstrate that the majority of the respondents view immersion positively.

Reasons for appreciating immersion

The players that indicated that they liked immersion have also explained their choice, which shows the reasons why immersion is pleasant for players. The citations below are examples of answers belonging to the reasons for appreciating immersion. The complete listing of answers can be read in Appendix 8, questions 83-84.

1. Immersion makes game experience stronger

Many players that state they like to be immersed say this makes the game experience stronger, which shows, for instance, from the following quotes:[167]

> 'Makes the experience that much more powerful' (1)

> 'It means I become one with the game. And like in movies this actually means it's good. Like being fascinated' (3)

> 'Complete experience of the game, playing it the way it's meant.' (14t)

> 'It enhances the overall feel of a game.' (30)

> 'Better 'experience' if you are sucked into the game, the game becomes more intense.' (99t)

2. Immersion is essential for game play

Others state that immersion is essential for playing the game. If there is no immersion, the game is difficult to play because the player is not able to concentrate:

> 'Immersion is needed to focus on the gameplay and play the best you can.' (18)

> 'Immersion is like concentration; when you are completely into it, things just speed up and go a lot easier. When you're not completely into it, you miss things and easily get frustrated.' (113)

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[166] The desirability of immersion could in fact be higher, as an explanation of the concept of immersion was used. This was necessary to explain immersion because many participants were Dutch. The example about Bobby being immersed in the questionnaire (which can be found in the appendix) may have biased the results, but only so to the disadvantage of the desirability of immersion.

[167] These examples have been selected from the answers. Other clear examples are the answers 2, 25, and 119 of question 83-84 in the appendix.

3. Immersion is the reason for playing games

There are respondents that indicate that immersion is the reason for playing games. If a game is not able to immerse the player, for them, there is no reason to play it.

> 'It's the reason why I play videogames. To visit an other world where I can be somebody else. (6)'

> 'Immersion is the basis for playing, at least with several genres of games I play...' (43)

> 'That's the whole objective of a game in my opinion' (105)

> 'If you can't loose yourself in a game, why play in the first place?' (134)

> 'A good game just has to pull you in.' (93)

4. Immersion is connected to the quality of games

Some think that immersion is connected with the quality of the game. A good game causes a player to become immersed or, vice versa, when a player is immersed, the game must be good:[168]

> 'If one is immersed in a game, that will probably mean the game is good.' (8)

> 'When immersed you really feel part of the game, things 'click'. You're not just the guy pushing some buttons / waving around with a remote.' (26)

> 'If you are totally in a game, it just means that it is a good game with a good story and you are having fun.' (52t)

> 'If the immersion is good, the game is believable and vice versa.' (56)

> '(...) it means you're doing something you really enjoy.' (118)

5. Immersion is a welcome distraction

Some state that immersion is an escape from daily life or reality, for example:

> 'I play games as a diversion. Sometimes as a stress relieve but then immersion is not very important' (72)

> 'It takes your mind of things that bother you in every day life.' (81)[169]

6. Immersion is fun

Immersion is also directly connected to pleasure. Pleasure is an important aspect of playing games[170] and is strongly connected with immersion or at least related in such a way that games that are not rewarding have higher barriers for immersion. Games are often played for leisure and they demand effort and time, often with pleasure as a reward. Some of the respondents confirm this statement:[171]

> 'It means I'm having a lot of fun' (12)

> 'When immersed into the game, you're totally focused on playing and those are the times it is the most fun!' (15)

> 'It makes the game so much more enjoyable.' (27)

> 'Makes me forget my daily 'problems', makes me feel good' (54)

> 'If a game manages to achieve that, it is more fun to play.' (84)

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[168] Other examples are the answers 53, 62 and 65 of question 83-84.

[169] Other, comments with similar opinions are 76, 92, 107, 108 and 109.

[170] Salen & Zimmerman (2004, p. 360).

[171] Other examples are the answers 10, 29, 32, 63t of question 83-84.

Reasons for disliking immersion

As stated above, there are players that do not like to be immersed. Some of them seem to have specific attitudes to immersion and do not really appreciate the complete immersive experiences that others do find attractive. They often specifically do not consider the effects related to absorption that were mentioned earlier as positive.[172] Some respondents mention the feeling of wasting time, others that the real world and other people are more important than games.

There are significant correspondences between these examples and some of the reasons described by Lazarro (2004, p. 5) for not playing games, which are obtained by questioning non-players. The motivations that are described concern the belief that games are meaningless or a waste of time.[173] This indicates that a primary requisite for immersion is the willingness to engage with play.

Conclusion

The vast majority of respondents consider immersion as a positive aspect of the game experience. Generally, two kinds of relations with pleasure are found. Firstly, some respondents describe immersion as the result of playing a good game, thus a symptom that shows that the activity is pleasant. Secondly, immersion is described as a rewarding experiential state that makes playing games more fun or is a general objective of playing games.

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[172] Some examples are: 'because a game is a game and not reality. Reality is more important than a game!' (22t), 'it's only a game and I am never absorbed that deeply' (38t) and 'games are games, real life is way more important. It's just something to do when you have too much time on your hands' (67). Also the addictive aspect of games was mentioned: 'after being addicted to gaming, I realised that it is a waste of time' (69).

[173] Other players have moral objections (for instance because of the degree of violence in some games) and games are said to be too addictive.

APPENDIX 7: THE SYMPTOMS OF IMMERSION

In this article, the symptoms of immersion will be examined. In an online user survey, presented to 139 gamers,[174] information about the properties of the experience of immersion has been gathered. The emphasis in the questionnaire lay on audio.

Grouped motivations

By asking the players how they noticed that they were immersed we have obtained several groups of answers providing a clear overview of the characteristics of immersion. For ease of reading, answers are grouped into categories, but only to give an indication of the range of answers and the similarities between them, not an exact ratio of the number of players that experience different characteristics. Answers were only grouped if the content was similar enough.[175] Characteristics that are less common can be found in Appendix 8 (question 85). This appendix also contains player comments for each characteristic.

Most of the players turned out to be able to describe the symptoms of immersion. Some players gave multiple characteristics, for instance in the following elaborate answer:

> 'You are completely focused on the game and stop noticing the world around you. By the time the immersion fades it is suddenly very late at night ;) You are more emotionally involved. example: Scary games become more scary because you are relating to the avatar more.'[176]

Characteristic	n
other people or real world	43
forgetting time / time flies	34
can't pause or stop	8
you don't notice it	7
emotional involvement	6
completely focused / concentrated / occupied	6

---

[174] These players have been invited to answer the questionnaire through various game forums on the internet, which discuss gaming in general, not at community websites about one specific game. After 140 question forms were completed, one entry had to be erased because all questions answered by this person were containing foul language, which clearly did not deliver any specific insight in the topic of this thesis, thus making the total amount 139 gamers.

[175] The two most found characteristics, 'seclusion from the real world' and 'losing track of time' were relatively easy to group, because they were clearly described. In other cases, interpretation and categorisation had to be done with care, for instance with the answers that are related to character empathy. In this case, the difference between 'I start thinking in character life instead of real life,' here grouped as 'game life' and 'Feeling down when a character dies, happy when 'we' win, betrayed, etc...' grouped under 'emotional involvement' might seem a nuance. Yet, these two answers were not grouped under the same title because the first does not necessarily concern the emotional connection the latter implies. Although these answers are more closely related than the features found in other groups, having the ability to question the respondents would provide the necessary information to make exact categories.

[176] Respondent 120, question 85.

eyes fixed to the screen	4
react heavily on feedback	4
not immersed	8

A more detailed table with motivations is listed at the end of this appendix.

Parents, Partners and Phones...

When examining these answers, most of the characteristics are indeed generally related to the player becoming very active and totally focused on the game. The majority of players describe an intense involvement with the game that goes unnoticed until other people or objects in the real world demand attention. Parents, partners and phones were named quite frequently for causing the realisation that players were immersed during play. Some participants responded that it is difficult to notice immersion itself: only disruption of the immersive state made them realise how immersive a game actually was.

Losing sense of time

Linked to this, losing sense of time is often mentioned. This is a very striking aspect of immersion: games can have the capability of making a player completely forget time. One player responded: 'I notice when I realise I've been playing all day (and night) and I have only a few hours left before I need to get up again for school' (2), which shows the impact immersion – or in fact the repertoire of current computer games - is capable of.

Strong game connection

Many respondents evaluate immersion as a strong connection with the game or the activity of the game, and describe elements such as an urge to complete the objectives of the game, causing the player to be unable to stop or pause playing even though it is 'only' a game. One player mentions the characteristic of the 'physical movement' of the player, which is often clearly perceptible when observing players during game play that involves intense pacing, for instance in racing games and some platform games. One player refers to 'suspension of disbelief': he is immersed when he stops noticing the errors and inconsistencies of the game (q85:r122).

Becoming completely occupied

In general, many of the symptoms the respondents describe relate to the activity of becoming completely occupied with the activity of playing the game, such as losing track of time or exclusion of the real world. On the other hand, some of the symptoms describe a link with the game itself, for instance the emotional involvement with the story or thinking in 'character life' instead of real life.

The similarities between these descriptions and Csikszentmihalyi's (1990) eight components of the flow experience are striking. Salen & Zimmerman (2004, p. 338) divide these eight components into four effects – 'the merging of action and awareness,'[177] 'concentration,' 'the loss of self-consciousness' and 'the transformation of time' - and four prerequisites – 'a challenging

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[177] The player becomes highly absorbed in the activity, which gives the feeling of being one with the action.

activity,' 'clear goals,' 'clear feedback' and 'the paradox of having control in an uncertain situation.' The effects occur in the player's experience and are symptoms associated with flow, the prerequisites are characteristics of the activity itself and can be considered conditions for the activity in order to experience flow. Many of the players describe symptoms that clearly correspond with the four effects of flow, although the merging of action and awareness is mentioned less explicitly, which is likely as the awareness of the player is completely on the action. This confirms the notion that the symptoms of flow and immersion can be very similar, and can point to a simultaneous occurrence of these two states. In practice, it is not easy - and probably not possible - to separate them, especially because the symptoms are quite similar.

n	Characteristic	Example comments
43	Seclusion from the real world (relation with other people or the real world)	'When my mother/father whacks the door open because I didn't hear them scream downstairs.' 'Someone starts yelling for not listening to them.' (26) 'My husband has to shake my arm to get my attention. I find a cat on my lap that wasn't there when I started playing, but I do not remember having noticed it jumping up. I am hungry...' (32) 'When someone else is only able to draw my attention by raising his voice.' (123t) 'I have to ask people if they can repeat questions' (111) 'Missed calls' (75)
34	Track of time is lost	'I notice when I realise I've been playing all day(and night) and I have only a few hours left before I need to get up again for school' (2) 'Time flies' (12) 'Losing track of time, finding out that you have been playing for the last couple of hours (>8)' (25) 'It's 6AM and my wife just woke up and reminds me that I have to go to work today.' (129)
8	Stopping or pausing the game is undesirable	'Thinking that I actually really can't afford to pause the game but its just a game...' (6) 'And can't stop playing' (7) 'I want to keep on playing. Hours and hours on end.' (27) 'If I keep going without stopping not even pausing to eat. (137)
7	Immersion is an unconscious process	'You don't :P' (28) 'I don't think you can notice and be immersed at the same time. I guess you can notice afterwards...' (134) 'You don't, you notice it when someone tells you or if things have happened without you noticing it' (45t)
6	Emotional involvement	'It's an emotional involvement that you notice, not so much in story as in the gameplay (you get exited).' (1) 'Emotional involvement with the story...' (14) 'Feeling down when a character dies, happy when "we" win, betrayed, etc...' (30)
6	Becoming completely	Thinking only of the game while playing it (99)

	focused / concentrated	When I start focusing on only the game, and nothing more (111)
4	Strong reaction to the game	'When i react more heavy on feedback i get from my game in every way' (2) 'I get scared easily from events in the game' (54)
4	Eyes are fixed to the screen	'When I see nothing but the screen' (131) '...eyes extremely fixed...' (4) 'And of course because that my eyes not leave the screen one moment!' (126)
3	Feeling of being sucked or pulled into the game	'Being pulled in to the game.' (39) 'Getting really pumped up about the game and kind of snapping back to reality.' (15)
2	Not wanting to be disturbed	'I don't want to be disturbed' (92) 'Shutting off my phone.' (126)
2	Having fun	'If you're having fun' (102) 'Having a grin on my face' (114)
2	Thinking of character life or game life instead of real life	'When thoughts of everyday life give way to thoughts of game life' (109) 'I start thinking in character instead of real life' (112)
1	Becoming one with the game	'One with the game' (75)
1	Game makes sense Actions become natural	'The whole package makes sense, and my actions become very natural.' (121)
1	Hearing everything	'I hear everything' (104)
1	Relate to what is going on in the game	'If you're having fun and can relate to what is going on in the game'(102)
1	Stop noticing the errors and inconsistencies	'Usually when I stop noticing and exploiting the errors and inconsistencies' (122)
1	Physical movement of the player	'for example with FPS, I often notice myself physically moving towards the left or right when being shot at or looking around the edge of a wall.' (29)
8	Not (or never) immersed during game play	

APPENDIX 8: USER SURVEY

The respondents were allowed to answer in Dutch or English. Spelling is corrected in the thesis; the original text is listed here. Empty entries have been omitted.

The average completion time was 27min 41sec (minimum: 4min 20sec, maximum: 83min 43sec).

The gamers were contacted through four general forums. The moderators of the forum were contacted in advance and asked for permission:

The Tweakers Forum	gathering.tweakers.net
3Dgamers Forum	maint.ign.com/3dgamers
Insidegamer Forum	www.insidegamer.nl
Gamers Forum	www.gamers-forum.com

ABOUT THE PARTICIPANTS

Age:

0-8	0	0.00%
9-14	1	0.72%
15-25	92	66.19%
26-35	38	27.34%
36-45	5	3.60%
46-60	3	2.16%
Over 61	0	0.00%

Gender:

Male	131	94.24%
Female	8	5.76%

How often do you play games?

Every day or more	70	50.36%
2-6 times a week	58	41.73%
Once a week	9	6.47%
Once a month	2	1.44%
(Almost) never	0	0.00%

STRUCTURE OF THE SURVEY

Welcome screen:

This is a survey about Game Audio. The data will be used for my PhD-thesis about

game audio and computer game immersion.

The results will be collected and processed anonymously. Please click "Next Page" below to begin.

Thank you!

Sander Huiberts

Overview of the questions:

	Questions
1	What is your age?
2	What is your gender?
3	How often do you play games?
4-6	Specific questions for those who never play games. Not applicable.
7-12	Can you give three examples of games you really like(d) to play, some of your favourite games?
13-18	Can you give three examples of games you really do not/did not like to play?
19-33	Rating game genres. Not applicable.
34-39	Choosing from pairs of aspects of the game experience. Not applicable.
40	Comments
41-70	Aspects of the game experience. Not applicable.
71-76	Choosing from pairs of aspects of audio in the experience.
78-81	Rating of goals. Not applicable.
82	The following questions are about immersion. Have you ever heard of the term immersion in computer games?
	A topic of this questionnaire is immersion. Immersion is what you experience if you are completely occupied with playing a game. Bobby is playing a game on his PlayStation 3 console. The phone rings, someone is calling him, but Bobby is immersed completely in playing the game and does not realise what is happening in the real world.
83	Do you like being immersed while playing a game?
84	Explanation
85	How do you notice that you are immersed?
86	Have you ever experienced that your feeling of immersion disappeared while you were playing a game? What was the reason?
87	Can you give an example of audio in a game that made you feel more immersed?
88	Explanation
89	Can you give an example of audio in a game that made you feel less immersed?
90	Please explain why
	Now I'd like to ask you some questions about audio in games.
91	While playing a game, how often do you listen to other music than the music of the game (for instance using a CD-ROM drive or MP3-player)?
92	Explanation
93	In your opinion, have you ever found a game having the wrong (kind of) music? If so, which game was that and why do you think the music is wrong?
94	How often do you turn off (all) sound during game play?
95	Explanation
96	What is your opinion about pop music (with bands or artists you know in real life)

	in games?
97	Is there anything you would like to have improved about sound and music in games?
98-102	Aspects of music. Not applicable.
103	Is there anything important about music you would like to mention that is not listed above?
104	Do you think there are aspects of your personal game experience that you did not come across in this questionnaire? If so, please mention them here. Not used.
105	Any comments on this questionnaire?

QUESTION 77: PREFERENCE OF PLAYERS

Gamers were asked to select important features of playing games. Some chose to explain their choice.

