
# Interactivity and Immersion in Games

Anja Volk

Sound and Music Technology,
21 Nov 2019

# Today

- Main modules
  A. Sound and music for games
     - Different functions of sound and music within games
     - Challenges of interactivity and immersion

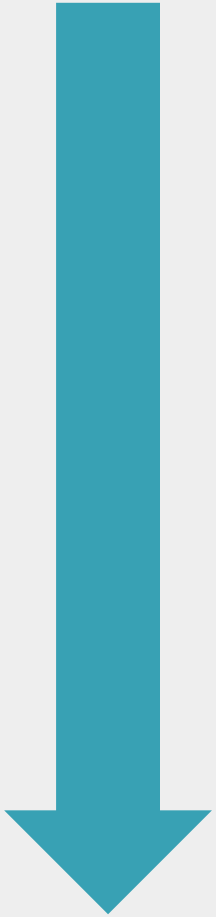
# Recapitulation last lecture

- Functions of sound and music in film and games
  - Annabel Cohen (1999) for film: e.g.
    - Provides continuity between shots
    - Induces mood
    - …

# Functions of film music

- Music masks extraneous noises
- Provides continuity between shots
- Directs attention to important features of the screen
- Induces mood
- Communicates meaning and furthers the narrative in ambiguous situations
- Enables the symbolization of past and future events (through leitmotifs)
- Heightens the sense of reality of or absorption in film
- Adds to the aesthetic affect of the film

Annabel Cohen (1999)

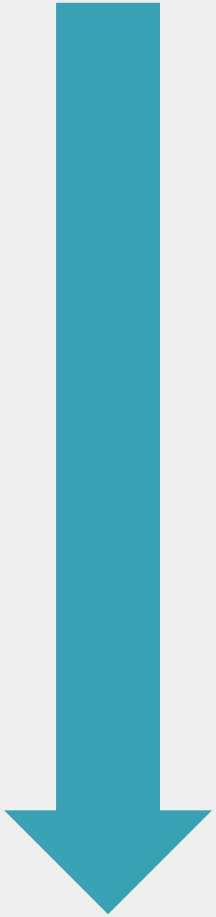


# Functions of game audio?

# Functions of film music

- Music masks extraneous noises
- Provides continuity between shots
- Directs attention to important features of the screen
- Induces mood
- Communicates meaning and furthers the narrative in ambiguous situations
- Enables the symbolization of past and future events (through leitmotifs)
- Heightens the sense of reality of or absorption in film
- Adds to the aesthetic affect of the film

Annabel Cohen (1999)



**support interactive aspects of the game play!**

# Different functions of sound and music for games

- Diegetic vs. extradiegetic sound
  - Diegetic: originates from a source existing with the film or game world
  - Extradiegetic: no connection to an actual source within the film or game world

- Transdiegetic sound in games: different to extradiegetic sound in films
  - Extradietegic sound can provide game player with information that changes players' actions, which in turn can change the game world

Jørgensen, K. (2009): A Comprehensive Study of Sound in Computer Games: How Audio Affects Player Action. Mellen Press.

# Different functions of sound and music for games

- Function of transdiegetic sound within the game
  - Connecting the atmospheric and the functional role of game audio, working as an interface between the game system and the game world.
- Dual nature of games: virtual world and user system
  - 1) Sound: usability system (e.g. beep as indication of illegal actions); highly informational and communicative
  - 2) Sound: confirm reality status of the game world (e.g. support sense of presence)
- Challenge: combine 1) and 2)

Jørgensen, K. (2009): A Comprehensive Study of Sound in Computer Games: How Audio Affects Player Action. Mellen Press.

# Game audio typologies

- Production-based typology: speech, sound, music
  - Refer to distinct paths in the production process of game audio
  - Result in three types of assets: voice recordings, sound effect files, music files
  - Problem: no distinction between different functions of music possible in this typology

Huiberts, S. (2010) Captivating Sound. The role of audio for immersion in computer games. PhD thesis Utrecht School of the Arts & University of Portsmouth.

