Department of Computer Science

Aesthetic Emotions in Digital Games: The Appeal of Moving, Challenging, and Thought-Provoking Player Experiences

Julia Ayumi Bopp

Aalto University

DOCTORAL DISSERTATIONS

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Julia Ayumi Bopp

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Abstract

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Abstract

Film, music, literature, and the visual arts are all acclaimed for their capacity to afford emotionally rich experiences, including aesthetic emotions typically considered negative and challenging. Games, in contrast, have been argued to be less effective at evoking a similarly broad spectrum of emotions due to their inherent focus on gameplay and mechanics. Concurrently, efforts in player-computer interaction have mostly concentrated on fun, flow, and need satisfaction. As a consequence, several empirical and conceptual gaps in our understanding of the player experience remain: We know little about what kind of aesthetic emotions players feel, to what extent they value such experiences, how games evoke these emotions, and what the outcomes of such experiences may be.

This thesis addresses these research gaps in five empirical studies. Results from Publication I, Publication II, and Publication III showcase that players experience a range of aesthetic emotions in games, typically associated with other art forms. Games also afford unique aesthetic emotions, such as remorse and a sense of responsibility. Publication I and Publication III highlight that players enjoy and appreciate such aesthetic emotional experiences, in some instances, precisely because of games evoking intense negative feelings. Moreover, Publication I, Publication II, and Publication III identify means through which games facilitate aesthetic emotions, including tough decisions, as well as attachment to and loss of game characters. Players' personal experiences and memories also shape the gaming experience, highlighting how games can profoundly impact players in different ways. Notably, Publication IV showcases games' potential for affording aesthetic epistemic emotions, experiences that prompt reflection on the self and others. Finally, Publication V provides insights on how a VR game specifically designed to stimulate reflection fostered understanding and empathy for others in distress, both in-game and in real-life.

This thesis contributes to empirical and conceptual problem-solving in player-computer interaction. First, it provides empirically based descriptions of the hitherto little explored phenomenon of aesthetic emotions in games and their potential outcomes. Second, it contributes to a more nuanced understanding of positive player experience and helps to clarify concepts such as emotional challenge and character attachment. Finally, the thesis highlight game aspects that play an important role in affording aesthetic emotional experiences, and outlines avenue for future research.

Keywords Player Experience, Emotion, Aesthetic Emotion, Games

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Preface

The research presented in this thesis was conducted between 2016 and 2020 at the Department of Computer Science at Aalto University, and at the Department of Psychology at the University of Basel.

First, I would like to express my deepest gratitude to my supervisor Professor Elisa Mekler who was always there for guidance and inspirational discussions throughout all these years. Thank you for introducing me to the topic and research of emotional player experience. Without her support, patience, direct feedback and, especially, encouragement, I would not have finished this long journey. I also want to thank our research group members, April Tyack and Jan Vornhagen, for providing helpful feedback on this thesis and the interesting and cheerful discussions in the coffee breaks.

I am sincerely thankful to Professor Klaus Opwis of the University of Basel, who provided support and freedom to explore a topic of my interest and opened the door to empirical aesthetics. Many thanks also to current and past members of MMI Basel lab for lots of advice and fun moments within and outside the academic life.

Further, I am grateful to the pre-examiners, Professor Regan Mandryk of the University of Saskatchewan and Dr. Marcus Carter of the University of Sidney, for their valuable comments and feedback to this thesis. I also would like to thank all my co-authors – I have learnt a lot about conducting studies and writing papers, but also about collaboration and teamwork. Special thanks to Martijn Kors for sharing the hardship of writing a dissertation.

I want to thank all my friends for their help and friendship during these years. A special thanks to Niveditha Putananickal for being there, listening to, and encouraging me during both cheerful and difficult times. Many thanks also to Stefanie Deschler, Leo Walzer, and Kimito Hoshino for the engaging discussions around games, taking part in studies, and sharing interest in emotional game experiences.

Finally, I am deeply thankful to my family. I couldn't have made it through this journey without the emotional support of my parents, Miki

Bopp and Urs Bopp, who always believed in me. Fabian Martinis, my fiancé, thank you so much for countless times of proofreading and providing feedback to papers and this thesis, and for being there for me no matter what.

Helsinki, October 22, 2020,

Julia Ayumi Bopp

Contents

List of Publications

This thesis consists of an overview and of the following publications which are referred to in the text by their Roman numerals.

I Julia Ayumi Bopp, Elisa D. Mekler, and Klaus Opwis. Negative Emotion, Positive Experience?: Emotionally Moving Moments in Digital Games. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems.*, San Jose, 2996–3006, **Honorable Mention**, 10.1145/2858036.2858227, May 2016.

II Julia Ayumi Bopp, Livia J. Müller, Lena Fanya Aeschbach, Klaus Opwis, and Elisa D. Mekler. Exploring Emotional Attachment to Game Characters. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play (CHI PLAY)*, Barcelona, 313-324, **Honorable Mention**, 10.1145/3311350.3347169, October 2019.

III Julia Ayumi Bopp, Klaus Opwis, and Elisa D. Mekler.. "An Odd Kind of Pleasure": Differentiating Emotional Challenge in Digital Games. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, Montreal, 41, 10.1145/3173574.3173615, April 2018.

IV Elisa D. Mekler, Ioanna Iacovides, and Julia Ayumi Bopp. "A Game that Makes You Question..." Exploring the Role of Reflection for the Player Experience. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY)*, Melbourne, 315-327, **Best Paper**, 10.1145/3242671.3242691, October 2018.