1:      sensory and narrative are strongly intertwined
3:      I think it's important that a game has all of the above. However lacking visuals doesn't need to make a bad game.
5:      In combinatie met het Teamspelen is muziek een extra factor!
9:      Hard to choose between some of the questions
13:     De combinatie goed verhaal, realistische graphics en goeie musical score
15:     (action orriented) gameplay first, then atmosphere (visuals) and lastly tactics
18:     Sensory experience ís important, but only if the gameplay is up to par. Good gameplay with lousy graphics is much better than vice versa.
27:     Story makes the game, there is too much emphasis on graphics nowadays. BUT, you should make a distinction between graphics and sound/music. Sound and/or music are much more important than graphics. A great storyline together with great music/sound/voiceacting makes a game, and graphics are not nearly as important.
29:     My preference absolutely goes to games that are both sensory 'overwhelming' and have a continuous storyline (such as GTA or MOH).
30:     Gameplay is king! (Gameplay is a mixture of storyline, controls, sounds and visuals)
32:     Story is everything. If it isn't immersive, if it isn't believable, or worse, no significant story at all, I don't enjoy it.
39:     A good game has physical and sensory sensation.
43:     Tough choices, as a player I get my reward based on my own skills (strategy, physical) as well as based on the game (visuals, world, narrative, story).
52:     Gameplay is het belangrijkste altijd, vooral omdat ik van multiplayer hou. Hierna komt story en als laatste graphics. Graphics kunnen veel toevoegen aan single player vooral aan realisme, maar als de gameplay niet goed is heb je der niks aan.
56:     Story driven content is always the best, it keeps you interested, more then some nice pictures.
58:     gameplay moet gewoon goed zijn
59:     i prefer a good story line, but good graphichs are important too
69:     How many more questions? > Graphics > Narrative
76:     "wie speelt er nu spelletjes omdat ze graag op knopjes drukken? ga dan typen ;)"
80:     best games are a good story line with the right visuals with it (it's like not reading the book but feeling and making the book)
92:     Games should make you feel like you are really in controll, then comes sounds and visuals
93:     Sound is never more important than the rest. but never less to.
105:    "Offcourse a combination is preffered, to be in control, reaching a goal teambased, interacting with humans and all of that in a ritch grafical and sound envirement ;-)"
107:    vraag 36 is echt 50/50. ik hou van een doel bereiken maar moet wel goed verhaal inzitten anders heb doel ook geen zin. andersom ook. verhaal is mooi, maar als er geen doel is om naar toe te werken is het ook niks aan.
108:    These questions were a mixed bag: I tend to play games both because I enjoy the stories, and experiences, and because I feel that the best games are works of art. These questions made it hard to pick just one answer.
110:    I play some games for the skills it involve, usually multiplayer but for singleplayer I want an experience, I want to live the story.
115:    I love games with a well put story and a decent atmosphere that makes the game shine!
120:    "Most important to me is ""playing"" the game (physical, tactical). But My personal preference goes to action games (Physical). After that comes the ambiance a game has (sounds, music, visuals). Stories in games are usually mediocre at best."
121:    "You should have included options for ""about the same"" for these paired rankings. I'd have chosen that for no. 32 and 35. "
124:    Right now I'm working on this theory which devides games in 2 sorts: the first is the game, in which gameplay comes first, and visuals/story are meant to cater this gameplay (mario, tetris). At the other hand, there's the interactive narrative. Here, the designers wants to convey a world/feeling. The gameplay has to cater to this

feeling/world, help conveying this to the player. This finishes the long debate of Story VS Gamplay: in both cases, gameplay is the essential part. However, the goal of gameplay differs greatly in both cases (being 'fun' versus being able to fit into the theme/feeling of the whole'

126:     "Story, believable characters/world, those things are important. But above all; FUN!"
130:     Story is everything. Even in an MMO where you might think it isn't. The latest expansion of WoW The Burning Crusade had a quest to deliver Sylvanas Windrunner her amulet that reminded her of her former self before being turned into an undead Banshee. It was beautiful and had an awesome song and cutscene. I make sure to always do the quest with everyone I create.
134:     I love stories, I like challenges. Most strategic games aren't really challenging. That's all I can say.
138:     I see what you did there, and I approve
139:     Deus Ex: storyline... (do I really need to say more?)

QUESTION 82: FAMILIARITY WITH TERM IMMERSION

Have you ever heard of the term immersion in computer games?

Yes	84	60.43%
No	55	39.57%

QUESTION 83-84: APPRECIATION OF IMMERSION

Do you like being immersed while playing a game?

Yes	100	71.94%
No	23	16.55%
I do not know	16	11.51%

Answers:
1:       Yes - Makes the experience that much more powerful
2:       Yes - Takes me away from my real world
3:       Yes - it means i become one with the game. And like in movies this actually means it's good. Like being fascinated
4:       No - That's a boundary too far.
5:       Yes - Voor mij is dat een goede ontspanning en ik wil dan niet gestoord worden.
6:       Yes - "Its the reason why I play videogames. To visit an other world where I can be somebody else.
         Sometimes there are things to do in a game where you just can not be interrupted because its need your total focus. Its up to the parents to guide you breaking that barrier so that you dont grab a knife when someone is saying that you have to go to school or something like that while fighting a endboss."
7:       Yes - You are totally into the game, and you want to finish it, want to know what happens next, and forfilling the story
8:       Yes - If one is immersed in an game, that will probably mean the game is good.
9:       I do not know - Don't know what imersion means
10:      Yes - I love it when the gameplay goes so deep it makes you competly forget about the real world.
11:      Yes -
12:      Yes - It means I'm having a lot of fun
13:      No - Het gewone leven is belangrijker dan een spel maar ik speel dan ook alleen een spel op tijden waarvan ik weet dat de mogelijkheid op de kans van storen tijdens het spel minien is.
14:      Yes - Complete ervaring van de game, spelen zoals het spel bedoeld is.
15:      Yes - When immersed into the game, you're totally focused on playing and those are the times it is the most fun!
16:      No - Things in the real world should be priority number 1
17:      No - The games I like to play can me stopped and saved so i can continue every moment i like.
18:      Yes - Immersion is needed to focus on the gameplay and play the best you can.
19:      No -
20:      No - Games are for relaxation, not for excluding yourself from the real world.
21:      Yes - Andwoord geven op een vraag van iemand, en 10 seconden later vragen wat die persoon ook al weer wou weten.
22:      No - Omdat een spel een spel is en geen werkelijkheid. De werkelijkheid is belangrijker dan een spel!
23:      Yes -
24:      No - "I don't like to loose control from the real world. Immersion only goes to a certain extend.

I always notice the things around me."

25: Yes - To actually have the feeling that you are right there, emotions felt are those that you would have when actually being there.

26: Yes - When immersed you really feel part of the game, things 'click'. Your not just the guy pushing some buttons / waving   around with a remote.

27: Yes - It makes the game so much more enjoyable. If I get immersed, its simple. For me, the game TOTALY owns. And who doesnt like to play a game that totaly owns!

28: No - I still need to be alert

29: Yes - "I like being immersed, because than the rewards (for example of completing a level or other sort of goal) are far more satisfying: once you "feel" surrounded by the world and "one" with the character - which is what immersion means to me in this context - the game and its goals get more depth."

30: Yes - "It enhances the overall feel of a game. It's like when you say "five more minutes" and end up with "five more hours". That's the ultimate decider if a game is immersive."

31: Yes -

32: Yes - I love being in another world for a while. Either when reading a book or playing a game.

33: Yes -

34: Yes -

35: I do not know -

36: Yes - Vind het leuk om helemaal op te gaan in de wereld

37: Yes - To concentrated

38: No - het is maar een spel, zo diep zit ik er nooit in

39: Yes - It adds something to the game when you are pulled in it. It's more real. That's de best description I can give.

40: I do not know -

41: No - It's just a game.

42: Yes - Het is gewoon fijn als je helemaal kunt opgaan in je spel, zodat je de wereld rond je even kan vergeten.

43: Yes - Immersion is the basis for playing, at least with several genres of games I play (RPG, adventures, management sim), to get lost in being someone, somewhere else, doing amazing things, or things I will never do in Real Life(tm)

44: Yes - A good game can totally suck you into the storyline or, speaking from a Live for Speed POV, is so intense that it attracts your focus and never let go.

45: Yes - "Als een spel echt goed is, en dan ook ECHT goed, wordt ik hier vaak helemaal in opgezogen. Als een spel zo goed is als dat, is het altijd leuk :)"

46: I do not know -

47: Yes - It takes my mind off of the real world.

48: I do not know -

49: Yes - It gives you the feeling to be someone else, who can do things you can't do in real life.

50: Yes - The game pulls you in and you want to get it done

51: No -

52: Yes - Als je helemaal erin zit betekent gewoon dat het een goede game is met een goed verhaal en dat je je vermaakt.

53: Yes - It's complete focus and makes a good game.

54: Yes - Makes me forget my daily 'problems', makes me feel gooed

55: I do not know -

56: Yes - If the immersion is good, the game is believable and vice versa.

57: Yes - In a way it's like seeing a good movie: forgetting the fact that you're watching a movie. A good mix of graphics, audio and gameplay will make you do just that.

58: Yes - om te concentreren

59: Yes - It's cool to be in another dimension, like when your reading a book. It's nice to feel that you ARE the character.

60: No - Je bent niet alleen op de wereld

61: No - Well i like to play a game but not seriously, because if someone calls me i take up the phone and ask him how`s life and pause or stop with the game for a sec.

62: Yes - "I like to concentrate fully on what I'm doing. If I am not "into" the game I tend to exit the game and never play the game ever again."

63: Yes - het voelt gewoon goed om opgeslokt te worden door een virtuele wereld en daar de dingen te doen die je in real life niet kunt doen

64: I do not know -

65: Yes - Immersed in a game world makes a game good.

66: Yes -

67: No - Games are games, real life is way more important. It's just something to do when you have too much time on your hands. It's a nice way to relax...

68: Yes - Same as with reading a good book or watching a great movie: being completely occupied with and experiencing the story

69: No - After being addicted to gaming, I realised that it is a waste of time.

70: Yes - i play games to relax, son being immersed would be gooed

71: Yes - It makes the game more enjoyable

72: Yes - "I play games as a diversion. sometimes as a stress relieve but then immersion is not very important"

73: Yes - feels good...

74: Yes -

75:     No - De paar keer dat het me overkwam was het mijn vriendin die belde..zij vond het niet zo leuk dat ik mn telefoon niet opnam.
76:     Yes - it is relaxing not to think of the daily things
77:     Yes - Better game experience, certainly when playing adventures.
78:     No - Blijf er wel nuchter onder he.
79:     Yes - Stepping out of reality and feeling at home / belonging in the game's fantasy world...
80:     Yes - It's a way to get totally of the planet it's time you have for your own it's something like a hobby a way to relax
81:     Yes - It takes your mind of things that bother you in every day life.
82:     I do not know -
83:     I do not know - I don't no if i like it, it depends on the game. If i'm immersed I like the game. If not the game will not have my attention for long and I will proberly not finish the game
84:     Yes - Als een spel dat voor mekaar krijgt geeft het meer plezier om het te spelen.
85:     Yes - If it isn't so bad as the proposed example, I like the effect, it makes you faster and better connected to the game
86:     I do not know -
87:     Yes - Being immersed is good, shouldn't go too far though as you still need to keep touch of the real world.
88:     I do not know -
89:     Yes - If I'm all in the game it means it is good and I feel like I'm in the game.
90:     No - Ik speel spellen voor mn plezier, ik vind dat als je zo opgaat in spellen dat je toch verkeerd bezig bent.
91:     Yes - I play games to relax after a day of work. Thus, i don't want to experience too much real-life stuff as i already have during the day.
92:     Yes - "it is the way to escape everyday life.
    it is my way of completely Relaxing, and experiencing a game the best possible way"
93:     Yes - "A good game just has to pull you in.
    You have more of an experience that way."
94:     Yes - While playing america's army sound is very important, so I concetrate only on the game sounds
95:     I do not know - I like being partialy immersed in a game... But so that I can still 'detect' the reality!
96:     I do not know - Allthough i want to be really in a game, i also prefer to stay aware of what is happening arround me. I can combine it.
97:     Yes - It creates a more realistic feeling of enjoying the game
98:     I do not know - Ik blijf meestal toch wel aan deze kant van het scherm.
99:     Yes - Betere 'experience' als je in het spel gezogen wordt, spel wordt intenser
100:     I do not know -
101:     Yes - When u go completely up in the game then the game has a good storyline and it's a good game and i think u play it better to cause u are not distracted
102:     I do not know - The example is being TOO obsessed by a game.
103:     Yes - I play games to forget about other things for a while
104:     No - erm
105:     Yes - Thats the whole objective of a game in my oppinion
106:     Yes - Being immersed is a way to get into the game, into the story in such a way that you are really involved and committed. This is a pleasurable sensation.
107:     Yes - escape the daily drag
108:     Yes - Being immersed in the game helps to make the experience more fun. It also helps me to escape from real life and relax a bit. It also makes the game more realistic, as I can actually feel like I'm there with the characters, in the game world.
109:     Yes - Games are a form of escapism.
110:     Yes - The whole experience of the game really touches me and I'm solely focussed on what's happening in the game. I got the smae thing with reading a good book.
111:     No - It annoys me when people aren't noticing their surroundings anymore, so I try not to become like that myself.
112:     Yes - I think it's the ultimate thing if you can enter the magical circle and forget everything outside of it
113:     Yes - "Immersion is like concentration; when you are completely into it, things just speed up and go a lot easier. When you're not completely into it, you miss things and easily get frustrated."
114:     Yes - hold my intention
115:     Yes - I consider immersion quite an important expect in games. Immersion breakers (bad voice-overs/music, glitches, bugs, things that seem out of place) can turn even the best game into a piece of junk.
116:     No - ik ben niet verslaafd... je moet op elk moment rekening kunnen houden met je omgeving...
117:     Yes - As an game it distracts from you day to day life. So you can do things you normally can't do in real life.
118:     Yes - When you are completely into a/the game, and don't want/can't quit it, it means you're doing something you really enjoy.
119:     Yes - Immersion enhances play experience.
120:     Yes - "You basically become the character on your screen. It's a form of escapism.
121:     Yes - It's probably the #1 reason I play a game in the first place. I want to experience a place and environment that I can't in ordinary life.
122:     Yes - When I adopt the rules and structures of the game around my playing of it, I can roleplay the character, gaining an insight into another Way.
123:     Yes - Ik ga heel snel helemaal op in bezigheden die ik leuk vind, dus als ik bij een game hetzelfde ervaar maakt mij dit niet uit - dit is zelfs een teken dat de game voor mij heel goed is.
124:     Yes - "I really don't know :S That's like asking "why do you like to be happy". Sortof. Okay, so maybe when I'm immersed, the game world 'comes to life' and that makes the experience of interacting with it more pleasant?"

125:     No - You shouldn't forget real life can offer you wonderful things, just like games, a lot of people disagree or are too lazy to find out.
126:     Yes - Because it's like reading a book. You are being sucked into another universe, where the rules of the real world don't apply. Reality sucks sometimes, you know. Hahaha!
127:     Yes - Playing games is a way of decompressing so being immersed make it that much more satisfying.
128:     Yes -
129:     Yes - "Game is a way of having fun, like watching the movie. I like being "in the movie" and that takes immersion while gaming. That is especially true for RPG games."
130:     Yes - That just shows that a game is good. I never get that immersed in a game, myself. I'd hear a phone ring, mostly cuz it would annoy me. LOL But time does seriously fly by unnoticed though.
131:     Yes - It gets my mind off of real world problems for awhile
132:     Yes - It adds credibility to the experience. It pulls the game together.
133:     Yes - experiencing something unique
134:     Yes - If I'm playing a game anyway I wanna be part of it as much as I can. It's what I like about stories and it's the reason I'm doing gamedesign in the first place. I wanna let other people loose themselves in mine. If you can't loose yourself in a game, why play in the first place? (my logic)
135:     Yes - "it means the game really drags you in, a positive sign.
         (I am never really really immersed, always aware of my environment)"
136:     Yes - My favourite type of gameplay is roleplaying. This has to immersive to work properly, a bit like acting.
137:     Yes - I like getting away from real life and getting interily sucked into a different (more pleasant) world.
138:     Yes - Experiencing things yo would not normally experience.
139:     Yes - This means the game is actually THAT good to take full control of you for a period of time and you get completely sucked into the story and the game. Immersion is one of the most important things in games, too bad no one seems to really care about it anymore.

QUESTION 85: NOTICING IMMERSION

How do you notice that you are immersed?