# Game audio typologies: IEZA model

- Huiberts & van Tol (2008)
- Conceptual design tool for game and audio design students at HKU
- Applies to game audio during the interactive game play

# Game audio typologies: IEZA model

- **Diegetic**: sounds that communicate what exists in the fictional game world or 'game space'
- **Non-diegetic**: sound that communicates the sound sources 'outside of' the fictional game world
- **Activity**: communicates events occurring in the game environment, directly reactive to the players' actions
- **Setting**: provides background or context for activity, does not respond directly to players' actions

# Game audio typologies: IEZA model

- **Effect**: contains sound objects that are perceived as being produced by or attributed to sources that exist within the game world
- Sounds: react to the player in a way that refers to sounds in the real world; often **dynamically processed** using techniques such as real-time volume changes, panning, filtering
- Examples: 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


Red Dead Redemption https://www.youtube.com/watch?v=ufZ1uchM9AA

# Game audio typologies: IEZA model

- **Zone**: sound sources clearly originate from the diegetic part, are linked to the environment in which the game is played
- often referred to as ambient, environmental or background sound
- Example: weather sounds of wind and rain in *Worms 3D* (2003)
- sound sources: no direct interaction with the player, but add a feel to the world of the game

# Game audio typologies: IEZA model

- **Interface**: sound that belongs to sound sources outside of the fictional game world
- 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
- references to the diegetic concept can be incorporated: e.g. *Tony Hawk Pro Skater 4* (2002), interface sound instances of the in-game menu consist of the skidding, grinding and sliding sounds of skateboards

# Game audio typologies: IEZA model

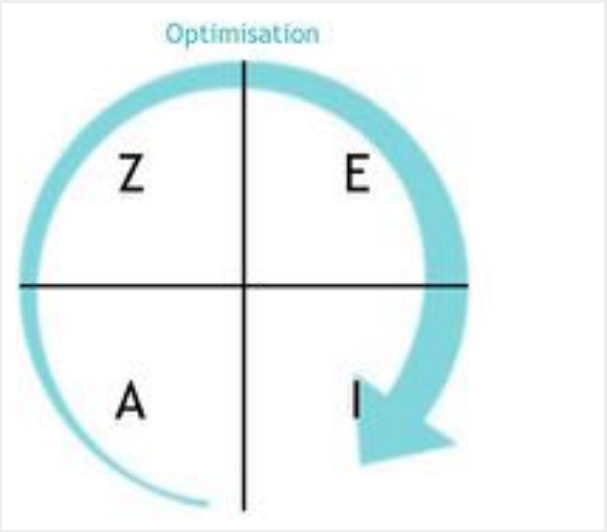
- **Affect**: sounds that are linked to the non-diegetic part of the game environment, expressing the non-diegetic setting of the game
- Example: orchestral music in an adventure game
- not always constructed of music (e.g. as many games use horror sound effects or synthesized sounds)
- used to add or enlarge social, cultural and emotional references