V Martijn J.L. Kors, Erik D. van der Spek, Julia Ayumi Bopp, Karel Millenaar, Rutger L. van Teutem, Gabriele Ferri, Ben A.M. Schouten. The Curious Case of the Transdiegetic Cow, or a Mission to Foster Other-Oriented Empathy Through Virtual Reality. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, Honolulu, 619, 10.1145/3313831.3376748, April 2020.

Author's Contribution

Publication I: "Negative Emotion, Positive Experience?: Emotionally Moving Moments in Digital Games"

The author designed the study, collected and analysed the data, and wrote the paper under the supervision of Prof. Mekler.

Publication II: "Exploring Emotional Attachment to Game Characters"

The author was responsible for the study design, data collection, data analysis, and writing the paper. Prof. Mekler provided guidance and feedback throughout the project. The other co-authors assisted with brainstorming survey questions, recruiting, and provided feedback on paper drafts.

Publication III: ""An Odd Kind of Pleasure": Differentiating Emotional Challenge in Digital Games"

The author was responsible for the study design, data collection, data analysis, and writing the paper. Prof. Mekler provided guidance and feedback throughout the project.

Publication IV: ""A Game that Makes You Question..." Exploring the Role of Reflection for the Player Experience"

The author prepared the interview protocol, transcribed half of the interviews, and conducted the qualitative analysis. The author also wrote part of the results section.

Publication V: "The Curious Case of the Transdiegetic Cow, or a Mission to Foster Other-Oriented Empathy Through Virtual Reality"

The author conducted open coding of the emotional data, as well as closed coding of the entire data set together with the first author. The author also wrote parts of the results and discussion sections, and assisted the first author in writing the rest of the paper by providing feedback and making revisions.

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Abbreviations

BAFTA British Academy of Film and Television Arts

HCI Human-Computer Interaction

NPC Non-player character

PX Player Experience

RQ Research Question

VR Virtual Reality

1. Introduction

Emotions are at the heart of the aesthetic experience [33, 160]. Film, literature, music, visual and interactive arts are all acclaimed for their ability to evoke a range of emotions [5, 158, 168]. Digital games, however, were long dismissed as an aesthetic medium. Film critic Roger Ebert for instance, declared that "video games cannot be art" [41], and director Steven Spielberg has purportedly claimed that games can only be considered art once someone confesses to having cried [151]. In contrast to other media and art forms, it seems that games inspire few emotionally rich experiences. However, digital games have also received praise as an artistic medium that can afford rich emotional experiences [170], underlined by instances of players mourning the loss of a companion character in *Planetfall* [84, 119], as well as the infamous death of Aeris in *Final Fantasy VII* [171, 172]. Further, several games such as *Journey* [176] and *Hellblade: Senua's Sacrifice* [132], were awarded with the BAFTA Games for their 'Artistic Achievements' [19, 20].

Despite these examples, player-computer interaction has to date seemingly failed to recognize digital games as aesthetic artefacts capable of affording emotionally rich experiences. Player experience (PX) research predominantly focuses on fun and enjoyment [101, 114], need satisfaction [180], and immersion and flow [31, 173] when investigating what makes for "good" player experiences. For instance, PX studies have often equated good player experience with positive affect [114]. As a consequence, player-computer interaction lacks both an empirical and conceptual understanding of players' aesthetic experiences, such as the appeal of traditionally negatively valenced emotional experiences. Concurrently, many research gaps remain unaddressed, leaving unclear which aesthetic emotions players experience through games, whether they find them rewarding, what evokes these emotions, and what the outcomes of such experiences are.

This thesis addresses these research gaps by exploring players' experience of 'aesthetic emotions', – emotions evoked via aesthetic artefacts [167, 168]. Specifically, this thesis explores (RQ1) the aesthetic emotions players feel in context of digital games, (RQ2) to what extent players value

Table 1.1. An overview of the publications addressing each of the research questions.

Research Questions	Publications
1. Which aesthetic emotions do players experience?	I, II, III
2. To what extent do players value them?	I, III
3. What evokes aesthetic emotions in games?	I, III
4. What are the benefits of such experiences?	IV, V

them, (RQ3) the contributing game-based and personal factors, and (RQ4) the benefits such experiences may promote (see Table 1.1).

1.1 Contributions

The thesis contributes to the research and design of games in the field of aesthetic emotional experiences. The main contributions of this thesis are as follows:

- The empirical findings of the publications highlight the role of aesthetic emotions in the player experience. First, players clearly experience a broad palette of aesthetic emotions, potentially just as broad as other media and artworks may afford [76, 168], counter to claims by those critical of the medium [41, 151]. Second, games also afford aesthetic emotions that are unique to the medium: For instance, games evoke aesthetic emotions, such as remorse and sense of responsibility, by requiring players to take tough decisions themselves, which may have undesired consequences for a character they feel emotionally attached to. These findings highlight the emotional spectrum digital games can afford.

- These studies contribute to empirically describing the little explored phenomena and factors, and effects of aesthetic emotions in player-computer interaction [139], by showcasing how players enjoy and appreciate various aesthetic emotions for different reasons. Hence, they expand our notion of what makes for a "good" player experience beyond fun and enjoyment. Experiencing intense emotions, including those traditionally considered negative, was perceived as inherently gratifying. Players also value when games prompt them to reflect on the self and others.

- The studies showcase potential capacity of games designed for entertainment purposes to deeply impact players on a personal level and to prompt sense-making of their personal experiences, as well as empathy for others, contributing to our understanding of attitudinal outcomes of game-play.

- The empirical findings contribute to a more nuanced understanding of core PX concepts: Publication II extends hitherto limited notion of character attachment and the basic psychological need of relatedness (e.g., [83, 155]). Publication III fleshes out the hitherto empirically unexplored notion of emotional challenge [27], providing the basis for subsequent studies [144] and questionnaire development efforts [37] around challenge in games.