1:      It's an emotional involvement that you notice, not so much in story as in the gameplay (you get exited).
2:      when i react more heavy on feedback i get from my game in every way
3:      i notice when i realise i've been playing all day(and night) and i have only a few hours left before i need to get up again for school
4:      Too highly concentrated, eyes extremely fixed, slow reaction to the real world
5:      Als er iemand in mijn computer kamer komt en ik merk het nauwelijks.
6:      Thinking that I actually really cant afford to pause the game but its just a game so I dont have much problem with that.
7:      People have to ask me mere times for attention. And can;t stop playing
8:      When all of a sudden you realise its 4 hours later from when you started playing.
10:     When my mother/father whacks the door open because I didn't heard them scream downstairs.
12:     Time flies
14:     Emotioneel betrokken bij het verhaal, invloeden van buitenaf minder opmerken.
15:     Getting really pumped up about the game and kind of snapping back to reality.
16:     If you forget the time
18:     I block surroundings
20:     When other people tell you?
21:     Als je dat 10 sec later vraag, is het redelijk duidelijk.
22:     Naar mijn idee ben ik nooit echt immersed. Ik mis wel eens wat dingen, bijvoorbeeld het geluid van de tv als die aanstaat tijdens het gamen. Maar dat is dan ook niet belangrijk om mee te krijgen.
25:     Losing track of time, finding out that you have been playing for the last couple of hours (>8)
26:     Time flies by, someone starts yelling for not listening to them.
27:     "I want to keep on playing. Hours and hours on end. Try different things, try all sorts of solutions etc etc. I do still notice things in the real world though. When Im immersed, Im not totaly unreachable or something. I tend to get a little anoyed though when f.e. the phone rings or something :)"
28:     You dont :P
29:     For example: when completing a goal (such as a level), I often notice I was on edge, focused completely on the screen and the end of a level then comes as kind of a 'relief' (albeit a joyful one). On the other hand, for example with FPS, I often notice myself physically moving towards the left or right when being shot at or looking around the edge of a wall.
30:     Losing complete track of time. Feeling down when a character dies, happy when "we" win, betrayed, etc, etc
31:     Getting "sucked in"
32:     My husband has to shake my arm to get my attention. I find a cat on my lap that wasn't there when I started playing, but I do not remember having noticed it jumping up. I am hungry and find that it is three hours later than I though. That's good.   ;)
34:     When someone tries to call me multiple times but i don't respond
36:     dat de tijd voorbij vliegt
37:     Because someone else told me
38:     ben ik dus niet
39:     Yes I have, being pulled in to the game.

41:	I don't.
42:	Ik hoor niemand meer. Ik reageer nergens op.
43:	I enjoy playing more, my mind doesn't wander, I don't have a sense of time.
44:	Time flying by.
45:	Niet, dat merk je pas als iemand het tegen je zegt, of als je merkt dat er allerlei dingen zijn gebeurt terwijl je dat niet merkte.
47:	I don't
49:	When people have said things to me or things have happened which i didn't notice because i was playing.
50:	forgetting the time
52:	"Ik vergeet weleens hoe laat het is als ik lekker bezig ben en dan kan het zo een paar uurtjes later worden s'nachts dan dat ik van plan was ;)"
53:	When someone has to call you multiple times.
54:	I get scared easily from events in the game (in the sense of being shocked by surprise attacks)
56:	"You look at the clock and its 4 hours then the last time you looked ;)."
57:	When I do not realise time has passed quickly.
58:	gaat automatisch
59:	Not. Well... at the end, when i'm ordered to eat or go to bed.
60:	Je vergeet de tijd
61:	Iam not.
62:	Time flies (when you're having fun)!
63:	wanneer je voor de zoveelste keer naar de klok kijkt en denkt 'damn, wat vliegt de tijd'
64:	I dont think i have ever been immersed. When im playing a game which i am into and the phone rings for instance ill probably pause the game or if its not possible leave the phone ring. If its important they will call back right! :P
65:	Time flies :)
67:	I'm not immersed...
68:	It's a few hours later then I expect it to be.
69:	When someone asks you a question (while ur playing) and it doesn't process, making you have to ask them again what they asked. Or you get annoyed if people are trying to distract you while playing.
70:	if its an hour later than i thought
71:	My Girlfriends tells me things i cant seem to remember.
72:	being able to game for 8+ hours at a time
73:	angry girlfriend.
75:	Gemiste oproepen, één met het spel.
76:	if I don't talk back when someone talks to me
77:	Forgetting about time or realising that it's is dark outside when you quit the game.
78:	Je hebt totaal geen idee van tijd.
79:	When you start feeling at one with the character...
80:	like in the example you don't react to your direct surrounding but react to the game
81:	It happens when i find continuing to play the game more important than fullfilling my current needs (ie eat, drink, sleep, bathroom)
83:	My wife has to ask thinks more than once
84:	Geen aandacht meer voor andere zaken.
85:	when things happen in the "real" world, you react slower or are very shocked
86:	I dont hear people that are talking to me.
87:	When playing a war and not wanted to be distracted
89:	if you snap out of it for some reason
90:	not.
91:	I forget to regularly visit the toilet and suddenly realise i wet my pants (exaggerated slightly for added effect)
92:	i don't want to be disturbed
93:	Playing for 3 hours while it feels like 10 minutes
94:	My mom has to call me more than once.
95:	When someone tells you that he has called you 3 times, while you only heard once.
96:	Forgetting what others say
97:	When a few weeks later my girlfriend reminds me of an appointment I supposedly said 'yes' to while playing ;-)
99:	Langer spelen dan je dacht, tijdens het spelen nergens anders aan denken dan het spel zelf
100:	Als je niet op normale dingen reageert.
101:	Uhh Yea
102:	If you're having fun and can relate to what is going on in the game.
103:	I suddenly realise it's 4 am and I need to wake up at 6 am
104:	I hear everything
106:	"You notice afterwards when you check your phone for missed calls ;-)"
105:	"It changes my emotions while playing. Like you sad in the question, being occupied, having less notice about the real-world around you." At the moment itself you don't notice, because you are immersed. Realising you are immersed means you've broken the immersion. Afterwards, seeing that a lot of time has passed, you realise you were immersed."
107:	msn screens still flashing, people screaming at you because you didnt hear them the first time, missed calls on mobile etc
108:	Usually when I become stuck with a part of the game, or I have something else on my mind, such as an even happening within the next few minutes or hours. Playing the game with others can sometimes make you notice that you are immersed.

109:     When thoughts of everydat life give way to thoughts of game life.
110:     The moment someone really has to put some effort to get in touch with me (yell, touch my shoulder etc.)
111:     When I start focusing on only the game, and nothing more, and I have to ask peopple if they can repeat questions.
112:     I start thinking in character instead of real life
113:     When you suddenly notice you haven't been noticing anything else, such as i.e. the phone ringing or someone calling/
114:     having a grim on my face
115:     "I notice it when I jump out of my chair when I'm playing a horror game or when I stop to admire the scenery (Oblivion it this case). Generally I'm immersed when people talk to me and I can't hear them =) "
116:     als mensen het je achteraf vertellen, denk ik?
117:     Things like noticing how many hours you actually played you may htink only an hour or so may have passed but you look at the clock and 4-5 hours have passed.
118:     I don't. Perhaps if I get interrupted (i.e. my mom comes in and tells me to take the dog for a walk) and I don't listen at first, so she has to repeat herself I realise I was immersed.
119:     When I find out it's all of sudden this and that time... ;)
120:     You are completely focused on the game and stop noticing the world around you. By the time the immersion fades it is suddenly very late at night ;) You are more emotionally involved. example: Scary games become more scary because you are relating to the avatar more."
121:     The whole package makes sense, and my actions become very natural.
122:     Usually when I stop noticing and exploiting the errors and inconsistencies.
123:     Als een ander persoon mijn aandacht pas weet te trekken door stemverheffing.
124:     By that I'm emotional involved with the characters/world in the game.
125:     I don't think I really been immersed in a game, I usually take notice of my surroundings
126:     Shutting off my phone. And of course because that my eyes not leave the screen one moment!
127:     When hubby says something to me and I jump because I didn't hear him come in.
129:     It's 6AM and my wife just weoke up and remined me that I have to go to work today.
130:     When you get up for a bathroom break and realise you have been playing for hours that seemed alot less.
131:     When I see nothing but the screen o when someone has to physically nudge me to get my attention
132:     I usually hear something and snap out of it.
133:     not hearing background noise / people talking etc
134:     I don't think you can notice and be inmensed at the same time. I guess you can notice afterwards when you seem to have forgotten all that happened during the time you played. Or if someone starts talking to you in between.
135:     i am immersed when I ingnore other signals on purpose cause I have a really hard time finishing an objective
136:     "I look at the clock what feels like a few minutes after I just looked at it and it is 2 hours later...Or I have to get my husband to repeat something he said."
137:     If I keep going without stopping not even pausing to eat.
138:     I forget the time etc.
139:     "It tends to get light outside again...(5 o'clock in the morning)"

QUESTION 86: BARRIERS IMMERSION

Have you ever experienced that your feeling of immersion disappeared while you were playing a game? What was the reason?

1:     "All kinds of reasons; unbelievable events, bad audio, bad visuals, bad gameplay"
2:     YEAH DEFINITLY, when i see advertisement! That breaks my suspense of disbelieve
3:     yes mostly due to bad controls. Sometimes because of a level which is toot difficult which results in having to play the same scenario over and over again.
4:     Yes, the reason was the tension in the game
5:     Ja, gestoord door telefoon of een persoon.
6:     Yeah, it was because of an empty stomach.
7:     yes, change of storyline, so you have to get to know what you have to do next
8:     Yes, due off sudden changes in gameplay.
10:    When something arround me happens which will get my out of my concentration. Sudden failure in my monitor , sound system.
13:    Het is maar waar de prioriteiten liggen. Het dagelijks leven of naaste om je heen zijn belangrijker dan een spel. Daarom speel ik vaker als de situatie het toe laat en niet op ga in het spel zelf.
14:    Technische fouten, ernstige bugs.
15:    Mostly being unlucky and die 5 times in a row, then it gets frustrating.
16:    Yes, internet dropped
17:    Poor gameplay, not able to do a required - complex - movement or action
18:    Yes, when switching levels.
19:    caught op in the moment
20:    I did end up once or twice playing a (new) game until late in the night without realising it. Shocked me.
21:    Als een spel niet meer leuk is, verslapt je aandacht wat en krijg je waarschijnlijk meer mee van je omgeving.

22:	Soms zit ik wel in een spel dat iemand tegen me begint te praten, dan wil ik het liefst zo snel mogelijk naar een dood punt in het spel om deze op pauze te zetten.
25:	Designer errors, story errors, plot twists that got written on toilet paper prolly.
26:	if something just doesnt click, adds up. Can be weird sound or stupid behaviour of AI, just needs to be different from the rest of the experience
27:	"Yes I have. Most of the time, its when I played to game too long. If you go through a story too fast, its not nearly as much fun."
28:	Yes, beeing fascinated by the game and having my sound put on max volume
29:	Yes, for example when completing a level, as described previously. But this, as I see it, is a positive thing. Additionally, the crashing of the game (back to desktop) also results in dissappearance of the immersion.
30:	"Mostly when I'm stressed out due to personal matters or schoolwork I can't seem to get "into" the game. Otherwise when either my sound dies or I get a lot of outside noise also kills the feel of a game."
31:	Yea, the neighbours' kids
32:	An action-scene or timed sequence that I was unable to solve, something in the story really doesn't make sense, I have to do something that goes against my nature (e.g. blow up something by taping a bomb to a harmless innocent animal), or the real life phone ringing.
34:	Don't remember
36:	las mijn aandacht verlsapte omdat ik het niet intteressant genoeg vond
37:	Yes due to low action in a game
38:	nee
39:	No not really
41:	No.
42:	nee
43:	"At times yes, sometimes because of "outside" events like the phone in Bobby's example, sometimes because the game creators did not manage to keep my attention. "
44:	Yes, Got bored, or unrealistic/unnatural things happened during gameplay which made me realise it is all fake. For me to get immerse the game has to have some elements of reality.
45:	Ja, bijvoorbeeld tijdens laadschermen, als er ineens iets gebeurt in het echt, of als het spel afgelopen is natuurlijk
47:	The reason was that the story and events made me forget about everything else.
49:	Yes, it was quite amusing but on the other hand i felt bad because it kind of scared me.
50:	yes, the game became shit (far cry, the alien part)
53:	It either became boring, got killed (ingame), someone disturbed
54:	"When experiencing something I don't like, such as yet another RPG cliché ("You're the hero the prophecies foretold about!") or when music doesn't match the game atmosphere or my feelings."
57:	Yes, either by a good moment in the game passing, by tiredness (from playing too much), or by interruption from a real world activity (phone, other people talking).
58:	Ja, als iemand je stoort
59:	Yes, but i don't know why i got disturbed...
60:	Afgeleid
61:	Nope, just let your brains work instead the eyes its real life not digital :).
62:	Yes, when I couldn't get past some point in the game. When I've tried to pass that point about 15 times I tend to just exit the game, see question 81.
63:	door harde geluiden: de telefoon die gaat, een auto die langs rijdt, mensen die je roepen
65:	Parents
68:	Bugs or rediculous storyline twists
69:	Yes, getting bored of the game.
70:	yes, probably because i get bored after a while, and i pick up the game later
71:	Some comment from bystander / Doorbell those kind of things.
72:	mostly outside factors ...phone, hunger, needing to go somewhere.
73:	that same angry girlfriend
75:	Is wel eens gebeurd bij Diablo2 en bij Warzone 2100 (geweldige audio ook bij dat spel trouwens). Op een gegeven moment merk je dat je alweer een paar uur zit te spelen terwijl het net lijkt of je er nog maar net achter zit. Je wordt soms in het spel gezogen door een combinatie van verhaal, gameplay en de mate van succesvolheid als speler. (als het niet lukt, houd ik er meestal snel mee op).
76:	sometimes, I got bored
77:	Badly choosen music or graphics that aren't consistent for the rest of the game.
78:	Nee.
79:	Yes, usually the cause of bad / nonresponsive controls...
80:	yes the storyline fades you are spending more time to watch your surrounding
81:	If storyline breaks down, or boredom sets in due to repetitive gameplay.
83:	BSOD???
84:	jawel, verveling, verlies, dingen om me heen
85:	dull moments, sudden stops of exciting moments
87:	"Beating the enemy in wars too easily for instance, or the audio of my headset disappearing in one of the speakers (it's broken, yeah ;))"
89:	if something doesnt fit in that part of the game
91:	"Sure, when i get disappointed by a game; for example, when you expect the reactor core to blow up in a big mushroom cloud after you've spent hours placing bombs and it turns out looking like shite"
92:	yes. Moaning Mother proboally :P

93: "My roommate hitting me in the head. games chrashing. msn :P"
94: no.
95: Well, playing a game is a good tool to set your feelings aside... For instance, if I'm a bit sad, playing a game can remove that sadness for a moment.
97: Can't say I have.
99: Bijv. vervelende level of eindbaas, te lange cutscenes/tussenfilmpjes
101: Loadingscreens and that sort of things i guess..
102: Poor game design
103: If a game is immersive in the first place it usually stays that way until I become too good at it
105: disappeared? If that happens, then I quit playing... meaning that I'm not having fun anymore.
106: Usually because of outside world activities, somebody starting to talk to me, or when I'm getting tired and because of that lose interest in the game.
107: BLUE SCREEN OF DEATH!
108: Yes. Sometimes it was due to things happening in real life (need to go places, time to eat dinner, etc.). Other times it was because others playing with me decided to stop playing. Most frequently, it happens if I become stuck with a part of the game, and I can't go on any further, in which case I'll leave it for awhile and come back to be immersed later.
109: Boredom with gameplay / story or frustrating, poorly executed controls.
110: Weird illogical action in the game, graphical bug.
111: Yup. The reason was that I snapped myself out of it.
112: it's when something happends that's not in harmony with the entire game... could be sound, graphics, AI failures or whatever
113: Usually an outside disturbance, too big not to notice. Or it has to be a game-element that is totally out of place. Like a pink elefant in a total reality-strict game.
114: overwhelmed
115: Many times sadly... like I said before a glitch or bad sound ("physical" virtual things that seem out of place are quite rare) can just make you want to throw the game CD/DVD out the window!
117: Yeah, generally it when things break from uniform or the game your playing or hit a paticulary bad bit of graphics or bit of story and you just have to grown.
118: Yes, I have experienced that. As an example, if I play a FF game (probably one of those games that really get immersed by) and I'm at a very boring moment, like the bad guy is making a stupid speach about something, or some minor character is doing something stupid which is supposed to be funny but really aint, I can sometimes end up just saving the game and do something else.
119: Long loading screens, loading screens with the game name on them, music fading, unexpected feedback...
120: The game crashes. The AI appears to "cheat". I get stuck (because of unlogical puzzles or even bugs)
121: Generally because of interruptions or hardware/software problems.
122: Yes, when the verisimilitude is broken be a badly placed story object. Like a convenient death, or sudden hero.
123: Ja, dit heb ik ervaren, maar dit was niet omdat de game minder goed werd. Dit was simpelweg omdat ik moe werd en concentratie begon te verliezen.
124: yes, usually because either the avatar said I line I wouldn't say, or because a character started talking about the interface or game mechanics
126: Phone ringing, mother calling for dinner, friends coming in without warning etc etc.
127: abrupt cinematics, game loses flow for some reason
129: Either hardware/software problems like crashing, bugs or storyline problems (story stopped making any sense or there was no sense of progress or reason for my actions).
130: Lousy game with annoying sound and music. Just a bad game for whatever reasons will do that.
132: I heard something and got up to check what it was
133: loading screens, unsuited gameplay for a certain game environment (last fight in Half-Life 2: Episode 2, World of Warcraft Karazhan prince fight with strange random gameplay elements etc), sound volume inconsistency (ie. voices that are too loud in many, many games)
134: Most of the time, too much repetition (in the gameplay) or bad storytelling.
135: yeah, after completing a goal
136: Something utterly out of synch happens, e.g. a badly thought out NPC, a technical glitch, music that does not fit the situation, inappropriate sound effects.
137: Being forced to quit by parents.
138: Yes. Something more powerful in the real world interrupts the game immersion.
139: No story, No identification with the story or game, Gameplay starts to suck at points, Bugs, etc...