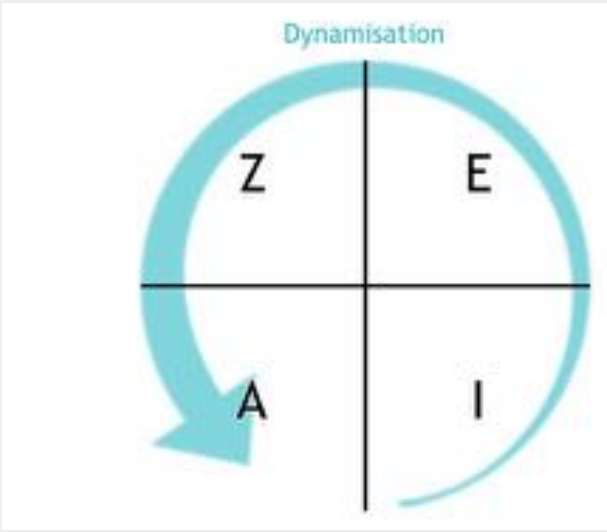
Thomas was alone

https://www.youtube.com/watch?v=YDaa3Cq6c7M

# IEZA model: two functionalities

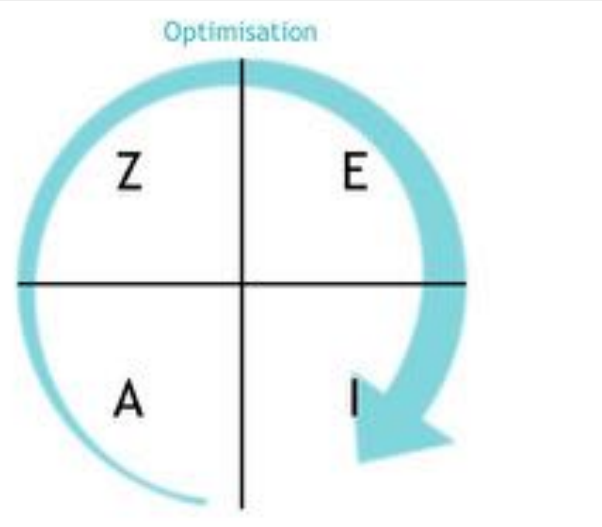
- two main perspectives on the expression of in-game audio aimed at the player's experience:
  - Audio used for **optimizing** game play:  helping the player to play the game by providing necessary gameplay information; serves usability
  - Audio used for **dynamizing** game play: making the gameplay experience more intense and thrilling

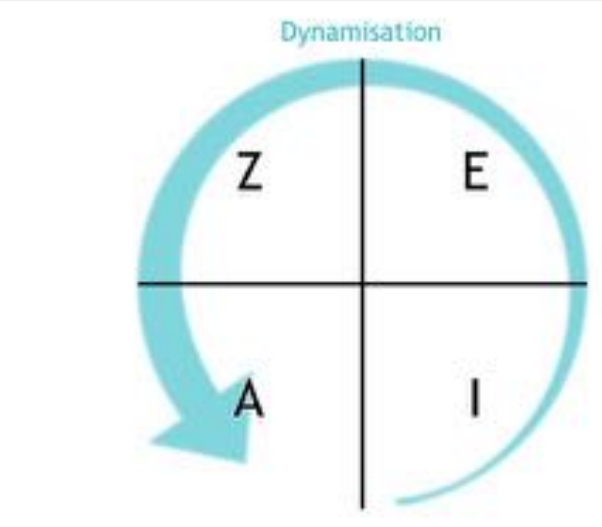


# IEZA model: two functionalities

- Many audio assets are designed and implemented to **serve both functions** at the same time.
  - For example: sound of a weapon communicates important information about the weapon itself, as well as making the experience more exciting
  - Optimisation: makes the game understandable, can have a positive influence on immersion



# Today

- Main modules
  A. Sound and music for games
     - Different functions of sound and music within games
     - Challenges of interactivity and immersion

# Immersion

- no generally accepted definition of term *immersion,* instead different descriptions in literature, e.g.
  - the experience of losing a sense of embodiment in the present whilst concentrating on a mediated environment
  - losing track of immediate physical surroundings
  - being transported into the game world
  - being absorbed in the activity
  - being identified with the situation or a character of the game

Huiberts (2010), p. 36

# Immersion:
## some systematic aspects by Sander Huiberts

- Sander Huiberts, PhD
- Three basic aspects of game immersion
  - 1- Being transported into the game world
  - 2- Absorption in the activity
  - 3- Identification with the situation or a character of the game

# Immersion:
## some systematic aspects by Sander Huiberts

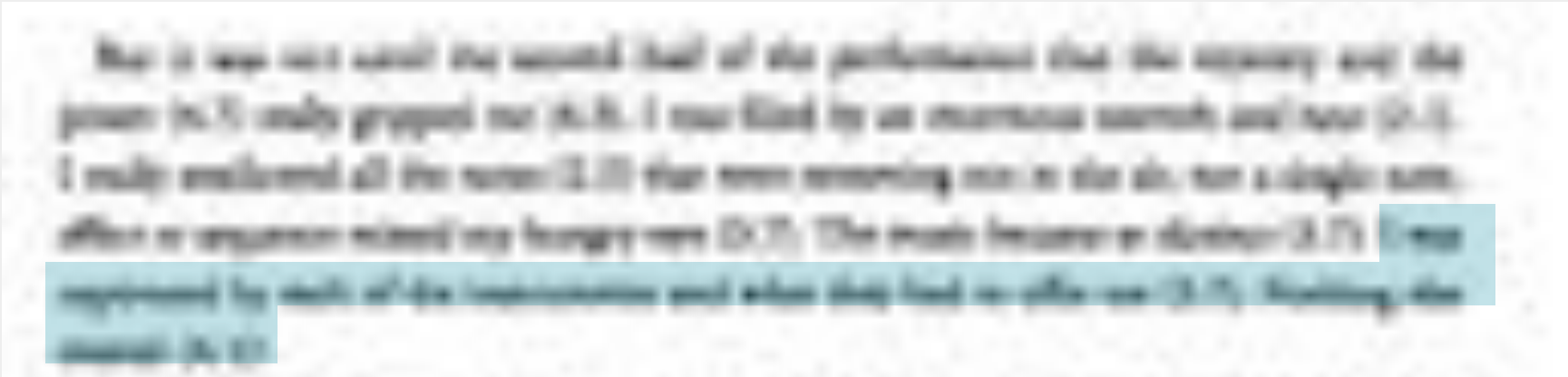
- Sander Huiberts, PhD
- Three basic aspects of game immersion
  - 1- Being transported into the game world
    - e.g. sensory features stimulate the feeling of being there
  - 2- Absorption in the activity
    - e.g. challenge-based immersion
  - 3- Identification with the situation or a character of the game
    - e.g. imaginative immersion
    - e.g. emotional responses: increasing the empathy through specific mood