- The thesis identified several game design aspects that facilitate the experience of aesthetic emotions, ranging from becoming emotionally attached and losing characters, to reduced agency and tough decisions. Publication V provides design implications for fostering empathy for the others in distress through a partaker-perspective (i.e., witnessing another's distress through the player character), as well as by encouraging players to reflect as an in-game task.

- The presented work has also had methodological impact on subsequent PX studies: Recent studies on related topics [63, 187] based their empirical approach, questions, and measures on Publication I and Publication III.

1.2 Outline of the thesis

Chapter 2 introduces the concept of aesthetic emotions, and then briefly summarizes related research within different media and art forms. Chapter 3 focuses on the interplay of positive and negative emotions in games, followed by findings from Publication I. Chapters 4 and 5 introduce the notions of emotional character attachment and emotional challenge, as well as Publication II and Publication III, respectively. With regards to the benefits of aesthetic emotional experiences in games, chapter 6 provides an overview of work around the outcomes of aesthetic emotions and concludes with findings from Publication IV and Publication V. In chapter 7, the thesis ties all findings together, and contextualizes them within related work. It also highlights questions and blind spots for future work in player-computer interaction. Finally, chapter 8 concludes this thesis with key takeaways.

2. Aesthetic Emotion

Humans are an emotional being, and everybody arguably has some understanding of what it means to feel emotions. But what is an emotion? Since James first posed this question in 1884 [85], it has been the focus of much debate across disciplines [159]. To date, several theories on emotions were introduced based on different approaches: For instance, emotions become apparent through distinct physiology and bodily expressions [85], such as facial expressions [35], that enable distinguishing universal basic emotions (although these may also be distinct in other aspects, such as cognitive aspects [46, 47]). In contrast to this discrete perspective on emotions (e.g., [46, 47]), others argued that emotions are highly related to one another, suggesting a multi-dimensional model of affective states [154]. Yet another prominent theory considers emotions to be shaped through appraisals (i.e., evaluations) of the moment and situation according to different dimensions, such as novelty and pleasantness (e.g., [157]). Scherer [159] defined five components of emotions combining many of the above mentioned perspectives: emotions consist of cognitive (appraisals), neurophysiological (bodily symptoms), motivational (action tendencies), motor expression (facial and vocal expressions), and subjective feeling component (emotional experience). Generally, this thesis refers to Scherer's [159] notion when addressing emotions. However it must also be noted that research on emotions was criticised for its individualist view, with studies stressing the importance of exploring social influence on how we experience and express emotions to others [152]. Besides defining emotions, Scherer [159] also distinguishes between different types of emotions, aesthetic and non-aesthetic emotions. As this thesis is interested in emotional experiences with digital games, it will exclusively refer to the notion of *aesthetic emotion*, introduced next.

Emotions are at the core of the aesthetic experience [33, 160] – whether we encounter visual art [141, 167], music [44, 90], literature [111, 133], film [5, 7], or interactive art [11]. Due to their central role in aesthetic experiences, these have been termed *aesthetic emotions*. However, the boundary to non-aesthetic emotions is blurry [76, 160] and thus, different

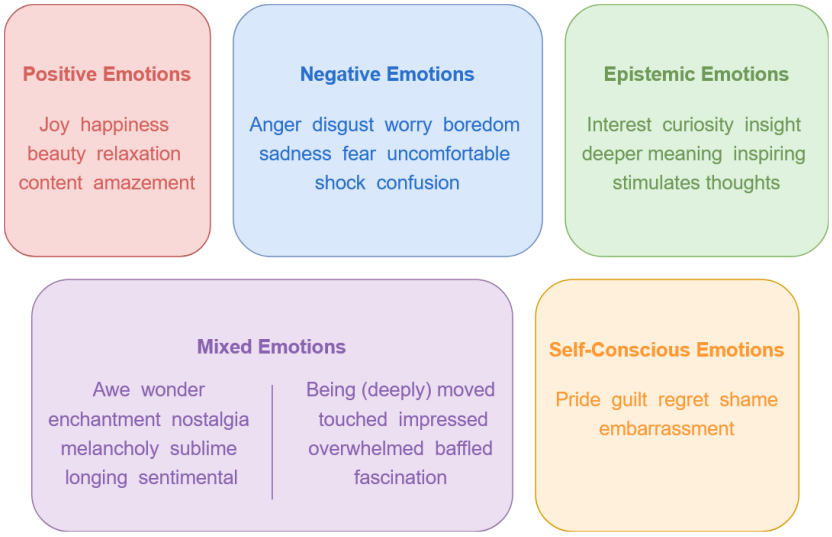

Figure 2.1. Overview of aesthetic emotion categories with example emotions discussed in relation to artworks. Based on [76, 168].

notions of aesthetic emotions exist. For instance, referring to Kant's [94] notion of aesthetic experience as disinterested pleasure, Scherer [159] explains that aesthetic emotions are those that do not cater towards a specific goal. As an example, fear is not an aesthetic emotion because it alerts us of danger, thus has the goal to prepare us for a fight or flight. In contrast, being moved is an aesthetic emotion which may involve goosebumps, a bodily symptom also associated with fear, yet not in service of behavioral readiness [159]. In general, aesthetic emotions can be categorized into negative, positive, and intellectual, with further more granular distinctions ([76]; Figure 2.1): Broadly, the negative cluster consists of feelings related to sadness, fear, anger, and confusion, whereas the positive cluster covers joy, beauty, and relaxation. The intellectual cluster is further divided into mixed emotions, including awe-related emotions and being moved, and epistemic feelings. Emotions, such as guilt and pride, are typically thought of as non-aesthetic, as these are usually evoked through social interaction rather than via the aesthetic artefact [118, 158, 160]. In contrast, Silvia [168] argues that artworks may evoke any kind of emotions, and therefore suggests to consider all emotional responses as aesthetic. Accordingly, Silvia [168] considers self-conscious emotions (e.g., pride, guilt) aesthetic.