QUESTION 87-88: POSITIVE INFLUENCE AUDIO

Question 87: Can you give an example of audio in a game that made you feel more immersed?
Question 88: Please explain why.

1: Ambient music in Metroid Prime worked well in some area's
   The soothing ambient sounds sort of ease you into the game world.
2: beautifull scenery/world music/soundfx that fits the mood very well. Like in Tombraider 1(anniversary too), like music in LOTR movie, but then in games It makes you thinking of the same situation that you are in too, it gives you more input about what you are doing, like its confirming your situation

3:    "1. I like it when background music represents howyou are doing in the game. 2. I also like realistic car sounds in driving simulator games like the GT series."

"1. it's like emotional feedback 2. It makes it even more real"

4:    The music and sounds in Soldier of Fortune, they adapt to the moment and the action. The tension of the moment is supported by the music/ambient sounds

5:    In de games die ik speel is de muziek ondersteunend en sfeer verhogend.

6:    When in Ninja Gaiden the rock songs started to play, your feeling all cocky and tougher then before.

Its an fighting action game so fast paced rock is an excellent combination.

7:    Rytmic music

You get excited, you know that there will gonna be more action, and you get prepared for it.

8:    "For example in the Halo series music is not a standard loop of tones that play from the start till the end of an level.

But music is played at certain points in a level to stimulate the gamer emotionally."

When music plays non stop its usually quite boring and repeative.

10:    Granades exploding next to me in a game.

The subwoofer goes insane and shakes the ground making you feel it actually exploded right next to you.

11:    zelda when i for the first time walked into hyrule field

don't know

12:    Audio helps subconsciously

13:    De oude Ghost Recon serie's.

De musical score geeft aan dat je in battle gaat, maw, het geeft je een soort voorbereidend gevoel van wat komen gaat.

14:    Halo 3, bepaalde momenten waarop de muziek aanzwelt of soms zelfs alleen maar enkele simpele pianonoten worden gespeeld... kippenvel. Zoals gezegd, krijg ik kippenvel van.

15:    Half Life series & Halo series

Both have really great, up-beat music that swells towards a big battle. Mostly i only notice the music after it has been playing for a few minutes but that's when it really works and i get really immersed!

16:    In halo 3 when you know its gonna get hard to beat all the enemies and the music gets louder.

The audio has to be perfectly synchronised with the game itself, then it feels like your in the game.

17:    tensioning music/sounds.

increased emotion and higher level of concentration

18:    Ambient sounds in GRAW 2

Enhances the experience of the surroundings and the feeling you are actualy there.

19:    in splinter cell double agent. When you get discovered you hear a different music

this music makes you a bit scary and supports you to play even better

20:    Flight Simulator, the sound of engines when throttle is applied or removed.

Just like it happens in the real world and you don't hear anything else anymore because of the engine sound.

21:    De audio in F.E.A.R.

Die creepy geluidjes laten je weten als er iets spannends aankomt

22:    Bij het spel F.E.A.R. met 1 lamp aan terwijl de rest van de kamer donker was.

Dit spel speelt in op de angst, door de sfeer in de kamer en het spel was ik ff helemaal in het spel.

23:    Achtergrond muziek/geluid in World of Warcraft

Geeft je het gevoel dat je echt in een omgeving aanwezig bent

24:    Music in Unreal.

Music in Outcast.

American McGee's Alice."

"Unreal: In my memory one of the first games to support dynamic music, fitting the game play events.

Outcast: Great orchestral music, again dynamically adjusted to fit the game play events.

Alice: Again, great music to set the mood for the game.

25:    Undying - the music is brilliant, together with great voice acting.

See 84.

26:    Halo

Hard to explain, up tempo music when things got more tence, slow music in the beginning, inviting you to explore, feel (more) relaxed.

27:    Eavesdropping on conversations between enemies!

Makes you feel so cool :P You discover things that way, and they dont discover you :D

28:    Portal, it gives you the spacy feeling.

look above

29:    Medal of Honor Airborne: the sound of the shootings and airplanes.

These sounds enhance the atmosphere and thus the feeling of "actually being there".

30:    In Deus Ex, waiting inside a dark spot hearing the footsteps of a nearby soldier.

You had a sense he was near but didn't know where he was and if he could see or hear you.

31:    1 Flight Simulators' engine sound.

2 Armed assault explosions and vehicle sounds."

1. Knowing when to increase or decrease throttle, to anticipate speed before scanning instruments (speedometer).

2. Knowing where the enemies are, the audio in armed assault really adds to the realism and gaming experience.

32:    Most adventure games, no single one springs to mind.

If the music fits the story, it's unobtrusive but helps set the atmosphere, it enhances the mood of the game, helps you feel 'be there' in that world in stead of in your own room.

34: listening to footsteps in swat4.
That way you can excactly place your oppenent in a level.

36: het aanzwengen van de musiek bij bijv een boss fight in World of Warcraft
omdat je dan het gevoel hebt dat het nu écht gaat gebeuren, dat er van je verwacht wordt dat je NU je best gaat doen anders loopt het slecht af...

37: Very impressed by the sound of call of duty but even more with Max payne Damn if i still think of that sound pfff
The cry effect of the baby in one level still gives me the creeps

38: Half Life 2 en Halo als de gevechten spannender worden zwelt de muziek aan waardoor de spanning toeneemt zie boven

39: In Need for Speed Most Wanted, when you are trying to get out of a police chase, there is like really beautiful music. Classic music, making it more exciting and that makes the feeling more stronger to escape from the police.
See question #84

41: BioShock
Surround effects creap me out.

42: Metal muziek
Je kan je beter concentreren met de muziek. Het geeft je een beter gevoel. Als ik bv. aan het css ben. Dan is er niets beter dan goeie metalmuziek tijdens een rush.

43: Several but it's hard to explain. I'll pick one example: in Metal Gear Solid 2 (PS2) there is a variation on the main theme played during a cutscene that greatly added to the scene.
The theme starts playing just after a dramatic moment in the story (a loved one died) where the player character and some non-player characters have to keep going. The song enhances the tragedy of the moment as well as build a sense of "we HAVE to continue". There is no text, spoken or otherwise, just the song and slow-mo visuals. Brilliantly done.

44: Company of Heroes - impact of gunfire, and cannon shells.
Realistic sounds making stick to the game

45: Af en toe in race spellen (de enige 2 die ik speel dan, flatout en burnout).
Harde rock muziek tijdens hard rijden heeft een effect op mij.

46: Medieval 2, some songs were beautiful.
LOTR BFME, I really liked some of those songs."
Don't know why, they were just nice to hear.

47: The music in the Dig and Revelation (Myst IV)
It was good and fit the style of the game

49: First couple of times when i heard the victory tunes of Battlefield 2.
The best thing to hear because you know you won.

50: half life 2
Change of music when action is etc also with TES4:oblivion

52: In BioShock de audio dagboeken.
In de audio dagboeken zit wat info over het verhaal en characters in de game of die in de stad woonde. Sommige zijn echt goed en dan kom je helemaal in de sfeer van rapture.

53: Background music
When the music changes pace you know something is coming

54: Vagrant Story's ambient sounds (howling wolves, wind, forest-leave whistling, graons and moans), Half-Life 2's ambient sounds (fires, headcrabs, zombies, gunfire) and action music (being thrilled, fast paced action music)
It really helps getting immersed in a way that makes me scared or motivated to play well.

56: The pub music in Neverwinter nights 2
it makes you feel like you are in a pub.

57: Super Metroid
See my previous comments on why I liked Super Metroid. The music plays a huge role into establishing the idea of being a huge, alien world. The atmosphere would not be nearly as amazing without the music.

58: als het realistisch is zoals bv het horen van voetstappen zodat je daarop ga concentreren

59: with the game spellforce, it's soft music when your doing something that has nothing to do with fighting. But when your fighting or theres something that can damage something the music changes to a kind of "battle suporting sound"
See 84 :P

60: Gevechten in World of Warcraft of Baldur's Gate 2
Past prima bij de sfeer en de actie/situatie

61: I never got any feeling into a game, only at lord of the rings (movie not the game and gladiator).
Only at lord of the rings (movie not the game and gladiator).

62: No.
No comment.

63: Gears of War
zowel muziek en geluid klopten perfect

64: Gears of war audio is superb
Its action based audio. So the sounds change get more creepy/exciting when somthing happens.

65: Soundtrack of Command & Conquer
Beat up bad guys with rock like music is nice :)

67: Star Wars sound in Jedi Knight II and III
Just the Star Wars feel..

68: The soundtrack of Mafia

It made the right mafia setting and 1930 timespan. Also it folowed the action of the game: You could hear what was about to happen.

69:     Voice audio from other players in a game.
You are trying to listen to what they have to say....

70:     engine sounds
makes it more real

71:     World of warcraft city music. When you enter a city, certain music plays.
This helpes giving an idea about the size of the town for example.

72:     bioshock
in bioshock the whole game was made for single player this can be seen by the nice looking graphics the support of the sound and the very good story.

73:     "Several; No One Lives Forever en Operation Flashpoint both have some great audio greatly enhancing the game experience for that game."
see 84.

74:     Half-Life 2
If something happens, the music change too. Then you are really IN the game. because most times it is a reaction of your action. It's sucking you into the game.

75:     Doom3, Warzone 2100.
Audio die de acties in het spel ondersteunen / onderschrijven.

76:     not really, worms perhaps
the voices fit the game really great

77:     Birds in trees, water flowing, the sounds that you hear in real life but take for granted.
If they are not there you miss something but you can't put your finger on it.

78:     Bij Bioshock, de geluidseffecten.
Zo realistisch, zo werd je in het verhaal gesleurd.

79:     Chaotic war sounds (gunshots, explosions, etc.) in games like Gears Of War...
It enhances the experience of being in the midst of a battle...

80:     the game DOOM3 always crying people in distress
you get your adrenaline up and think everywhere anything can happen

81:     Call of Duty 2, Machine guns firing on my squad.
The sound of the MG's made me duck, and i really wanted to prevent getting hit. The violence was overwhelming.

83 :   NO not realy
I'm just not very audio minded

84:     levensechte geluiden en beelden
dan lijkt het echt of je je in het spel bevindt

85:     Half life is a very good example, in special scenes the music turns on.. and your.. PWAH, in the game
when the tension is getting bigger and bigger and the music is getting faster and faster.... exciting...!

86:     Call of Duty
Fantastic sound effects

87:     Environment sounds, think of far-away shooting in FPS
Gives you the feeling actually being there

89:     there was 1 demo I played(forgot the name)
there was a creepy situation, the sound was really applying to that and well sound realy helps at shock effects ;P

90:     Alle muziek van de final fantasy games
Ookal zijn het over het algemeen midi's, Het gebruik ervan maakt de sfeer zoveel beter.

91:     Audio commentary in soccer games
Loud & agressive (and realistic sounding) gunfire noise in fps'es.
In rts games, a general 'soundwall' of explosions all around when attending large scale battles
Music that follows context of the game"
The more senses pleased, the lesser external (real-life) impulses are noticable. Without sound in games, you notice the ticking clock, the barking dogs outside etc, distracting you from the game.

92:     Song of Time in The legend of zelda: ocarina of time
It is a beutifull tune

93:     FEAR, with the music (or sometimes lack of) and ambient sounds
The lack of music in combination with the right surroundings can be pretty damn frightening in a game.
In combination with ambient sounds (footsteps, breathing, gun fire, wind) will get you some pretty good goosebumps.

94:     Sound of footsteps.
Because u have to concentrate hard to hear them.

95:     Audio that really adds to the game. Music that fits to the atmosphere
Cant really explain why. I just like good audio. Both in games, but also in movies. Without good audio, the game (or movie) just isnt as good as it should be.

96:     Age of empires 3
The audio changes when things happens, like battles, etc

97:     The voice in Portal.
It added to the feeling of being trapped and tested.

98:     Delen in HL2 waarbij een grote vijand moest worden verslaan, en waarbij er muziek bij kwam.
Door gebruik te maken van opzwepende muziek word de gebruiker ook drukker en meer gefocust.

99:     Bij F.E.A.R of Half Life 2 Episode 2 zwelt de muziek aan als er een heftige actiescene zit aan te komen.

Als de muziek begint voel je de adrenaline al, je wordt dan meteen veel alerter en voorzichtiger
100: Deus ex
De acties die je uitvoerde hadden een grote invloed op het verhaallijn. Het muziek versterkte dit aspect alleen maar.

101: The exiting music and sounds in the game called "Fahrenheit"
U can play the game in different ways cause it reacts on discisions u make and after a discision u see a split movie and the music then played is exiting and u are gonna see then what's about to happen

102: Tony Hawk's pro skater (2)
Nice punk tunes get you in the skating-mood

103: The thrill music in F.E.A.R.
It starts at exactly the right moments

105: Difficult ;-) Its a total package offcoure, but if everything is right then the right music can add something...

106: Fear has a lot of good sound effects that give a scare. At one of the last levels, the music is completely absent. Somehow, subconciously you realise that something bad is about to happen... Best level I ever played in a game and immersion was total.

107: World of Warcraft Audio. ingame is het in dienst gesteld van de gameplay.
tension muziek als er iets spannends etc gaat gebeuren. goede achtergrond geluiden,ongelofelijk goede theatrale muziek met filmpjes/intro scherm

108: Jesper Kyd's soundtracks for the Hitman series.
Kyd's soundtracks help to set the mood for the games, and range from gritty and realistic, to grand orchestral pieces, to dark electronic themes. The music matches the events of the game, and has a good sound.

109: Grim Fandango and Syberia
The music, voice acting and sound effects added great depth and interest throughout.

110: Crickets in the high grass while walking through it in my own Far Cry map. The sun was low matching a summerafternoon.
The Crickets increased this feeling and memory.

111: A short harp sample in Super Mario Galaxy. It plays when you shoot Mario out of a Launch Star.
It's in perfect sync with the background music, giving the action that little extra punch to it.

112: EAX
When I'm inside a church I want everything to sound of if I'm actually there.

113: The backgroundmusic of Ratchet and Clank 1.
Ratchet and Clank 1 had great, big, open worlds to explore. The music totally supported the graphical feel of each world, overall theme and showed lots of emotional depth, even though the game's story didn't.

114: walking through a game hearing ambiance sounds
being part of the world

115: The good'ol Doom 3 days, Morrowind, Oblivion, Prince of Persia... many games.
Immersion is possible by creating a believable world (well... one that fits in with the game theme).

116: LOTR: BFME, TF2
geweldige muziek

117: I would have to say FEAR did a good job.
It made you really sit on th eedge of your seat when you first played it.

118: Memories Of That Day - Final fantasy 9
It's about Garnet having a flashback about the day her mother died.

119: Gears of War.
The battle music slowly fades in when combat is engaged. Also, enemies make battle sounds, teammates talk to you, music accompanies triggers, enhancing the event's effect.

120: Ambiant sounds in Myst
Those eerie ambiant sounds really brought me to that lonely island.
After a while you really felt desolate and alone.

122: Hearing the sound of water dripping of stalactites while sneaking around a cave in Oblivion. Hearing it change with my position and speed.
It makes the world believable. Getting closer to the source of a sound amplifies it's volume, and relative 3D position is the reason we have two ears and not just one.

123: Vrijwel altijd bij een RPG als er muziek veranderd door de aanvang/verloop van een gevecht.
Dit maakt de algemene ervaring wat spannender omdat het zich onderscheid van de normale relaxte acties, zoals bijvoorbeeld lopen. Bovendien blijft de gevechtsmuziek meestal hetzelfde dus dan link je die altijd aan een tijd met actie, en dan voel ik me al automatisch meer betrokken.

124: Resident Evil
Rooms have scary music and scary zombies. Always be on yoru guard. There are a few safe rooms however, where the music also sounded safe. Because of loading times, music was heard before the room was visible, so hearing the music really put your heart at ease

125: I guess horror games can give me that feeling, but for that I don't like horror games because they really scare me.
It is the goal of horror games to feel the suspension and audio is the way to do that

126: Half Life 2 & God Of War 2
HL 2: It's because the lot is more ambient. The lack of music and the implementation of great SFX makes it more believable.
GOW2: Exactly the opposite of HL2. The soundtrack is so pompously orchestrated, it's a good addition to the larger than life gameplay! (Battling Greek mythical monsters!)"

127: FEAR, that game had great audio for immersion. It was like watching a scarey movie but being in it.

128: The musical score in the Elder Scrolls games (Morrowind and Oblivion) were both very good.

The music really helps set the tone and feeling of the game.

129: AVP, Hellgate, Thief, System Shock, Legacy of Kain (series)

Audio effects enchancing immersion (AVP, Thief, System Shock), being able to rely on audio to provide information like in teal life (Tief), soundtrack building up the tension or going with the action when needed (System Shock, Hellgate), wonderfull and dramatic voiceacting (Legacy of Kain)

130: Ambient sounds are more where I'm coming from. Music I can do without, but the realistic sounds of the world I'm playing in are what immerse me more than anything.

Music is not something you hear in real life. No one, besides Peter Griffin has their own soundtrack running all the time around them. But the sounds of the world, real or fantasy, are what you'd hear.