# Immersion:
## some systematic aspects by Sander Huiberts

- Sander Huiberts, PhD
- Three basic aspects of game immersion
  - 1- Being transported into the game world
    - e.g. sensory features stimulate the feeling of being there
  - 2- Absorption in the activity
    - e.g. challenge-based immersion
  - 3- Identification with the situation or a character of the game
    - e.g. imaginative immersion
    - e.g. emotional responses: increasing the empathy through specific mood

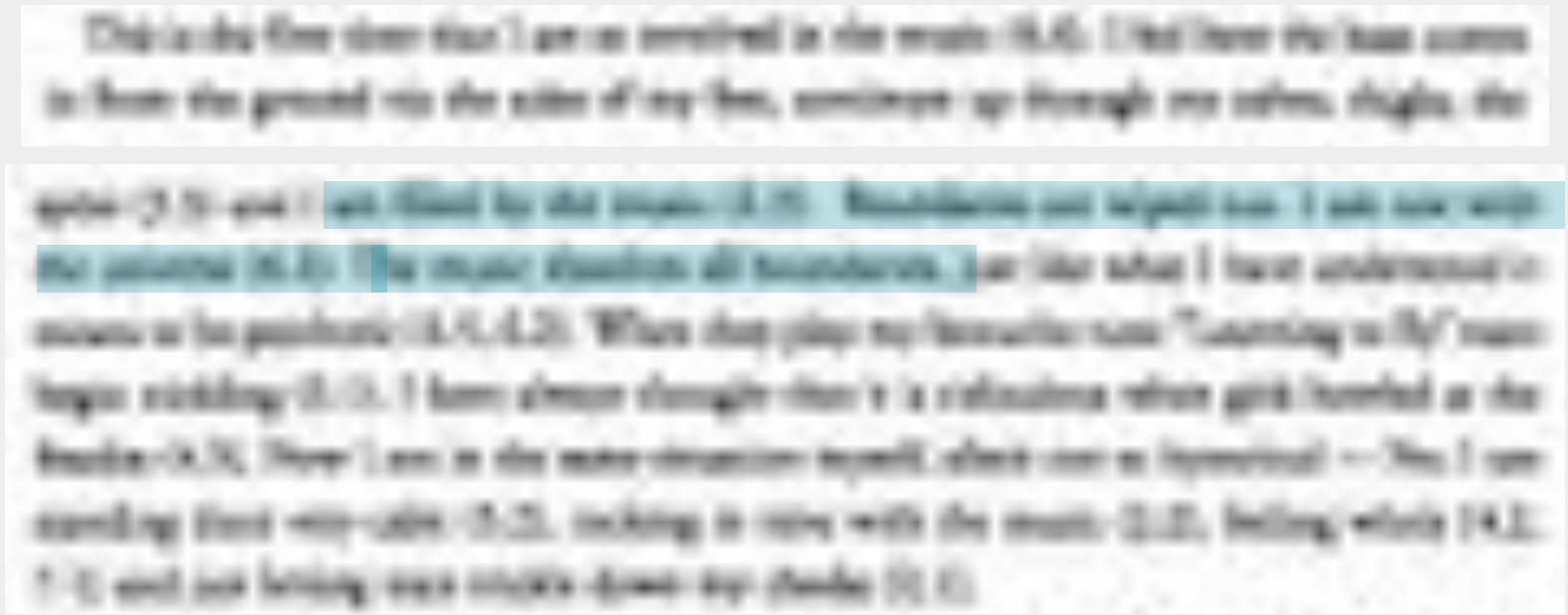
# Strong experiences related to music

- Empirical study by Gabrielsson & Wik (2003)
  - 900 people reporting on strong experiences of music



Someone listening to a band playing Finnish tango in a pub

# Strong experiences related to music



Someone listening to Pink Floyd in a concert

# Strong experiences related to music

- Empirical study by Gabrielsson & Wik (2003)
  - 900 people reporting on strong experiences of music
  - complete absorption
  - one did not think about where one was or for how long this would last
  - I was totally caught in the experience
  - everything around me did not exist
  - time and space ceased to exist
  - I dreamed myself away

# How can we create music for games…

- … that induces these strong experiences and contributes to immersive experience of games?