Artworks that are difficult to interpret are thought to give rise to more complex aesthetic emotions, rather than mere feelings of pleasure and arousal [33]. Confronting such an artwork, people enter a reflective mode: People refer to their own experiences with nuanced emotions and emotion blends to find an appropriate combination allowing understanding of the artefact's meaning [33]. Moreover, aesthetic artefacts may trigger personal

memories, letting people re-experience emotions experienced in their past [55, 111, 120, 133].

Various cognitive and social benefits of aesthetic emotional experiences were found [5, 11, 18, 33, 165]. Aesthetic artifacts can challenge people's personal convictions and schemas, encouraging reflection, and in turn, result in new insights [5, 11, 33, 141, 165]. On the one hand, this may provide people with new moral ideas or different world-views, which will encourage them to reflect on their self and their life, and in turn, help them understand themselves better [55, 136, 165]. As each new artwork may add to people's range of aesthetic emotions [111], it may also support sense-making of people's own emotions [4, 55]. Further, triggering emotions linked to a personal memory, it may provide an occasion to process emotions people have not assimilated so far [111]. On the other hand, it may stimulate people to think about how others (e.g., the artist) experience the world and how they think and feel, and as such, promote empathy and a better understanding of the others [18, 165]. Further, people feel gratification from sharing aesthetic emotional experiences with other people, which fosters empathy for and closeness to others [5, 11]. These downstream effects may be one reason why such experiences are frequently linked to meaningfulness [7, 29, 99, 135].

Aesthetic emotions have been empirically researched across different media and art forms. As they have addressed a wide spectrum of emotional experiences, the following sections briefly introduce research on visual art, music, literature, film and television, as well as interactive art and design.

2.1 Visual Art

In the last decade, several empirical studies explored the experience of both specific and general aesthetic emotions in context of visual art. For instance, art museum visitors mentioned a range of different emotions, ranging from interest, amusement, and nostalgia to astonishment, pity, sadness, and disgust [177]. Studies also showcase that people report feeling touched, absorbed, and chills [169], wonder [122], awe [166], and, to a lesser degree, the sublime [79, 140] in response to visual artworks.

Pelowski [142] introduced a model explaining people's experience of 'feeling like crying', and empirically explored the experience in three museums, such as the Rothko Chapel (Figure 2.2). Entering the Rothko Chapel, the paintings' opacity and redundancy challenge the viewers' schema (e.g., paintings portray things) and self-image (e.g., I am an experienced art student). This results in a discrepancy, evoking anxiety, tension, and confusion. The viewer then can disengage from the discrepancy by, for instance, re-framing the artwork as "it is not art", resulting in sadness and anger. Instead of disengaging, the viewer can also accept their failure

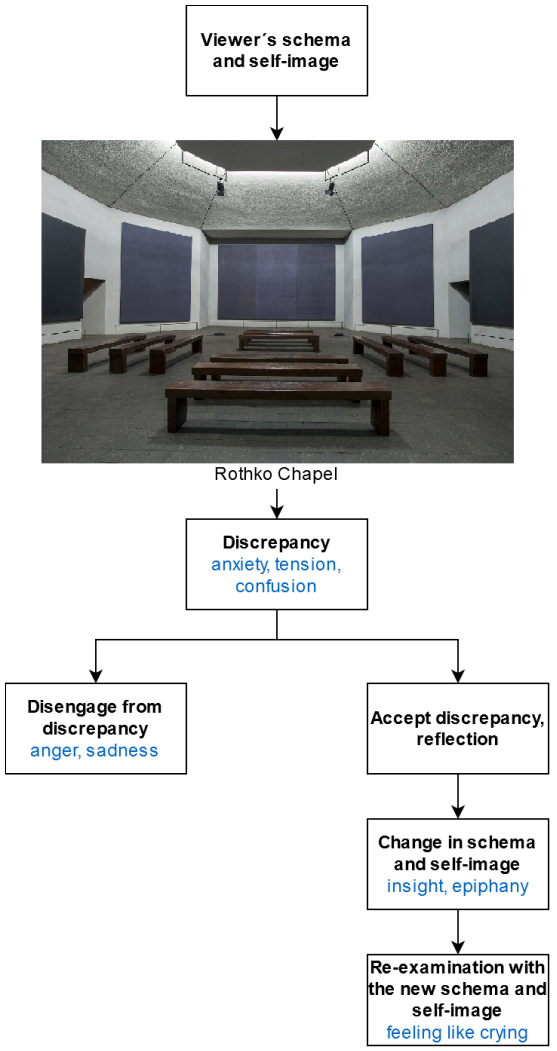

Figure 2.2. Simplified model of Pelowski [142] explaining Rothko Chapel visitor's experience of 'feeling like crying'. Picture of Rothko Chapel retrieved from `www.rothkochapel.org/experience/gallery/`

Figure 2.3. Meret Oppenheim's *Frühstück in Pelz* (1936), in English known as "*Breakfast in Fur*". Picture retrieved from https://tageswoche.ch/wp-content/uploads/2013/09/imagescms-image-002987374.jpg

to immediately understand the artwork, and reflect on its meaning, similar to reflective mode [33]. This may result in new insight and epiphany, leading to a change in their schema and self-image. Re-examining with the new schema and self-image, the viewers eventually find harmonising understanding of the artwork, evoking 'feeling like crying'. Supporting the model, 'feeling like crying' was associated with higher ratings on epiphany and meaningfulness [142].