131: In Games like Metroid Prime, you can use audio clues to find out whats going on or what you have to do.

Because instead of just looking at a sreen, you have to use more than one sense to play the game

132: In Bioshock all the noise being made by the sea and pipes and people all around you.

It made me feel like the the actions were happening around me.

133: Half-life: Use of reverb in different rooms.

More believable experience.

134: The audio in kingdom hearts 2, almost all of it really, just download the OST.

I don't know. It's music. GOOD music and music pulls people in. It wasn't the same all the time, it sounded good and it wasn't irritating. How do you logically explain music? You don't.

135: no example, but audio does help raise up the tension...

it raises up the tension or other emotions...

136: The Lord of the Rings Battle for Middle Earth. Playing as the elves, the sound of the giant eagle.

The noise is realistic and added to the atmosphere.

137: The intro music of legacy of kain soul reaver.

It comes back multible times during situations similar to the intro event. This makes you recal what happened previously and get drawn more into whats happening now.

138: Silent Hill, Mafia, Broken Sword.

Silent Hill uses music very effectively to creep you out, the jazz in Mafia enhances the mood, and the music in Broken Sword fits the mood very well.

139: Deus Ex again...just play the game, then you see that the ambience music is great and the sounds of all the objects are unique.

QUESTION 89-90: NEGATIVE INFLUENCE AUDIO

Question 89: Can you give an example of audio in a game that made you feel less immersed?
Question 90: Please explain why.

1: The more busy and moticable music in the same Metroid Prime

The music becomes busier with bosses and such, and then you start to notice it more: You are confronted with the fact that this is music coming out of your video game.

2: Rainbow Six Vegas music

It has such an soundloop, doesn't make it good, gets me out my immersion

3: I hate bad voice acting.

Especially voice actors who're (hearably) not speaking their native language."

my toes start curling

5: mmm... misschien in race games.

Daar vind ik dat storend.

7: Old music

if it isn't right with the game, the game can get very boring very quick

8: Endless loops of boring music.

Because its boring.

10: Sudden high tones or sounds that doesn't match the area or setting your currently in.

When your running in a jungle trying to catch a objective and some dude is using the voice-chat. You loose all kinds or in-game reality. Makes you understand your not in a real jungle but just some pixels.

12: Yes

"Sounds that are too loud (and not part of the story, such as explosions), any music that doesn't "fit" in the story, etc"

13: SuperMario

"Heb wel eens op een Nintendo gespeeld maar die bliepjes in vele van hun games maken "mij een beetje gek/geirriteerd."

14: Lelijke of te harde muziek tijdens racegames die zowiezo onverstaanbaar worden door het geluid van de auto's.

Bij racespellen hoor ik graag naar het geluid van de motor, hier doe ik de muziek dan ook vaak veel zachter.

15: Can't really think of a game now...

When guns sound like a paintball guns and really bad voice acting.

16: Yeah if your in a fight and suddenly the music switches to some peacefull music

If the music is not ok with the graphics, it feels like your in 2 games at once

17: onexpected or not suitable sounds/music for a situation.

18: Bad voice acting

Distracts from the game and focusses on the strange voices

20: Radio or TV playing in the background while playing a game

It's not corresponding with the game environment.

21: "muziek" in veel racegames "
Kunt de motor minder goed horen, en daardoor is het schakelen een stuk lastiger.

25: Neverwinter nights - The sound and music is limited to certain parts - the sudden stop of music does tend to rip you out of any immersive feeling you had. See 86

26: Cant remember the name, but is was an arcade racing game
The car engine sounded more like an ice cream machine then a car engine.

27: Totaly out of place music... May be the genre, may be the music isn't appropriate for the situation.
I think it speaks for itself.

29: Not really, although I often notice that the lack of audio makes me feel less immersed. For example in earlier games, such as Maniac Mansion, the lack of speech (being replaced by onscreen text) was somewhat of a immersion-killer.
Having to read what you would otherwise 'hear', doesn't highten the feeling of 'being there', just 'being behind a computer screen'. Although if the story were good enough (for example Police Quest), it would probably not matter as much.

30: Baldur's Gate II used to have a bug where combat wouldn't end and the combat-music kept on playing.
Having fast paced tense music when the story provides a romantic moment kills the mood.

31: "No speech when interacting in "STALKER shadow of chernobyl"
Seeing a person in a game talk (ie. facial expressions), but not hearing voice sucks.

32: Grand Theft Auto San Andreas
There were only one or two songs I liked in the soundtrack and I was really distracted by all the terrible annoying songs I kept hearing.

34: Music i don't like.
Makes me turn the music off.

36: irritante achtergrond muziekjes
omdat ze irritant zijn...

37: Yeah some dart game on my mobile phone
Because the sound of hitting the board was so fake that i wondered why they put any sound at all

39: In MotoGP 2007 is it default to have music on when you are racing. Very distracting when you are trying to race as fast as possible in a race. And it's not even realistic to have music on your Grand Prix bike like a MotoGP bike.
See question #87

41: Transport Tycoon
It's just background music.

42: Jump, techno, hardcore
Op sommige server hoor je in het begin zo'n domme schijf waardoor je je slechter gaat voelen en spelen.

43: Pick any game with licensed music (video game music should be written for video games).
Existing pop/rock songs, or whatever the genre, does not cause immersion because it is basically unrelated to the game you are playing.

44: Live for Speed - engine sounds
"sounds do not resemble realistic sounds, although they've gotten improved a lot during the last couple of updates. Key is realism"

45: "Pfoe, uhhh..Ik heb een keer een gaar spel gedaan met op de achtergrond een gaar techno nummer, terwijl ik gewoon rondliep, dat was raar..." Net gedaan :P

47: Devil May Cry
I don't know, it just didn't fit the mood of the game. The game was set in a gothic environment. Rock doesn't fit with that   in my opinion.

49: Music that i don't like in games i wont remember.

50: CoD

52: In WoW raid alerts.
Nou word je tijdens reden sowieso niet echt in het verhaal getrokken ofzo, maar als dat al zo was dan zou die raid alert (als raid bosses een ability gebruiken) je wel eruit halen. Heel onrealistisch geluid natuurlijk voor de spelwereld.

54: Repetetive music, music with voices (I don't think suit games)
Music becomes an annoyance in that case. It should/can be noticed, but should be in line with a game or game atmosphere.

56: Music in game of Battlefield 2
To intrusive.

57: I can't really name a game here.
"There are three types of audio that tick me off:
          - monotonic, grating compositions;
          - compositions with poor samples/instruments (opposite to orchestral soundtracks);
          - overly happy/bouncy/cute music"

59: can't give an example but I hate it when the music is too loud or doesn't fit the game.
see 86...

68: Not specific, but any game that want to be realistic, but the sound isn't
Imagine your suddenly sounds like a mixer, would you feel confortable?

70: unreal sounds like gunfire that doesnt sound like guns
makes the game less real

72: background sounds/music of arcade games
they do not suppport the playing but are there to be sound ..

75:     Audio die los van de acties van de speler gewoon doorstuiteren.
76:     any background music
        it plays through my own music
77:     Bad quality audio
        Even if the sounds are realisticly chosen for the moment, bad quality will always be annoying.
79:     The rock soundtrack of Prince Of Persia: The Two Thrones, or techno / dance music in racing games...
        It does not belong there and does not fit within the story and atmosphere of the game...
80:     sound that isn't following the story line (weird music choice) (sport games and so..)
        you don't feel your in the game
81:     Two Worlds, both in-game music and voice overs.
        Some in-game songs did not fit the gameworld because of use of electric guitar in fantasy game. Voice overs
        were horrible
83:     Yes
        Unrealistic sounds of (race) cars of guns... repetetive ai-enemies which constant say the same tree phrases
84:     vervelende achtergrondmuziekjes bij RTS
        leiden af
85:     no audio for example, dull race games contain no music.
        hearing a motor and the gearbox for 15 minuts is not really exciting
86:     Football manager 2008
        No audio
89:     think it was C&C renagade.
        sound was nothing special, just sound so there was sound
90:     Muziek in tactical ops (ook in counterstrike)
        Leidt alleen maar af.
92:     dnno if i'm not immersed im hardly Noticing sound
93:     "music in some games.
        voice acting"
        "just the wrond kind of music that didnt fit in the game.
        and the wrond voice actors for characters so they just dont sound/feel right"
94:     Loud music
        I don't like loud music while playing a game, so i will turn down my sound
95:     Hardcore music in a sad or romantic cutscene.
        It breaks the atmosphere of the game or moment.
97:     Motor sounds in some older NFS versions
        It sounded too much like a sample being played in higher pitch.
98:     Geluid die totaal niet het gene reflecteren van wat er op het scherm gebeurd.
100:    Het geluid van een wapen dat in het echt heel anders klinkt.
        Dan intresseert het je niet zoveel.
103:    A track or tracklist that just repeats itself disregarding what happens in the game, like in the Europa
        Universalis games, or Civilization IV
        It doesn't add to the gameplay
105:    Sure, if the game sounds are just stupid or low quality or to repetetive it then can be distracting in a bad way
        resulting in a less immersed state.
106:    Bad voices in games.
        When speech is played in games and the actor doesn't get the tone right to match the character he speaks for or
        if lipsync is out of order, you reduce realism. In many games, realism is something that the creator want's to
        present. It can be a real turn-off.
107:    old games with bleeps/cracks. or an old computer with only motherboard speaker
        was niet om aan te horen al dat gepiep en gekraak
108:    I cannot think of one.
        I rarely find games whose music makes me feel less immersed in the game.
109:    Morrowind
        Little to no recorded dialog. Music was bland.
110:    Battlemusic on Oblivion
        The moment and enemy detects you the current music stops immediatly and switches to more agressive
        combatmusic. it makes you aware of an enemy before it's even in sight.
111:    "A "select" sound in Sonic Riders"
        It was annoyingly high-pitched.
112:    Bad lipsynch
        Kinda breaks the immersion... remembers me that it's just a game.
113:    The feedback audio in Evolution Worlds.
        The movements and acting of the characters VS the audio supporting those, weren't 'played' at the same time,
        which made it feel totally unnatural.
114:    stupid windows-like sounds
        don't fit in a game just an oc
115:    The voices in Hellgate:London Demo (it's the most recent I can think of)
        They sound as believable as a Santa tale... I was expecting a darker atmosphere not a guy that sounds like a
        shoe salesman.
117:    Sorry can't think of any right oof the top of my head, maybe because I don't want to remember them!
        Either because they just where plain badd recordings or what not or they totally didn't go with what was
        happening.

118: I don't know the name of the audio, but it's the one for "Tingle", in Zelda: Majoras mask
I hate Tingle, because he looks ugly, acts like an idiot/retard and... talks like a retard.

119: Oblivion.
The normal music completely comes to a halt when an enemy approaches (no matter how powerful the enemy really was) and this insanely loud battle music would play.

120: Real Time Strategy games usually fail to immerse me.
The sounds, though they fit with the units or buildings, are more functional. They tell you you clicked something. Or that an order is received. That does create an ambiance of sorts, but not the kind I look for in a game.

122: When as soon as something hostile spots you in Oblivion the music immediately changes and lets you know.
Why on earth would a hostile entity alert it's victim to it's aggressive intentions?

123: Eigenlijk niet.
De enige mogelijkheid dat audio mij minder betrokken zou maken met het spel is als het een storende, irriterende factor zou zijn (een constante piep of iets dergelijks) en ik kan daar op dit moment geen voorbeeld bij bedenken.

124: Mystic Heroes
Bad voice acting! But this was already covered in class right?

125: really bad point and click games?
they're made by amatures and some of them just past a crappy audio loop over their game.

126: Casual game music, like the ones on the internet.
Most of the time they are annoying, uninspirational and just plain bad. Puts me off immediately.

128: Combat-style music starting before an actual fight begins.
If something hostile has spotted me from a distance, I shouldn't be able to tell just by the music.

129: Star Wolves 2
"It was bad voice acting that put me off. Im most cases if voice doesn't "fit" the character it breaks immersion totallly."

130: The old one sound footstep, like in the old Resident Evil games. That always annoyed me.
Cuz repetitive sound is annoying and not realistic. And when it's all you hear, your ears start to try and hear anything else, then they hear the real world around you just to get away from it. LOL

132: The upbeat music and sound effects of Super Mario Galaxy.
They didn't seem realistic so they didn't pull me in.

133: Fable: Loud voices
doesn't fit in the world, very unbelievable

134: most of the gamemusic I know is actually pretty good. If you have to have an example you can have the destiny island theme of the first kingdom hearts.
It get's irritating REAL fast.

136: During a Guild Wars cut-scene. A little boy is crying, having just witnessed a trusted authority figure turn into a monster after being infected with a plague, then killed. In the background, the sound of my husband's necromancer character's minions attacking another foe (a somewhat disgusting gobbling and thumping.)
The noise of the minions completely killed the tragic atmosphere and was louder than the dialogue.

137: Usually when existing audio's of bands are used in games. Usually they're used in racing games.
it does not feel like it's part of the world your in, but part of the real world.

138: Not off the top of my head. Usually music that doesn't match the visuals.
It doesn't work with the other elements, but disrupts them.

139: Yeah a lot of games have this problem. Almost 80% of the games.
Mostly because they just rip a song from some well known artist. Music should be made for the game, it should not be otherwise. Also I hate fast paced action (trance like) music. Those just do not work in games like it supposed to.

QUESTION 91-92: LISTENING TO OTHER MUSIC DURING GAME PLAY

While playing a game, how often do you listen to other music than the music of the game (for instance using a CD-rom drive or mp3 player)?

Every day or more [1]	13	9.35%
2-6 times a week [2]	20	14.39%
Once a week [3]	13	9.35%
Once a month [4]	9	6.47%
(Almost) never [5]	84	60.43%

Explanation (question 92):
1: I like to experience the game as the designers intended. [5]
2: Makes me happy :) [1]

3:      i like to hear the game music and sfx [5]
4:      It often doesn't fit the game you're playing and gets in the way of the gamesounds/music [5]
5:      Storend. [5]
6:      For instance the soundtrack of Okami is really beautifull. And I have a passion for the Eastern culture so I like to listnen to it. [4]
7:      You'll get distracted from the game [5]
8:      Some games have boring or no music, or are simple and dont need much attention. [2]
9:      Soundtracks in games get repeated a lot. Most of the time I like my own music more [1]
10:      "I actually try to get immersted in a game. Running arround in a jungle with Micheal Jackson screaming "Thriller" won't help getting me immersted :P." [5]
12:      Performance, not the right music, ingame sounds drown out [5]
13:      In gaming is het belangrijk om elk detail op te vangen, zoals voetstappen of een twijgtakje wat breekt. Met name in CS zijn voetstappen heel erg belangrijk om te horen, maar feitelijk geldt dat voor iedere game. [5]
14:      Ik speel de games graag zoals ze bedoeld zijn en de audio is daar een belangrijk aspect van. [5]
15:      When, for instance, playing a skating, racing or GTA-like game. Games that don't really expect you to react quick and where you can really 'cruise' around. [4]
16:      You get distracted [5]
17:      [5]
18:      I don't like music during games, always turn it down. [5]
19:      I like my own music in games that i played before. like counter-strike etc. [2]
20:      Some games keep playing the same tune over and over again, or the tune that is played doesn't matter to the game experience. [4]
21:      De muziek lijd me af tijdens het spelen [5]
22:      De muziek van het spel vindt ik belangrijk. Het geldt alleen niet voor GTA bijvoorbeeld. [5]
23:      [1]
24:      "I don't have a particular dislike for a specific genre (exception being Hiphop/R&B), so most of the time I'm just fine with the music that comes with the game. Besides, custom soundtracks are not dynamic, so not always fitting the gameplay." [5]
25:      "The game music is good enough in most cases; I prefer not to play any other kind of music during gaming as it can distract :)" [5]
26:      Additional music ruins the game audio, and thus the game experience. [5]
27:      "I do it sometimes when Im playing Unreal Tournament online on a public server. But I would never do it when Id play a competative match. And as for Singleplayer games. NEVER! The music in the game is especialy selected for that particular   game, it makes the game so much more enjoyable." [5]
28:      When im in a pub playing or just with some friends, i tend to listen to my own music [3]
29:      In the past, I used to. For example with racing games, to get pumped up. However, listening to another CD for example while playing MOH Airborne, would not fit the timeframe and setting of the game. Thus, I prefer to listen to the in-game music, which is often also 'linked' to levels of suspence in the gameplay (which further enhances the experience). [5]
30:      I prefer the intended sounds and like to keep as much resources of my computer available to the game instead of programs like winamp. [5]
31:      [5]
32:      If my husband plays music on the stereo which I like better than the soundtrack of the game or if the music isn't important (game must have subtitles so I can play without hearing voices!) [3]
33:      san andreas driving car [1]
34:      I like the music/sound used in the game more. Its fits. [5]
35:      Ik wil graag het geluid van de game horen [5]
36:      leid me af [5]
37:      Most of the time the music would take away the experience of the game [5]
38:      leidt af van het spel [5]
39:      Most games have music in it, like Test Drive Unlimited. And when you're playing Call of Duty or another First Person Shooter you want to hear the game audio, not the music of your MP3 player or anything like that. [4]
40:      Sometimes the ingame audio can get boring, so then a other background sound would be nice. [3]
41:      Sometimes I feel like listening to my own music. [2]
42:      Ik vind dat je beter speelt met muziek op. [2]
43:      The game should have good music of its own. Even if it doesn't (in my opinion) it is part of what the creators wanted me to experience, so I never play other music. [5]
44:      I want to be sucked into a game, listening to other music prevents this from happening. [5]
45:      Soms wil ik gewoon mijn eigen muziek luisteren, bijvoorbeeld bij GTA (eigen radio station) of oblivion. [2]
46:      I don't like the music of some games so I turn it off and use my own MP3's. [3]
47:      [5]
48:      "wil de geluiden van het spel horen. als ik buiten oorlogje ga spelen lijkt muziek me niet handig" [5]
49:      It distract me more than game music. [5]
50:      cant concentrate [5]
51:      [1]
52:      In World of Warcraft is de ingame music veel herhalend en vooral als je wat solo aan het doen bent is het dan wel lekker om even wat muziek op te zetten. [2]
53:      [5]
54:      [2]
55:      Door andere muziek dan die van het spel zelf wordt het spel minder. [5]
56:      Music where you have to listen to is not music that is good for playing a game. [5]