# Challenge

- **How** is music inducing these experiences and emotions?
  - What do we know from the scientific perspective?
    - Juslin & Vjästfäll (2008); Juslin, Harmat, Eerola (2013)

# How is emotion induced?

- (1) brain stem reflex
- (2) rhythmic entrainment
- (3) evaluative conditioning
- (4) contagion
- (5) visual imagery
- (6) episodic memory
- (7) musical expectancy
- (8) aesthetic judgment

BRECVEMA

# BRECVEMA

- (1) brain stem reflex
  - hard-wired attention response
  - acoustic features (e.g. extrem loudness or speed)
  - Prepares body to react
  - quick and automatic

# BRECVEMA

- (2) rhythmic entrainment
  - Adjustment of internal body rhythm to external rhythm in music
  - E.g. adjusted heart rate can spread to other components of emotion
  - Hightens arousal

# BRECVEMA

- (3) evaluative conditioning
  - Certain music associated with certain events
  - Music repeatedly paired with other negative/positive stimuli
  - Then music evokes these negavie/positive associations
  - conditioned association

# BRECVEMA

- (4) Contagion
  - listener perceives the emotional expression of the music, and then "mimics" this expression internally
  - Induction of the same emotion

  - difference between "perceived" and "induced" emotion
  - here the "perceived" emotion leads to an "induced" emotion

# BRECVEMA

- (5) Visual Imagery
  - inner images of an emotional character conjured up by the listener through a metaphorical mapping of the musical structure
  - E.g. “beautiful landscape”
  - experienced emotions are the result of a close interaction between the music and the images

“When the melody was augmented by a predictable harmonic sequence, he started to fantasize about the music, conjuring up visual images – like a beautiful landscape – that were shaped by the music’s flowing character (i.e., visual imagery)” (Juslin & Västfjäll, 2008)

# BRECVEMA

- (6) Episodic memory
  - an emotion is induced in a listener because the music evokes a memory of a particular event in the listener's life
  - "darling, they are playing our tune"

# BRECVEMA

- (7) Musical expectancy
  - emotion is induced because a specific feature of the music violates, delays, or confirms the listener's expectations about the continuation of the music
  - E.g. Feeling of being "surprised", arousal, tension

# BRECVEMA

- (8) Aesthetic judgment
  - subjective evaluation of the aesthetic value of the music based on an individual set of weighted criteria

# Examples in game music

- (1) brain stem reflex
- (2) rhythmic entrainment
- (3) evaluative conditioning
- (4) contagion
- (5) visual imagery
- (6) episodic memory
- (7) musical expectancy
- (8) aesthetic judgment

BRECVEMA

# Summary immersion

- Different types of immersion
- Emotional aspects of music form important part for identification with the situation or a character in the game

# Literature


- Cohen, A. (1999): The functions of music in multimedia: A Cognitive Approach, in Music, Mind and Science, Seoul, Korea
- Volk, A. & Wiering, F. (2011), Tutorial Musicology at ISMIR 2011
  - http://ismir2011.ismir.net/tutorials/ISMIR2011-Tutorial-Musicology.pdf
  - Check out regarding: music and meaning
- Stevens and Reybold (2013): Game audio tutorial
- Huiberts, S. (2010) Captivating Sound. The role of audio for immersion in computer games. PhD thesis Utrecht School of the Arts & University of Portsmouth.
- Friberg, J. & Gärdenfors, D. (2004). *Audio games  New perspectives on game audio* [Electronic version]. Paper presented at the ACE conference in Singapore, June 2004.
- Stockburger, A. (2003), *The game environment from an auditive perspective*. In Copier, M. and Raessens, J. (Eds). Level Up, Digital Games Research Conference. Utrecht: The Netherlands: Faculty of Arts, Utrecht University.