Modern artworks were argued to evoke interest and other feelings through different forms of visual ambiguity that challenges the viewer [126, 127, 128]. For instance, the ambiguity in Meret Oppenheim's *Frühstück in Pelz* (in English known as "*Breakfast in Fur*"; Figure 2.3) lies in the context how familiar objects (teacup and fur) are presented, evoking the feelings of inconvenience and irritation [128]. Thus, ambiguity may be considered a form of discrepancy [142]. Indeed, Muth et al. [127] found that the higher the perceived ambiguity, the stronger was the subjective insight viewers draw from the artworks.

2.2 Music

Music is known to both convey and evoke emotion [54, 64], which often coincide [54]. In general, music elements, such as mode and tempo, express different emotions. For instance, sadness can be expressed by minor mode, low pitch level, firm rhythm, and slow tempo [54]. Contrast of solo instrument and orchestra, a sudden or gradual increase of volume, and slow movement was characteristic to chills [64] that occur in strong emotional experiences with music [55, 64].

Listening to music, people frequently experience feelings of being moved, tender, nostalgic, relaxed, and enchanted [91, 122, 191]. While Zentner and

Scherer [191] argue that negative emotions are expressed by music rather than felt by people, others highlight the diversity of negative emotions felt by listeners. Strong musical experience is characterized by a wide range of felt negative emotions, such as confusion, shame, shock, anger, and feeling lonely [55]. Memorable and familiar sad music has been found to evoke powerlessness, grief-stricken, and pleasant melancholia [42]. Further, several studies addressed the paradox of sad music enjoyment (i.e., people enjoying listening to music expressing sadness [42, 43, 143, 182]). Studies found different types of felt sadness [43, 143], and argue that this nuance in sadness is the key to the paradox [143]. Sadness accompanied by being moved was enjoyed for aesthetic reasons and for the "beauty of the emotion itself" (p. 96), whereas other forms of sadness were experienced negatively [143]. Others state that, not sadness, but being moved contributes to enjoyment of sad music, based on the fully mediating role of being moved they have found [182].

2.3 Literature

In the context of literature, emotions are evoked through two main routes [133]. First, emotions arise through how the text is presented, giving rise to feelings, such as, curiosity, admiration and being moved [111, 133]. These aesthetic feelings [111, 120] mainly pertains to the formal aspect of the writing (e.g., style, narrative [120, 133]). For instance, original poems, compared to those missing parallelistic features (literary tool to connect and emphasize ideas, e.g., rhymes, repetitive terms), were rated significantly more emotionally moving [117]. Besides enhancing beauty and melodiousness, parallelistic features intensified felt sadness, which may be experienced as inherently rewarding and moving [117].

Second, literature consists of stories and characters, giving rise to the narrative feelings [111, 120]. Readers feel sympathy for or identify with the characters and their situations [133]. Personal aspects also account for emotional experience, when a narrative event triggers a reader's "emotion memory" (p. 63, [133]), letting them recall and relive emotions comparable to those felt by the characters [111, 120, 133]. Kotovych et al. [98] found that the less information of the protagonist was provided in short stories (i.e., higher ambiguity), the closer the readers felt emotionally to the protagonist. They argue that people will refer to their own experience to fill in the missing pieces of information, and in turn, understand the character better [98].

2.4 Film and Television

As screen media, films and television series are endued with different ways to include emotion cues (e.g., lighting, camera movement and editing; [4]). They are considered particularly powerful in conveying metaphorical meaning by, not only text lines, but using wordless audiovisual cues [4]. For instance, the sadness of Jack's death in *Titanic* (1997) is conveyed by the dark lightning, slow music, and a close-up of Rose's facial expression. Additionally, portraying how Rose releases Jack's hands letting him sink into the depth of the sea underlines the grief by linking to the metaphor of "drowning in a sea of sorrow" [4].

Media psychology and communication research have long focused on people's enjoyment of entertainment media and the role of mood regulation [192, 193]. But as the success of *Titanic* showcases, people enjoy sad movies evoking feelings of sorrow and grief – a phenomenon called sad media paradox [134]. Sad and meaningful screen media were found to give rise to being moved [7, 65], as well as, elevation, a mixed emotional response when witnessing acts of moral beauty [137]. To account for the paradox, Oliver and Bartsch [135] introduced the notion of *appreciation* – a positive experiential state distinct from enjoyment "that is characterized by the perception of deeper meaning, the feeling of being moved, and the motivation to elaborate on thoughts and feelings inspired by the experience." (p. 76; [135]).

Screen media can perturb and challenge its viewers in various ways to afford aesthetic emotional experience [6, 69]: Affective challenge demands viewers deal with and regulate intense negative emotions, such as disgust and fear. In contrast, cognitive challenge requires intellectual skills to keep track of complex narrative, or to interpret the meaning behind it. Subsequent empirical study [6] showed that suspenseful films, such as horror and action movies, mainly provided affective challenge. Cognitive challenge was characteristic to intellectual movies, like documentaries, and was linked to appreciation. Films, such as light-hearted comedies, afforded neither form of challenge and were experienced as most, and exclusively, fun. In contrast, films demanding both types of challenge, like dramas and thrillers, while perceived as less fun, scored highest on appreciation.

People viewing emotional screen media draw gratification from the felt intense sadness evoked by empathizing with the characters [5, 134]. Others found that being moved mediated the link between felt sadness and positive rating of a sad film [7, 65], similar to sad music [182]. It was suggest that intense sadness will strengthen the feeling of being moved, which in turn will lead to positive experience [65].