57: Listening to other music will detract from the gaming experience (ranging from less immersion to less concentration for gameplay). [5]
58: dat stoort kan je belangrijke informatie missen [5]
59: I only do when I feel to or the game has no music/bad music. [5]
60: Doe ik niet [5]
61: Most of the time, if i listening to music its radiomusic. I love music, 80`s, dutch. [2]
62: Music is part of the experience in games. It makes me feel like I'm actually playing the game. Other than World of Warcraft I never listen to other music than the music of the game. [5]
63: de beleving van een spel gaat er op vooruit wanneer je muziek die specifiek voor dat spel is gecomponeerd beluistert [5]
64: "For racing games for instance i dont like the game music i rather listen to the engine or something.
So it depends on the game." [3]
65: Playing a single game a massive amount of times makes the music become repetative. Putting in your own music gets rid of   that issue. [1]
66: [3]
67: Don't like to have to listen to different things at the same time.. [5]
68: mainly when playing simulators (driving, trains, flying). They generaly don't have soundtracks. [3]
69: I play games where audio helps with the way you play. [5]
70: the ingame music usualy sucks [2]
71: I like the game music most of the time. [5]
72: gives a distraction .. [5]
73: depending on the game, i either prefer mp3's or just radio, or none of them because the ingame music/sounds makes me not hear mp3/radio at all. [1]
74: Many Multiplayer games don't have music, and the right music can make you more concentrated [2]
75: Afhankelijk van het soort spel dat ik speel natuurlijk. Momenteel ben ik bezig met C&C:TFD. De meeste oude C&C-spellen hebben een soundtrack die gewoon lekker doorstoomt (een x aantal nummers die op repeat staan). Na een paar keer luisteren is het moois er wel vanaf (vooral ook omdat ik die spellen vroeger ook allemaal al heb gespeeld). Dan is het luisteren naar andere muziek net zo fijn. Ook bij D2 (diablo) luister ik weinig naar de originele muziek, die heb ik echt te vaak gehoord. [3]
76: I likke my own music better, also a soundtrack can get boring if you play for a long time [1]
77: I almost always turn even the ingame music off. to much distraction. [5]
78: Ik vind het irriterend en komt niet ten goede van de spelbeleving. [5]
79: It takes you out of the gameworld and generally makes games less fun... [5]
80: games where music is not so important or less important if it only has a nice beat (racing games) [5]
81: It disconnects me from the game, and i enjoy the game less. [5]
82: Muziek op de radio is boeiender. [1]
83: I'm not a music person, mostly ye gamemusic will do [5]
84: Alleen bij RTS als de game-sound saai of standaard is [5]
85: I play games with music in it! [5]
86: I mostly play Pro evolution(a football game). The audio is boring. [2]
87: I just play better when listening to good music ^^ [2]
88: [5]
89: usually the ingame music is right and dont want to use more cpupower on a mp3 player (gta had mp3 build in, that waas nice) [5]
90: Vind het fijn om de radio of mp3 aan te hebben als ik Tactical Ops speel. [2]
91: PES and FIFA soccer games usually feature music in the menus, but not during a match. [2]
92: Depends on teh Game, if is has good music i wont, yet Online Shooters like COunterstrike dont have decent music, so i turn on my own player [1]
93: "Depends on the game.
with simpel not imersive games i usually play my own music. But immersive games or games where sound/listening is critical i usualy turn the music off (even ingame)" [3]
94: Most games do have good music/sound by itself [5]
95: The game should have enough audio so that it's not needed to play MP3 or an audio CD during gaming. [5]
96: Game has no music [2]
97: It distracts. More so, the audio in the game also spoils listening to a good piece of music. [5]
98: Ik moet kunnen horen of er een vijand in de buurt is en daarmee de richting van de vijand bepaal. [5]
99: Spelervaring is over het algemeen minder als je de game-muziek/geluiden onderdrukt [5]
100: Nooit. [5]
101: "I have to use the sounds so i can listen where people are comming from (counterstrike). Otherwise i listen to the sounds to expirience better gameplay" [5]
102: "I listen to the game's audio. I hate mixing "normal" music with the music that is supposed to be played with the game." [5]
103: This really depends on how important the music is for the gameplay, as explained in the previous page if the music doesnt add to the gameplay I usually turn it off (and have my own instead) [5]
104: some games have dull music .. so I put on my mp3 list [1]
105: Its to distracting. [5]
106: Music in the games is usually well chosen and matches the atmosphear of the game. No need for other music. A game like Civilisation does tend to get boring with standard music. Probably because once you have played it for many hours you have heard the tracks too often. [5]
107: vaak alleen WoW [4]

108: I don't usually play games that have no music, and even then, I usually prefer to hear the game sounds. Occasionally, I will listen to other music, but I try to pick songs that fit with the gameplay. [5]

109: not interested [5]

110: Sometimes certain games have no or really bad music like Counterstrike and I put on some other music bu generally I stick to whatever music is in the game. [5]

111: Music in games usually compliments the actions and worlds, so it's a shame to listen to other music while playing. Of course, there are exceptions (World of Warcraft for example), where putting on your own music can make it feel like less of a grind. [5]

112: Music I normally listens to distracts me from the game. Good game music should not do this. Game music and actual music are two different things. [3]

113: Audio feedback is critical in a lot of games. The eye is seeing so many things in a gameworld, you might miss crucial information. Audio helps set the focus on what needs to be noticed. (Plus I always really enjoy game music, often more than 'regular' music.) [5]

114: I want te be immersed [5]

115: I prefer to listen to the in-game tunes. Most games I played had a decent soundtrack. [5]

116: Soms beter dan ingame muziek [3]

117: I generally only do that when playing certain games. FPS mainly as they can work with what ever music most of the time.   Especially when playing multiplayer. [5]

118: "Most games have good audio. If it don't I usually just turn it off. But it has happened that I have used some other music, say for Oblivion, if I wanted it to feel like Lord of the Rings or something. Then I just put on a fitting LOTR song.
Thoguht, I have added some Final fantasy music + someone elses Oblivion theme songs to Oblivion because Oblivion ahve way too little music in it, and after a few hours you et too used to them." [5]

119: I know the in-game music already, and it doesn't properly reflect the intensity of my actions in-game. [1]

120: When I play a game for a long time I sometimes get tired of hearing the same music loop over and over again, so I disable it and listen to my own. [4]

121: Using other music would kill the immersion for me. [5]

122: I either mod the in-game music or see no reason to. [5]

123: Als ik een bepaalde routine uit moet voeren die ik vaker uitvoer in het spel (denk hierbij aan bijvoorbeeld een normale dag doorwerken in Harvest Moon) wil ik nog wel eens een muziekje opzetten omdat ik graag naar muziek luister. Dit doe ik dus alleen als ik niet veel hoef na te denken tijdens de game. [2]

124: Only with online multiplayer games, like Counterstrike [4]

125: when I play does crappy point and click games and old gameboy or old snes games the music sometimes just doesn't work [2]

126: Game music is a vital aspect of the immersion. I can't put on Metalica and play. Only if the game music is really horrible, then I'll do it. [4]

127: I want to see what the makers chose and most make good decisions. [5]

128: If I don't like the music in-game I just switch it off so I can hear sound effects etc. [5]

129: I do it when I get bored with game's soundtrack. Especially if it doesn't increase immersion or dramatism of the game. [2]

130: Only time I substitute the game music for my own is when playing a sports game and they choose friggin Rap and hip hop garbage. Racing games especially...some good ol' Rob Zombie or KoRn really gets me in the mood for speed. [5]

131: If The game has a good soundtrack, i don't need outside music, but if the soundtrack isn't good, it helps to listen to music i'm in to. [3]

132: Usually the game is meant to be played with the music and many of the games I play have sound effects and other music just messes with that. [5]

133: Ingame sound can get repetitive, especially in online games. In due time gameplay becomes more important and you don't care about ingame music anymore. [3]

134: If i have a new game of which I like the music I download the OST. If I have new songs I listen to them about 10 times a day. It goes like that with every song in my library. [1]

135: nu en dan zet ik een muziekje op. Alleen als ik dit kan combineren met een andere bezigheid [2]

136: Sometimes I am in the mood for a particular type of music. If the game has a different type of music, I import music from a media player so that I can still listen to what I want. [4]

137: The soundtracks of the games I play have been created especially for that particular situation in the game I am playing. It's well thought out and more suited for the game I am playing than any other music. [5]

138: It ruins the immersion. It's hard to match music with a game. [5]

139: "Because most of the games which I play already have good music in them. But that isn't the real reason actually. Most of the games I play have good music in them, but not just good music, these are made especially for the game. These sounds will make the experience about 60% more immersible...should I say more? " [5]

QUESTION 93: WRONG TYPE OF MUSIC

1: Tons of game have wrong music: Ambient where it should be active, active where it should be ambient. Or simply music that does not fit the mood of the events.

2: Burnout 3, it uses rock music, where you drive very hard trough different streets. Its just not the same setting as Tony Hawk game, for example, thats why its different and doesn't fit into the game.

3: can't think of it

4:	Yes, but no idea which game
5:	ik geloof het niet, lijkt me ook logisch gezien de kosten die er in zo'n game worden gestopt.
6:	No.
7:	yes, trackmania nations ESWC, the music makes you nervous, and you'll lose your concentration
8:	non so far
9:	hmm, good question. I'm sure it has happened but I don't know any titles..
10:	Yes , to many to name actually. Having the right kind of sound in the area your currently in is very important.
11:	yeah in a stratergie game very fast music
12:	Yes. Can't remember.
13:	Goh, moeilijk te beantwoorden, ik heb veel games gespeeld maar het zijn moment opname's. Audio blijft vaak niet bij, al is de audio van Black Hawk Down wel bijgebleven, zeker ook omdat ik de film ken en de maker van de muziek, Hans Zimmer.
14:	Motorstorm, de soundtracks onder het racen waren totaal niet mijn smaak en ook nog compleet onverstaanbaar door het geluid van de motoren.
15:	Can't really think of 1 right now
17:	"in a racegame, very relaxing music ingame, that didn't fit the gameplay. Don't know the title anymore, it was an old game."
18:	I don't like music during games, always turn it down.
20:	Not that I recall.
21:	Ik kan zo geen voorbeeld noemen.
22:	Nee
23:	-
24:	Not that I'm aware of, I dislike the DefJam fighting games, because I hate HipHop with a passion, but it's fitting the game rather well I guess...
25:	Mmh there are a few but I can't recall the titles atm.
26:	Wii - sports. The baseball music is to 'loud'. it draws to much attention to ítself' making it harder to focus on the game.
27:	Cant really thing of any..
28:	nope
29:	None that I can think of, really...
30:	Not that I recall.
31:	No.
32:	GTA SA, it had too many songs that I really did not like. There should be more variation in styles and genres. I do not like popmusic, rap, hip hop, r&b etc and the 'rock/metal' songs were mostly of the 'ballad' type or from artists I don't like. In my opinion it's better to have a soundtrack specifically made for the game and not existing songs from real artists.
33:	flatout 2, too much top 40 rock.
36:	kan ik me niet echt herrinneren
37:	not as i can recall maybe if you would give some music examples would be better
38:	kan zo snel niks bedenken
39:	No not completely wrong music. In the Fifa series there are some song that do not fit to a soccer game.
40:	Cant remember one atm.
41:	No.
42:	Neen, in de games die ik speel is de muziek overal fantastisch
43:	Well see my remark about licensed music...I can't think of a clear example where the music in a game was completely 'off'.
45:	Geen idee meer.
46:	The music in Oblivion becomes pretty boring after a while, but I don't think it's a miss-match with the rest of the game..
47:	Devil May Cry. See last page
48:	i don't know
49:	I probably do, but at the moment can't recall any.
50:	dunno
51:	no
52:	Niet iets wat me te binnen schiet eigenlijk.
53:	Not really.
54:	Can't think of an example.
55:	Infernal. Veel te harde rock muziek.
57:	Some tracks in Secret of Mana & Seiken Densetsu 3, or Final Fantasy games. They were overly whimsical, and often annoying. Also, if it does not fit in with other themes/songs, it can take you out of the experience, even if for just a small bit.
58:	nee
59:	I know there are alot of games wich have awfull music but I can't name them at this moment.
60:	Nvt
61:	I never listening to music of a game, i want to play a game graph, gameplay, i dont care about the music.
62:	Yes, a lot of times, but I cannot give examples. I'm not very good with names. Sometimes the music is just trash and won't give you the feeling you're into the game.
65:	None that i can recall
66:	SSX Tricky
67:	Can't come up with something now..
68:	Need for Speed: Underground 2: really annoying gangsta-hop. Not my style.

69: No, I have not.
70: need for speed underground had some rock music, wich i dcan't relate with going faster
71: I have played many games over the last few years, but cant think of any game atm.
72: can`t really remember
73: nice question, but i can't remember a title.
74: don't know
75: Ik houd me nooit zo bezig met de muziek in spellen. Als het me niet aanstaat, zet ik het uit. Geen mening op je vraag.
76: not really, the music does repeat itself to often though
77: Can't think of one.
78: Ja, bij MotoGP '07 wordt er metal/rock en dat soort van muziek gebruikt wat totaal niet aansluit op het realistische van de   game, dat is meer voor arcade games.
79: Prince of Persia: The Two Thrones: hard rock music that was too modern for the game's setting and era. The previous Prince of Persia had music that matched the game's time period and setting, this one failed completely...
80: virtual tennis 3 background music is to hard for a tennis game
81: See q87
82: Nooit
83: Yes but that is a matter of opinion, like in these games with multible carradio station I never choose hiphop r&b but mot the dance/trance or 70ties channel
84: Bepaalde RTSen hebben dan saaie muziek. Zijn wel de oudere games, de nieuwere is dit vaker niet het geval
85: -
86: Project Gotham racing 3. Classical music doesn't fit in such a fast game. However it's funny though.
87: Not rly
88: Maakt mij niet zo uit, als de muziek mij niet bevalt, zet ik het softwarematig uit.
89: that I cant really remember, maybe cc renagade
90: Online Fps games, bijna altijd verkeerd omdat het meer afleidt dan dat het voor een extra ervaring zorgt.
91:
92: never noticed
93: "Trackmania. ok just one song in the game but it just wasnt right for a racegame. nothing else, forgot all the names.
94: Sims, it totally drives me crazy.
95: Cant remember, but Im sure there are such games out there!
96: Eve online has 95% of the time hardly music. When a battle starts a nice music should also start
97: I don't remember.
98: In halflife was het gebruik van muziek minimaal wat naar mijn idee de game ervaring niet ten goede kwam.
99: Geen idee. Goede muziek onthoud ik beter dan slechte muziek.
100: Nog geen tegengekomen.
101: dont know
102: cant think of an example
103: Europa Universalis, it was just music that didnt connect with the different ages you played in.
105: no idea...
106: No, not that I can remember.
108: Off the top of my head, I can't remember any one game having the wrong kind of music. There have been times when I dislike a particular song within a game, but rarely do I feel that the game has the wrong music.
109: not offhand
110: I can't remember I ever turned off any music in any game because it was so bad. I did it in Oblivion but that was because it was so repetative.
112: can`t remember the name but there's this first person shooter that plays aerosmith music in the background... WTF?!?
113: Nope.
114: rock in a kiddy-wii-like race game
115: Now that I think of it I can't say I ever played a game where the immersion killer was the music (that doesn't mean it couldn't have been better) since I rarely play games that aren't acclaimed by the gaming-press. I had more problems with dumb voice-overs and annoying bugs.
117: Hmm can't thik of any again, but an example would be say modern music in a medival period game and such.
118: I know I have had that feeling many times, but I can't really remember. I have some CDs with all Blue Dragon audio (Nobuo oematsu is the composer :P)but the names for the songs don't always seem to fit... but I haven't played Blue Dragon.
119: Some current fighting games have really fast, progressive rocklike music that is far too loud and bothersome, both in-game and in menus. Then again, different target audience...
120: None that I can think of at this moment. But a lot of games seem to have rather generic music with little artistic value which you forget instantly when you quit the game.
121: Yes, but I can't remember the details.
122: CABAL online has some really bad music. On one map you're forced to listen to a cheap copy of Queen played at ridiculously high volume. It really doesn't fit with the location.
123: Voor zover ik mij herriner ben ik een game als deze nog niet tegengekomen.
124: Can't think of one...
125: I can't think of one right now

126: "Many fighter games have this kind of "rockish" music, which overemphasises the "toughness" of the game, which is not a good thing. In Rockstar presents tabletennis you get this Tiesto kind of trance music. Really afwul, makes me want to puke."