Aesthetic emotions can also address viewers' social and cognitive needs [5]: For instance, sharing emotional film experiences with other people, as well as thoughts stimulated by the emotional experience were perceived

as rewarding. Meaningful films encouraged viewers to contemplate their lives in a more complex ways by confronting them with the imperfection of human life [136, 137]. Moreover, the connection between viewing sad media and its positive evaluation was not only mediated by being moved [65], but also by reflective thoughts inspired by the film [7].

2.5 Interactive Art and Design

While HCI generally seeks for comfortable, efficient, and positive experiences with technologies, deliberately designing for multiple interpretation [164] and ambiguity [16, 56, 58], discomfort [11, 12], and failure [71] can afford aesthetic experiences. The focus of these works is particularly on how to design for such experiences, rather than people's emotional responses. Nevertheless, they are typically based on art and media experiences, often feature negatively valenced emotional connotations, and are argued to provide benefits similar to other artworks (e.g., [5, 165]).

Multiple interpretations and ambiguity are deemed to prompt users to interpret the system by themselves [56, 164], encouraging personal interpretation and meaning-making [16, 58]. Ambiguous artefacts afford aesthetic emotional experiences [16], for instance, by evoking feeling lost [58]. Overtly ambiguous artifacts, however, give rise to confusion, and their experience risk to be perceived as meaningless [58]. Ambiguity is manifested in different ways, such as, deliberately providing unclear information or withholding it entirely [56]. For instance, *Affector* [16] lets the users apply distortion to their live video feed (stream) so their viewers are encouraged to find their own interpretation of the streamers' emotional state (Figure 2.4). Ambiguity can also be enhanced by presenting an aesthetic artefact in an unfamiliar context (similar to *Frühstück in Pelz* Figure 2.3), or by encouraging people to interpret the ambiguity within their personal relationship to the experience, which fosters 'self-examination' (e.g., what would I feel when using *Frühstück in Pelz*? [56]).

Others addressed deliberately designing for uncomfortable interaction with technology [11, 12, 71]. For instance, failing at playing the right sequence on an interactive piano, the system altered the notes of succeeding phases [71]. This afforded positively surprising experience, and promoted alternative musical interpretation [71]. Discomfort can be evoked viscerally, culturally, through control, and intimacy [11, 12]. For instance, in *Breathless* (by Brendan Walker), an audience member lays in a motored swing, which is controlled by another audience member (Figure 2.5). The rider surrenders control (i.e. discomfort through lack of control), whereas the other takes control over the swing (i.e. discomfort through too much control). Both participants also wear gas masks, which obstruct natural breathing and sight, and may be associated with the culturally uncom-

Figure 2.4. *Affector* [16] enables the user to choose different kinds of distortion to their stream video to increase ambiguity. Picture retrieved from [16].

Figure 2.5. *Breathless* (by Brendan Walker) affords uncomfortable experience through increased or lack of control, isolating participants by wearing gas masks, which impedes natural breathing and may be associated to war [11, 12]. Picture retrieved from [11].

fortable topic of war. Additionally, gas masks impede communication with other audience members (i.e., discomfort through a lack of intimacy). Similar to visual art and film [5, 165], uncomfortable interaction with technologies was argued to promote three benefits: Emotions evoked can be inherently entertaining, discomfort can provide enlightenment and new insights, and sharing uncomfortable moments may foster social bonding [11].

2.6 Working Definition: Aesthetic Emotions in Games

This thesis is interested in quintessentially aesthetic emotions in context of digital games that have typically been found in other media. The aim is to provide a more profound understanding of players emotional response and the appeal of such player experiences, rather than defining which emotions evoked in games are aesthetic emotions.

This chapter showcased how research on different media address the

notion of aesthetic emotions. It is, however, difficult to inherently transfer the notion of aesthetic emotions from other media to the context of digital games. First, studies comparing emotional response between media forms highlight the existence of media specific aesthetic emotions [122]. Second, games come with several modalities: they are dynamic, are interactive, have rules, often with defined win or lose states, and can be played with other people. Applying the notion of aesthetic emotion from other media risks excluding interesting emotions evoked by the uniqueness of games (e.g., excluding guilt or pride when employing the notion of [118, 158, 160]). Hence, following Silvia [168], this thesis refers to aesthetic emotions as *all emotions that are evoked through games*.

3. Interplay of Positive and Negative Emotions in Games

People play for the experience games afford [101], and one aim of PX research is to understand what contributes to good player experience [112]. Emotions are commonly considered at the core of player experience [78, 84, 124]. Games heighten emotional responses to increase player enjoyment, for instance, by offering novel and unfamiliar environments for players to explore evoking curiosity and wonder [101].

In player-computer interaction research, many prior works addressed emotions with regards to understanding and measuring emotional player experience (e.g., [70, 109, 150]), as well as more affectively engaging game design (e.g., [61, 78]). For instance, drawing from affective computing [146], the notion of affective gaming was introduced [61, 77, 174], in which the players' emotional state influences the gameplay [61]. Accordingly, ways to assess emotions during gameplay have been suggested, such as the pressure on the gamepad buttons to measure arousal evoked by game difficulty [174]. Relatedly, studies explored ways to detect players' frustration or anxiety to dynamically adjust game difficulty [62, 104]. Others focused on measuring emotions in order to develop objective methods to assess moment-to-moment player experience [70, 108, 109, 110, 129]. For instance, Mandryk and Atkins [108] introduced a method to continuously model emotional states using players' physiological data. Their model first converted physiological measures to valence and arousal, which were in a second model transformed to boredom, frustration, fun, excitement, and challenge [108].