127: I know there have definitely been some but they were just that forgettable that I don't remember the names.

128: Final Fantasy X-2, it switched between pop music and classical style scores with no real feeling of continuity. There needs to be an underlying theme.

129: "Civilisation 4 - boring, repetitive and not building mood or supporting the player.
Any grand strategy game using techno music for example. Hard to remember those as if the music doesn't "fit" I turn it off Instantly and use mp3 player instead."

130: Generally anytime they have the above mentioned cRAP music. But since I rarely listen to music in games otherwise I couldn't say.

131: not really

132: I've found a few and usually the problem is that the music doesn't fit with the atmosphere that is trying to be created by the visuals.

133: Prince of Persia: Two Thrones. Hardrock in an ancient persian fantasy setting.

134: dunno. Can I say singstar of the PS2? Guess not, let me get back to you on that one.

135: cant think of any

136: No examples spring to mind.

137: I dont know.

138: Not really.

139: I hate racegame music, those fast paced trance music is just wrong. (like burnout)

QUESTION 94-95: ALL SOUND OFF

How often do you turn off (all) sound during game play?

Every day or more [1]	5	3.60%
2-6 times a week [2]	11	7.91%
Once a week [3]	9	6.47%
Once a month [4]	3	2.16%
(Almost) never [5]	111	79.86%

Reasons, based on explanation:

Description	n
Sound is needed for gameplay and experience, appreciated and the game is not fun without sound	68
Own music/less volume, disturbed by music	22
Sound off for other people / external reasons	17
Boring / concentrated repetition	11
Sound is needed for immersion	11
System performance	1
Sound off for focus on gameplay	1

Explanation:
1: I like to experience the game as the designers intended. [5]
2: Because its part of the game [5]
3: need to hear [5]
4: I need and like sounds while playing [5]
5: Geluid, dus alle geluid is belangrijk. Wij gebruiken TeamSpeak in onze spellen! [5]
6: Sometimes I can focus better when the sound is off but this happend not often. [5]
7: want to listen my own music [5]
9: Need sound! [5]
10: I like playing with my sound on. Makes me feel like i'm really in the game (which is really important to me). [5]
12: Never all sounds, I often play the music softer (or shut it off) because I don't like it. [5]
13: Met name actie games en FPS daar heb je audio bij nodig vanwege vijandelijke verplaatsingen. Zonder geluid word je steeds onaangenaam verrast, door dat je het niet hoorde. [5]
14: Eigenlijk nooit, als ik stil moet zijn zet ik wel een headset op. Zonder muziek is de game echt nog maar 50% fun voor mij. [5]
15: How do you play a game without sound? It just doesn't feel right and really brings down the experience. [5]
16: you miss things of the game [5]
18: Sound is a crucial part of the gameplay, it's impossible to compete with the sound off. [5]
19: Late at night, don't want to wake up my housemates [2]
20: The engine sound of Flight Simuatlor can be somewhat bothersome, especially if I'm doing a long flight. Somethings you just don't want to experience all the time. [4]
21: Zoals ik al verteld heb, zet ik de muziek tijdens race games bijna altijd uit. Omdat het moeilijker is me te concentreren op het geluid vd motor. [4]
22: Ik kan het niet in tijd uitdrukken, ik doe het alleen wanneer het repeterend en te duidelijk aanwezig is. Als ik het verhaallijn niet meer kan volgen door de muziek dan gaat deze uit. [5]
23: Je mist een deel van de gameplay als het geluid helemaal uitstaat [5]
24: I need sound! [5]
25: I never turn off all the sounds, sometimes music if it too loud to be able to hear voiceovers and such, but besides that..almost never [5]
26: Same reason as before, the audio is an important part of the game experience. Without audio its just no fun. (maybe games like Worms, mario kart. If you have to for some reason) [5]
27: "I do it sometimes when Im playing Unreal Tournament online on a public server. But I would never do it when Id play a competative match. And as for Singleplayer games. NEVER! The music/sound in the game is especialy selected for that particular game, it makes the game so much more enjoyable." [5]
28: If the music in a game isnt according to my taste i just use my own [3]
29: Never. Sound gives too much useful ques and experience enhancement, that playing a game without it would not be half as interesting. [5]
30: EvE Online has beautifull music and sounds but also has known issues with my current soundcard and has a dramatic performance increase when I turn of all sound. [2]
32: Same as before, if husband plays music on the stereo. Also, when I play games on my handhelds in public places. I don't want other people to be annoyed by sounds I produce so I switch off all audio. [2]
33: too make phone call or watch tv [3]
34: "At swat 4 and UT ive got the music turned off. but the sounds (from guns etc on)
The music distracts me in shooters." [1]
36: ik vind dat geluid onderdeel van de beleving is. Alleen als anderen in de kamer er last van hebben zet ik wel eens het geluid uit, maar dan mis ik echt wat [5]
37: Sound is part of a game.. depending on the game it is more or less important. For example need for speed is game music and sound very important compared to playing pong which is less important... if sound improves the action feeling of the game it is in my opinion more important [5]

38:     haalt de spanning uit het spel [5]
39:     "Dit gaat even in het nederlands hoor.
        Als ik het geluid uit zet dan is het spel meteen zo nep en beleef ik er echt totaal niks aan. Je word niet in het spel getrokken niks." [5]
40:     Sometimes i get a headache of the sound. [4]
42:     Zonder muziek of geluid verliest een spel zijn waarde en is het niet meer leuk om te spelen. [5]
43:     You miss part of the experience [5]
44:     Sounds are an essential part of the game experience. [5]
45:     "Geluid maakt het natuurlijk wel leuker.
        Als er echt totaal geen geluid is, wordt ik nooit echt "immersed" [5]
48:     "wil geen muziek tijdens het gamen,
        wil de effecten goed kunnen horen" [1]
49:     Sound, music and effects, gives me hints to if im doing it right and where things are coming from. [5]
50:     music is part of a game [5]
53:     To hear whats going around me, suspicient noises outside, or to hear soemone talking better. [1]
54:     No sound makes me not get into the game at all. I feel unsatisfied when having to put off the sound because I can't stand it anymore (repetetive mostly) [5]
55:     Maak het spel een stuk minder [5]
56:     Its part of the game experience. [5]
57:     Like previous answers: it detracts from the gaming experience. [5]
58:     als er iemand tegen je begint te praten [1]
59:     I like ingame sound, it makes you feel your IN the game. [5]
61:     Its anoying most the of time, i hear the same sound. [2]
62:     I like to hear effects and such. [5]
63:     zie vorig antwoord [5]
64:     "Racing games should come without music. Music is made by the engine." [3]
67:     Game isn't fun without sound, and it's way more difficult without it. [5]
68:     same as with watching a movie: part of the experience [5]
69:     Sound helps game play. [5]
70:     "my own music is better than the ingame music.
        i never turn engine sounds off" [2]
71:     I need the sound to hear what other players are doing. I am playing competitive games vs other people and listening to the sounds of their abilities, makes me able to react accordingly. [5]
72:     I play with headphones and if I don`t like the music and it is not needed I just take them off. [5]
73:     Sound/music in game usually has a function, being a notification or background music, so i pretty much never turn it down. [5]
74:     Games NEED sound, otherwise you don't get the best experience. [5]
75:     Nooit alle geluiden, alleen muziek. [5]
76:     i turn of just the music, if it annoys me [2]
77:     impossible to play without any sound, no feel for the game. Just like watching a movie without sound. [5]
79:     Game sounds enhance gameplay. Without sound games become less fun to play... [5]
80:     "girlfriend is sleeping ;p" [5]
81:     see q89 [5]
82:     Saai [5]
83:     I turn the volume down compared to the sound FX/spoken text [5]
84:     Als ik moet bellen of iets anders doen dan gamen [5]
85:     if the sound is bothering somebody, I tend to grab my headphone. [5]
86:     I rather hear real music. (mp3) [3]
87:     Need sound to play FPS, and music at racegames never sucks (do not play any other games that often) [5]
89:     tending to set the volume really low so I can hear teamspeak [5]
90:     Ook weer tactical ops, de ene keer met mp3 de andere keer helemaal stil. Heeft te maken met hoe serieus ik wil spelen. [2]
91:     Even if i need to be silent (neighbours sleeping, ..) i usually use headphones. Don't like silence at all [5]
92:     when it is to late to be loud [3]
93:     "cant live in silence.
        always have some sound on even if its just winamp." [5]
94:     Sounds help to make the experience [5]
95:     Without sound, the game is boring! Just like movies. A horror movie without sound just isnt scary anymore. [5]
97:     In some games that I've played for a long time, I turned off the background music because it got boring. Sound effects are always on. [5]
99:     Muziek is een belangrijk onderdeel van de gameplay [5]
101:    I use them for gameplay [5]
102:    Audio is part of the gaming experience [5]
103:    Sound is important to me [5]
104:    see Question 89 [2]
105:    all sounds never, maybe set the volume of the music lower if its distracting. [5]
106:    Sounds are usually well chosen and always part of the game. No need to turn them off. [5]
107:    TeamSpeak, of nieuwe top 40 van newsserver ff tussendoor beluisteren. Soms ook TV aan en dan computer geluid uit. [3]

108: The sounds of the game help in the immersion, and they make the game seem more real. Turning down the sound is either out of necessity (communicating with other people) or on the rare occasions that I'm listening to other music. [5]

109: Even mediocre music / voice acting is better than none at all. [5]

110: "I did it in Oblivion but that was because it was so repetative. An other reason is because I want to listen to my own music." [5]

111: I only turn off sound if I'm bothering other people with it. [5]

112: only music [5]

113: See previous answer. Audio feedback is crucial & I enjoy game audio. [5]

114: "..." [5]

115: I just can't picture playing a game without the sound turned on... [5]

117: I generally atleast have Soundfx full and music soft. [5]

119: When there are 25 characters on the screen, and each of them generates roughly 3 sounds per second, I have no desire of hearing 75 slashing sounds, blood sounds, character moaning sounds... [1]

120: Sound is very important for me for immersion. But often also for feedback. [5]

122: Not entirely accurate, but during, games in which I need to speak to people at the same time, the music can get too loud to hear what people are saying, so I turn it off. Sound effects however I leave on. [5]

123: "Alleen als ik mijn eigen muziek wil luisteren of als ik in het openbaar ben. Ik vind het irritant als ik vage geluidjes van iemand anders' apparaten hoor komen dus probeer ik zelf ook niet voor overlast te zorgen. Voor de rest heb ik altijd het geluid aan, ook al is het heel zachtjes; voor mij hoort het er gewoon bij." [5]

124: sound is important [5]

125: they music was most of the time created for the game,most of the time it matches and makes the game experience whole [5]

126: Only if I'm stuck in a game, and the music keeps looping over and over... then I kill ze sounds! [5]

127: If I'm playing and need to hear what is going on around me. [5]

128: I like to hear environmental sounds and effects [5]

129: If sound doesn't add anything to the game and the game can be played without it, for example sounds in logic game. [3]

130: I only turn off music, cuz it just gets in the way of ambient and other sounds I need to hear. [5]

131: Because i don't want to wake people up or if the music is really annoying [2]

133: don't care about in game sound anymore, ingame sound interferes with something else (voice coms etc) [3]

134: I like music and it seldomly irritates me. I can focus better with music too. Without it just feels wrong most of the time. [5]

135: zonder geluid bij een game voel ik me ook minder betrokken bij de game [5]

136: I like to have the sound effects when roleplaying as it is more immersive when they are done well. [5]

137: It becomes boring once the sound is off. [5]

138: Why would you? Sound is part of the game. I only turn it down when I am talking to someone. [5]

139: reason stated in the question before [5]

QUESTION 96: APPRECIATION POP MUSIC

Description	n
Works for some games	64
Mostly not fit, annoying	40
Generally ok	25
Game music is usually better	11
Depends on band / style of music	9
Don't care	8

1: It works for some game (sports, racing). Mostly game that are connected to the real world (such as sims) pull off licenced pop-music well.
2: Its oke, but it have to fit! Like the Burnout 3 example, use music that really confirmes the mooth of what you are doing!
3: "depends on the band. and obvously the game. If it fits it's nice"
4: Can get veeery annoying. For example the song of Blur (I think) in an early version of FIFA (I get knocked down)"
5: Als het functioneel is, zoals bij NFS Most Wanted.
6: "I don't listnen often the radio or watching clips on MTV or TMF. It to much of the same. I like Rock, Metal, New age, movie soundtracks but for that I have to go to other channels (internet)."
7: nothing wrong with
8: If the music is good it wouldnt be a problem.
9: if it fits in the game, sure. if it doesn't or I know they've put it in there JUST because the band is know, I almost wanna turn off music in the menu. A game like fifa has that kind of crap, cool music. But short because they've spent a lot of money on know artist while they could have had 20 hours more of 'good' music from less/no know artists/bands.
10: sucks...well it depents. If the setting is right and your playing a puzzle/platform game or something i could do with some pop-music.
11: dragonforce,pain of salvation,hammerfall.
12: I like it. But it usually means one or two songs that are played over and over...
13: Pop muzikanten moeten wegblijven van de game scene. Mijn ervaring is dat musical score's het vele malen beter doen,tijdloos zijn en vaak doordat het alleen muziek is veel beter bij blijven. Als ik een zingende bekende groep zou dan zou dat alleen maar afbreuk doen aan een game.
14: Kan soms goed werken, vooral bij racegames, mits de nummers bij het racen passen en niet overheersen. Bij andere games geef ik de voorkeur aan originele, voor de game gemaakte, muziek.
15: As long as it's good pop music and not a Britney / Justin cheesy kind of music... and it suits the game, I have no problem with it.
16: not good
17: Not done. You will than listen more to the music than you will play the game. The music should be supporting, not carrying.
18: Couldn't care less
19: In some games its okay, like fifa 08, but not in action/adventure games. in those games you want to hear music that is composed for that level.
20: It applied in Carmageddon & Descent. That's the only time I noticed a band I know."
21: Meeste popmuziek past niet echt bij de games die ik speel.
22: Liever niet, pop heeft zijn eigen sfeer. In Need for Speed kan het, in een actiespel niet
23: als het goed is toegepast kan het wel iets toevoegen aan de gameplay (bijv. donkey konga)
24: It all depends on how it's done. In Motorstorm for example, it's done rather well. A mixed soundtrack, altered / mixed / tweaked to give a real festival sound. Omikron: The nomad soul... being able to buy records from David Bowie, even a live show... wow!"
25: dislike pop music in games; Game music should be particularly composed for the game itself and its theme to.
26: Only suitable for racing games and such, where the character in the game could actually have acces to pop music. (without resorting to personal audio systems in FPS games). In other situations it just doesnt fit, unless

the audio was specificly   created for that (part of the) game, but even then i would be reluctant to call it as good as 'real' game music.

27: It doesnt neseseraly mean a better game. If it makes the game better, sure, why not. If its just to promote the game more/sell more games, no thanks!

28: I generally sucks, especially R&B and hiphop, it shouldnt be called music, its simply a computer rendered beat on which you just speak in rhythm and ear millions of $

29: I think it's nice. For example a Sims-talk (non comprehensible) version of Trivium's Like Light To Flies, is awesome, really.

30: Only if it fits. (no electronic music in the middle ages please)

31: Great, if the music style fits the kind of game.

32: Don't like it much, do not listen to radio because I don't like pop music so why should I have to endure it in games?

33: mostly bad, not my taste

34: its nice. In games like GTA i really like the music.

35: Meestal cool (carmageddon)

36: ben bang dat snel de toegevoegde waarde uit het oog wordt verloren, dat het meer om de band gaat dan om de muziek en wat dat betekent voor het spel.

37: Well i was realy impressed by the sounds of need for speed underground 1 with the sound of snoop dog but also in Fifa game with the sound of tiesto made it very cool so im positive to this

38: in sport, puzzle en race spellen prima, in alle andere spellen verschrikkelijk

39: Some songs just dont fit to the game genre. Like I said before about the Fifa Series. But the pop music is overall good enough.

40: Sometimes it fits the game's scene, but i dont like pop.

41: Depends on the game.

42: Ik hou niet van pop

43: It should not be done, unless specifically written for the game by the band and/or artist. Which hardly happens

44: depending on how they are used. In menu's such as FIFA it's ok, but during gameplay not needed as it (mainly) does not add anything to the game.

45: KUT

46: Pretty cool to hear songs from the radio/TV in my game :-)

47: If it fits with the game, then sure. Quest for the rest is a good example of when it's good.