Regarding understanding and experiencing emotions, many PX studies implicitly equate good player experience with positive affect [114]. Negative emotions, in contrast, are often dismissed as they are seemingly at odds with the focus on positive experience [112]. Thus, when addressing negative emotions, such as frustration, they are rather considered as something to be balanced [62, 82, 131]. However, a few scholars stress the importance of the interplay between positive and negative emotions and suggest different ways games achieve this [14, 115]. Recent studies [2, 121, 188], for instance, addressed frustration in a more nuanced way,

showcasing different ways frustration can contribute to good player experience. Abusively difficult game designs, such as *Kaizo Mario World* [175], are frustrating to the point of absurdity and fun [188]. Other studies argue that games evoke two distinct kinds of frustration: a motivating one that leads to positive experience, and a disheartening one, which encourages players to disengage with the game [121]. Allison et al. [2] found that permanent death of the player character in the zombie survival game *DayZ* [17] in general evoked 'good frustration' that composed the game's appeal and enjoyment. In contrary, losing a character due to bugs or glitches was considered frustrating without an upside [2].

Others highlight that preceding negative emotions give rise to subsequent positive emotions. Frustration plays a prominent role in 'hard fun', as it enhances the feelings of fiero (a positive emotion of personal triumph over adversity) once an in-game challenge has been overcome [101]. Similarly, in-game failure, which is generally considered a negative experience involving negative emotions, is an essential contributor to positive experience linked to subsequent successful moments [92]. The excessive challenge in *Dark Souls III* [53] evoked anxiety, fear and frustration, but made the hard-earned victory more outstanding and valuable [145].

Fear and fright evoked in horror games can be transformed into thrill and arousal, making for an enjoyable experience [103, 106]. Similarly, while permanent death of the player character in *DayZ* [17] was found to give rise to anxiety, tension, paranoia, and devastation, fear of death was particularly considered to contribute to a profoundly unique excitement experience [22].

Beyond digital games, extreme live-action role-playing games were found to afford 'positive negative' experience that involved intense negative emotions of disgust, powerlessness and self-loathing but also amazement and being moved [75, 123]. These experiences were perceived as powerful, which enabled the players to explore dark emotions [123].

Lastly, related work also stressed the importance of considering techniques and tools to design for emotional game experiences [52, 148]. For instance, the Spectrum cards [148] aim to support designers with generating ideas and evaluating the experience of games affording a range of emotions other than fun, such as love, gratitude, inspiration, and remorse. Others addressed real-life grief in context of digital games, by reporting the game design process involving bereaved mothers [66, 67], and analysing game elements used by designers, communities, and individual players to pay respect to the deceased players of *World of Warcraft* [15, 59] and *Eve Online* [24, 60].

3.0.1 Emotionally Moving Player Experience

'Being moved' is a quintessential aesthetic emotional state [30, 49, 116, 161, 178], characterized either by an emotional blend of joy and sadness [116, 178], or considered to be a mixed emotion, evoking both positive and negative emotions simultaneously [7, 76]. Being moved is typically accompanied by physiological responses of warmth in the chest, goosebumps and chills, as well as tears or moist eyes with a tightening of the throat [30, 99, 116, 161, 162, 163]. It is argued to be evoked when the meaning conveyed by the artwork (e.g., reunion of close friends) matches with the people's personal values and convictions (e.g., friendship is priceless; [30, 99]).

The experience of being moved was empirically explored across different art forms of screen media [7, 65], music [43, 158], literature [117, 133], and visual art [141, 169]. However, due to the narrow focus on fun and enjoyment, being moved in games was hitherto disregarded, except in the context of a live-action role-playing game [75]. As a consequence, player-computer interaction is not equipped with concepts that explain emotionally moving player experiences, nor does it inform the methodological approach to explore such experiences.

Publication I analyzed 121 players' accounts of emotionally moving game experiences with regards to the feelings and thoughts they evoked, whether players value them, and contributing game-related and personal factors. The online survey consisted of open-ended questions and psychometric scales from previous studies in media psychology [5, 135, 138].

Players highly enjoyed and appreciated emotionally moving game experiences. They evoked a wide range of positive, negative, and mixed emotions, with sadness being by far the most prominent aesthetic emotion. Indeed, sadness and the gratification of experiencing emotions (i.e. strong emotions per se are perceived as rewarding), positively correlated with both enjoyment and appreciation. This indicates that in the context of moving player experience, sadness and intense emotions in general were inherently considered gratifying. Further, gratification of contemplativeness (i.e., the potential of experiences to stimulate thoughts) positively associated with appreciation.

Players identified game-related factors considered to have evoked being emotionally moved. Character attachment played a prominent role in evoking being moved, with players reporting to have felt for or identified with the characters. Accordingly, losing a beloved character due to in-game death or other kind of separation was another outstanding factor. Players felt particularly responsible when they were forced to take decision concerning a character, and felt guilt and regret when their previous decision caused bad consequences for the character (e.g., loss). Lack of agency, both when players could not act as they desired, and when forced

to do something, in general gave rise to various negative emotions, such as anger and helplessness. Other game aspects afforded predominantly positive emotionally moving experiences. Games' atmosphere, pertaining to how graphics, music and sound came together, was accompanied by awe and amazement. While being moved by in-game achievements typically evoked positive emotions, some players also experienced conflicting feelings when, for instance, defeating a boss with whom they empathized.

Personal aspects, especially players' memories, shaped emotionally moving experiences as well. Players associated loss of a character with their past life experience or reminded them of loved ones, letting them re-experience similar emotions. Memories sometimes also evoked emotions players had to restrain in everyday life.