48: soms is het goed. bij GTA san andreas was het leuk om met muziek aan in de auto te rijden was nog goede muziek ook

49: In real life i like pop music, but it has a different meaning when it is in a game and it will probably get the wrong association.

52: Ligt aan de game. In call of duty of World of Warcraft past dat natuurlijk niet. Maar bijvoorbeeld Fifa kan het wel prima hebben.

53: If its a game set in current day its good.

54: Don't like that. I don't like vocal music, and I think it's not suitable for videogames.

55: Prima, mits het bij het spel past.

56: If it suits the game, its fine with me.

57: I prefer a movie-like soundtrack for games. Pop-music usually sounds too cheesy (like Eyes on Me in Final Fantasy 8). However, it does work well sometimes (Final Fantasy X, Capcom vs SNK 2).

58: Alleen goed voor spellen van het genre GTA

59: Depends on the game, but I prefer music that is made for the game.

60: Moet passen en niet opvallen.

61: Its relax, beter then game music most of the time sad and repeated whole the time.

62: It's nice, but sometimes it doesn't fit in the game. It's a good way to promote bands I must say.

63: liever geen zang in games maar als de stijl van de muziek bij de stijl van de game past heb ik er geen problemen mee

64: Justin Timberlake is cool but Metallica also so i like different styles of music.

65: Depending on the game pop music can be good (Need for speed series). Role playing games / war simulation etc should be looked at as movies and create a soundtrack suiting the particular game."

67: It's a nice way for the artists to make some extra money and to get more famous..

68: Great, but not too much of the same if possible. Great sollution to this where the radio stations in the Grand Theft Auto games (since GTA III)

69: Sounds like a shit idea.

70: sounds cheap usualy

71: Its nice. Its always fun to listen to a famous band in your favourite game.

72: do not care. If they support it is ok else I don`t mind."

73: For some games it's pretty nice (e.g. need for speed) and for some games it aint (more realistic story lines shooters)

74: Can go wrong, if you heard their songs like 1000 times before.

75: Niet echt een voorstander of een tegenstander. Het kan goed werken, een voorbeeld daarvan vind ik GTA:Vice City.

76: it depends on the game, if it fits, it's good

77: pure marketing, doesn't add anything to a game. Although I most make an exception, IMO The Blue Oyster Club did great in the game Ripper.

78: N.v.t.

79: Usually doesn't add anything to the game (and worsens the experience), except when used correctly (such as radio stations in GTA)...

80: it's nice if the songs fit the genre of the game
81: Only when fitting. I liked it in Grand Theft Auto and in Need for Speed Underground
82: Wel vet, maar het moet bij de game passen.
83: Good! More realisic than madeup music (if such a thing even exists)
84: Kan, maar zou ik alleen doen als het er goed bij past
85: if it is placed right, no problem. Overstating this is really bad.
87: Is nice, but should have to option to choose from a great variation of genres as not everyone likes the same type of music.
89: its fine, if it fits the game
90: Word er niet warm of koud van.
91: Only fits some types of games, like soccer; in rts of fps games however i think 'movie-music' (instrumental) is the better choice
92: usually adds nothing towards the game.
93: depends on the game. Music in GTA or Tony Hawk games just fits right in. Its part of the culture the games are based on.
94: In some games it can be funny, like GTA
95: If it fits, I like it... For instance, GTA! I just love to hear music that I recordnise. But in a fantasy game, I dont want to hear pop music.
96: I think in games music should mainly be instruments, no singing.
97: It can give a nice touch to a game, but it also distracts from the gameplay.
98: In de NFS serie werd veel gebruik gemaakt van reallife producers en ik vond dit een leuk systeem omdat beide partij hier baat bij hadden.
99: Ik vind het wel lekker werken, vooral bij racegames als Need For Speed of Burnout
100: Voegen soms iets toe bij sportspellen.
101: I dont like popmusic cause it's to mainstream
102: Can be good, depends on the implementation
103: If it's good music and fits the game then I guess it should be a'ight
105: no good - depends on the game however. the games I play don't have pop and never will I hope hahaha
106: This can be a positive development if the scenes where the music plays are chosen carefully. Haven't really experienced it yet.
107: mwah gaat wel.
108: I'm not a fan of pop music in real life, and I haven't really encountered them in games.
109: Most all pop music is derivative, boring or just plain bad regardless of how / where it is used.
110: Depending on the music they make it's sometimes a good thing. As long as the music is immersive to the game.
111: As long as it sounds good and compliments the game, I'm fine. Burnout is a good example.
112: I think it can get people to buy the game. But it greatly depends on the game genre.
113: It really depends on the genre and feel of the game. For instance, I really enjoy 'pop' music in games as Need For Speed Underground, since the games show realism and it adds to the badass feel. But in any other kind of game, I would probably be persuaded to turn off the volume.
114: doesn't fit
115: I listen to many genres but I can't say I like Pop too much... I'm a rock fan.
116: cool.
117: Depends on the game setting and situation.
118: Pop doesn't sound so good, and there's way too much of it. After hearing the same songs on radio day in and day out while working you start to grow a small hate against it, especially if it's a song with a stupid lyric.
119: If you have no time to make your own music and the money to just buy it instead, I spose you could do it - otherwise you're just taking the high road on immersion.
120: Not all types of music fit with all settings. You can't have pop music in a sci-fi setting, because it breaks the immersion. But I don't mind hearing pop music in race or sports games. Or rock or techno in a shooter. As long as the songs aren't an excuse to hide a lousy game behind.
121: Hate it. I want something original and specific to the game.
122: Pop music really doesn't have any theme or point, and therefore it is very difficult to match up to moods one is trying to engender in a game. It's also repetitive and all sounds very similar.
123: Ik houd daar niet zo van omdat het dan voor kan komen dat ik dat bestaande nummer al kende en het misschien niet leuk   vind; dan ga ik mij er aan zitten ergeren en dan verlies ik focus voor de game.
124: Cool in games like SSX
125: yuk, although david bowie in nomad soul was kinda cool.
126: Implementation of real artists can enrich a game experience, but also can negatively affect it. If the emphasis is on the music and not on the game... Then I'll download some CD's, if you don't mind.
128: I think it's OK as long as the music isn't the sole reason for the game. A good soundtrack can't save a bad game.
129: Only as theme music or maybe audio effects (like radio in a room). There were some great exceptions (like soundtrack to Omikron or Homeworld) but these are too few to justify pop bands making music for games.
130: Sucks. Period.
131: I like it in some games, it depends on which one.
132: Games should never have pop music unless they (the games) are specifically designed around the music or the music is a part of the story.
133: depends on the type of game
134: It's something I wanna try :D. It would have to be apropriate to the game though.
135: k heb ze liever alleen in guitar hero of singstar, anders kan ik me vervreemd voelen van het spel
136: I don't like pop music anywhere. I certainly wouldn't have the foul stuff interfering with my gaming.

137:    I dislike it because I think music for games should be instrumental and a piece that is created especially for that game-world. It sets the athmosphere of experiencing a new world better if there are no real world aspects in it, or limited.

138:    Music with lyrics is usually a bad idea for a game, it detracts from the narrative. Especially if it's popular music I know. I generally prefer moody, instrumental music.

139:    Almost no games seem to do this right. It's very dangerous because the music isn't really made FOR the game. GTA is the only one almost who seem to do this right.

QUESTION 97: IMPROVEMENT OF GAME AUDIO

Is there anything you would like to have improved about sound and music in games?

1:      I'd like to see more adaptive music in games.

2:      Well, just make the music more capable for the game, choose music that fits better

3:      More freedom and maybe incorporate into gameplay. Like gta series. (car stereo)

7:      better sound quality, not only synthesisers, but symphonic music can make the game more exciting to play

8:      Some games dont have a option to adjust the music volume

9:      The only thing I don't like is that the soundtrack are often too short.

10:     kick up the bass. Really helps you get in the mood.

13:     Muziek moet meer onderdeel worden van een verhaallijn. Een overwinnings tune of wanneer je maten verliest een treurige melodie. Films zijn daarvoor een perfect voorbeeld en nagenoeg vond ik dat het op die manier weinig word toegepast.

14:     Accentueer de gameplay, speel niet alleen maar voortdurend een willekeurig deuntje maar verander de muziek op kritieke punten in het spel.

15:     In most games you have a few guns that really sound bad and 'ploppy'. I for instance really like the pun in the counter strikes source guns.

18:     Most games are pretty good at it nowadays

19:     i would like to see sounds that invole you more in the gameplay

20:     Not in General, perhaps per specific game.

21:     Sommige games mogen qua omgevings geluid wel wat beter klinken (geluid in sommige auto's is vaak teveel hetzelfde) maar ik kan me er niet echt aan ergeren.

22:     Meer de nadruk op de omgevingsgeluiden.

24:     "In general... no. I'm quite happy the way it is now. Some games are more suitable for custom soundtracks, like sports games. RPG's on the other hand don't."

25:     "More use of directional options. Almost everyone has a 5.1 or 7.1 set at home; Let composers use it! "

26:     I cant really think of anything i really want to change. But then again, i'm no sound/music expert.

27:     Make it MORE important than graphics!!! Graphics are OVERRATED!

28:     More Rock, he only game with a truely fitting music player is Flatout 2 in which you have got the music to fit with th game

29:     More support for 5.1 sound sets, I guess. Although in most big games it's already there.

30:     "More "ambient" music influences by events and environment and make it more 'fluent'. Most game have a tendency to blast into a combat song as soon as combat starts instead of going into it gently."

31:     "Sometimes the audio in a game just isn't good or what it's supposed to be. Like really unrealistic engine sounds in Need for Speed. But that's the developers' fault. In such a case, the developer just failed to make a good game. I really can't make any comments about "improvements" in general. Games are too diverse."

32:     More subtitling (also during cutscenes!) so I can turn it off if I don't like it. Should never be obtrusive and always stay in the background.

33:     own music

35:     niet dat ik kan bedenken

36:     wat meer interactie dmv geluid ipv als achtergrond. Dat geluid bijv meer gebruikt gaat worden in bijv puzzels. Vaker rekening houden met 5.7 of 7.1 geluids systemen

37:     difficult so say but im sure experts know how to improve the feeling which music or sound can have in a game

38:     Grootser/epischer is altijd lekker

39:     No not really, most games that I play have good audio.

40:     More attention to the detail of sound.

43:     Overall quality of video game music is good, sometimes excellent. Attention and appreciation of both are rising as well, so most developers don't use audio as the least significant part of the games anymore. Sometimes that happens, but it shouldn't.

44:     more surround sound oriented to immerse better

45:     Niet direct nee :)

46:     Yea, a lot more diversity so the music doesn't become boring.

49:     I would like to hear more music that realy affects you and let you immerse in the game.

52:     "Moeilijk. Geluid is best goed tegenwoordig, vooral voor ongetrainde oren zoals de mijnen ;) Zolang ik maar kan horen waar het geluid vandaan komt en wat het is ben ik al gauw tevreden."

54:     More attention given to it, it really is almost as important as the gfx/controls for me.

56:     Not all music needs to be electronic. Some real classical music can be good for a game 2.

57:     In some ways one can argue that innovation, with the exception of Nintendo games, has come in the form of the improvement of visual and aural qualities. However, it seems more effort has been put in the visual

department, and for the aural it's basically focused on creating the right explosions and such. One interesting thing would be to see if the music can be more incorporated into gameplay, much like Zelda:Ocarina of Time and Twilight Princess did.

61:     Build in radio, wmp, winamp or something.

62:     Generally speaking, no.

63:     minder compressie, minder loops, meer variatie

64:     I always liked the soundtracks in the Need for Speed games they thats about the only thing EA has taken to the next level. Though i usually only listen to the car engines i sometimes make exceptions

65:     Look to a game more like a movie and compose a soundtrack in similar fashion.

67:     Well.. as long as the sound suits the game, it's good :)

68:     More diversity! Not every door does sound the same, not every stone makes the same sound when bumped into

69:     Realism in sound only in FPS games.

70:     more known bands

72:     better sound support on vista

74:     "More sounds for one object, many times a person or thing always sounds the same.
        That isn't realistic. More songs in a game is always better, otherwise they get boring and you just turn off the music. Radiostations or playlists are good, because you can choose what you like to hear. "

75:     Niet te veel aandacht aan besteden. Gameplay is belangrijker naar mijn idee.

77:     Less music, only instrumental and it has to go with the story, no record that repeats every 10 or 20 songs.

78:     De muziek moet soms minder overheersend zijn, de geluidseffecten van bijvoorbeeld van een auto die keihard wegtrekt hoor je dan niet meer.

79:     Learn from composers like Nobuo Uematsu and spend more time on proper voice acting.

80:     maybe a better implementation of evvironmentel effects like water, fires,... thunderstorms   (or music that plays faster if you play faster

81:     I really enjoyed the hilarious Dutch voice overs in Beyond Good and Evil. More of that plz!

82:     Meer trance in games.

83:     Less repetetive, more choice

84:     Meer diversiteit

85:     not really... maybe volume controle in game

89:     well for quite some games there should be more attention to music in the game, and play the right music at the right moment (but dont switch to niticabel)

90:     Nee, de spellen waarin ik geniet van de muziek zijn gewoon ander soort spellen dan degene die ik speel zonder. Ik zou bijvoorbeeld in online fps games nooit de ingame muziek gebruiken. hoe goed of slecht ook.

92:     make it more orchestral and Epic if possible and suiting for the game

93:     "No, music = taste.
        Some Music/game combinations are just right for me while other people cant stand it. "

95:     Sometimes, the quality of used samples are bad. But overal its pretty good.

96:     It should really depend on what you are doing, not just a random song.

97:     Less background music in racing games. Better ability to hear the point of origin from sounds.

98:     Meer muziek, en ook andere stylen niet te monotoom allemaal.

100:    Er meer tijd voor besteden om het te ontwikkelen.

101:    Dont know

103:    I'd like to have game designers put as much effort in their music and sound effects, as they do in graphics nowadays.

105:    "No - its good as it is....Offcourse the quality can be improved. But thats also personal. Maybe better serround sounds."

106:    Not in general. Support for things like EAX5HD, 5.1 surround sound and perhaps the new Philips immersion system (with light on top of speakers and two fans to blow air in your face) might be nice.

107:    meeste gamedesigners raken wel de kop vd spijker in hun games.

108:    I think that all games should have the highest quality audio possible. The audio really improves the game experience, and having poor quality audio hurts that experience.

109:    More attention paid to quality voice acting and sound effects that truly sell a scene, set a mood or increase immersion in a story.

110:    Full interactive music changing on the fly to what's happening in the game, player nearly died, victory, enemy nearby, losss of teammate.

112:    I want music to reflect my action in the game even more than it does right now. AI driven music

113:    It's not the sound of music I would like to see improved, but the technology supporting it. Even now, there are still games on the market that aren't programmed properly (due to deadlines and budgets) or don't just have the capacity to create the audio experience I would like them to.

114:    spend more money on audio in games

115:    Decent ambiental sounds and better voice-overs mostly.

116:    cool music during the game itself instead of intro's

117:    Just like in movies and T.V. some times you get good ones and sometimes not.

118:    Perhaps when the scene is really dramatical but the song that's playing doesn't add much to the feelings for the scene, you might want to change it a bit.

119:    I would want the sound and music to reflect the intensity of the player's needed action, or told narrativity. If I am wandering the game world and engage in combat, then engage in bigger combat and so on, I want the music to become more intense as more creatures approach, and less intense as I kill a few of them, when the battle seems under control.

122: "Music is only really necessary during themed scenes, but background music is included everywhere. As if the character is travelling around with an iPod...Ambient sounds guided by environment is the way to go."

123: Er wordt nog maar half uit gehaald wat er in zit! Ik hoop dat er binnenkort net zo veel aandacht aan audio in games wordt besteed als aan audio in films. Het kan veel epischer en grootser, dramatischer, spannender, vuriger, etc - ik zou graag willen dat de audio-tak van de game industrie zich nog meer uit gaat breiden.

124: Yes! Every game should have a sound playlist, in which you can replay all the music from the game menu (after you finished the game or whatever) This is sooooo important and sounds soooo easy to implement! Why Why Why not right now?

126: Games and music should be developed in sync. Music should get even more attention, because it's such a vital part of the game experience. It can convey emotions or make them more powerful.

129: I think that audio effects should play greater role in informing the player about enviroment his character is in (like in Thief for example).

130: Less intrusive music. If it's going to be listened to it has to blend more into the surrounding environment. Music for music's sake is just noise to me.

131: More emotion instead of dead sounding synthesisers all the time

132: Not as a whole, no, but it would be nice more games with more acoustic music.

133: More immersive experience, broader channel seperation (revival of A3D type techniques)

134: Yeah. There are some things I would have liked to change. Like melodies or whole themes. But I have those ideas so often...

135: soms lijkt het me wel eens fijn om even geen muziek te horen, maar alleen bijvoorbeeld de overige geluiden, maar dit wordt bijvoorbeeld ook bij zelda gedaan voordat er een eindbaas verschijnt

136: I would like more choice to be available.

137: The games I've enjoyed playing all had intensely good soundtracks so the answer would be no.

138: Maybe adapt more seamlessly to the player's actions.

139: It should get that Immersion back to games like it did some years ago. Bioshock seem to do it right again. (finally)

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