Emotionally moving experiences inspired players to think about their life or how they perceive themselves. Players imagined what they would have done in the same situation as the protagonist, and pondered whether they were satisfied with their current life situation or how they want to proceed in future.

Publication I provides first empirical insights into the experience of being moved in games. Players were particularly moved by experiencing sadness and mixed emotions, underlining the key role of sadness for moving experiences as discussed in the context of other media [7, 65, 117, 178, 182]. Notably, the findings highlight that sadness, intense emotions, and contemplativeness can be inherently rewarding [5, 65, 117]. These findings add to our understanding of the interplay between positive and negative emotions, and expand the current notion of good player experience. Additionally to audiovisual and narrative elements discussed in films and music [8, 178, 182], games afford being moved by requiring or denying player action, evoking various, sometimes uncomfortable and challenging negative emotions.

4. Emotional Character Attachment

As Publication I showcased, character attachment was a key source of being emotionally moved in games. However, while nuances of character attachment were found in Publication I, whether these are accompanied by different emotions remained unclear. Hence, Publication II further explored the emotional attachment to game characters.

Characters are essential to most games [1, 83], and the attachments players form with characters afford an engaging player experience [13, 40, 84, 95]. Accordingly, game developers [83, 149] and researchers [48, 100, 102] alike have a keen interest in designing believable characters. However, compared to works focusing on the characters' emotional expression (e.g., NPCs' appropriate emotional response in a social situation [100, 102]), studies addressing players' emotional response are scarce. Moreover, the game industry is increasingly concerned with affording not only believable, but 'emotionally engaging character experiences' [74, 147, 149]. Fittingly, some work stresses the importance of emotional character attachment [48, 84], and discusses the potential of affective modelling of characters, gameplay, and expected player experience [77, 78, 190]. Yet, the emotions which characterize attachment are largely unclear.

Despite the variety of different characters offered by games [83, 184], the current player-computer interaction research treats the experience of character attachment in rather narrow and limited ways. Many studies (e.g., [13, 40, 153, 186]) explore identification with an avatar, pertaining to players imagining being the character [26]. Others focus on relatedness, – a sense of belonging and feeling connected [155], – to other players (e.g., [87, 155]). Only a handful of works hint at different emotional experiences for specific characters, namely, children [45] and romantic interests [183]. As a result, little is known about players' emotional range evoked by the different forms of character attachment.

Publication II consisted of a qualitative online survey with 213 participants responding to questions regarding a game character they really like or really liked in the past. Publication II identified seven distinct types of emotional attachment, each characterized by a range of aesthetic emotions

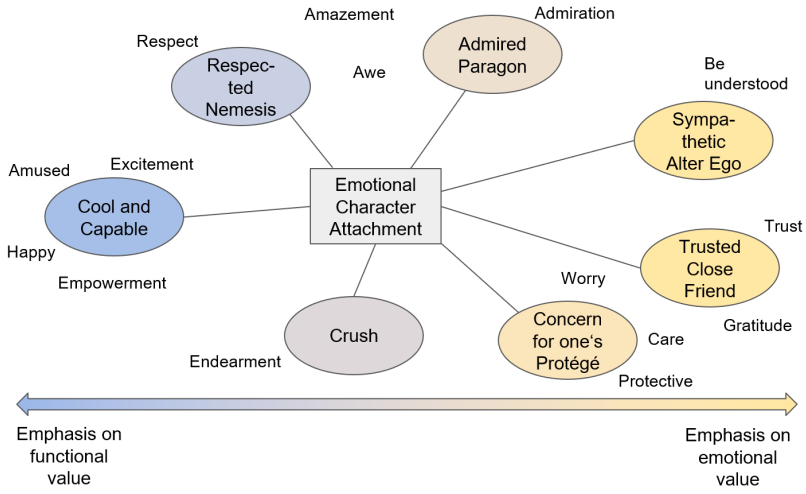

Figure 4.1. The seven types of emotional attachment identified in Publication II with their key emotions. The double arrow at the bottom represents the degree players emphasized the character's emotional and functional values. Image retrieved from Publication II.

(Figure 4.1). Some attachment types particularly highlighted characters' functional value (e.g., skill and strength in gameplay or the narrative world) when describing their emotional responses. Players referring to *Cool and Capable* felt powerful and excited because the characters were effective and strong in gameplay. *Admired Paragon* was characterized by awe and admiration for the perceived virtues the characters embodied. These players frequently considered the characters as their role models and aspired to be more like them. While *Respected Nemesis* also evoked awe besides respect and amazement, conflicted feelings (e.g., scared and amazed) were reported as these characters were antagonistic to the player character. Players having a *Crush* on the character highlighted how much they liked the character, though, besides endearment rarely mentioned specific emotions.

Other attachment types especially emphasized characters' emotional value focusing on the player's and characters' emotionality. Characters reported in *Concern for One's Protégé* were predominantly NPCs who were more vulnerable than the player character. Players frequently worried about these NPCs, and felt responsible to be a good role model to them. *Sympathetic Alter Ego* pertained to players feeling sympathy towards and feeling understood by characters with whom they shared similar personal experiences. Rather than specific emotions, players emphasized how much they could relate to the characters' emotional state. Finally, feelings of trust and gratitude were prominent in *Trusted Close Friend*, with players

feeling a strong personal connection with characters.

In contrast to the current narrow notion of character attachment (e.g., [83, 155]), Publication II showcased that emotional character attachment is not a generic sense of liking or closeness, nor is it limited to identification. Rather it manifests in distinct types of attachment, each with a characteristic emotional quality. While all participants likely have experienced relatedness, the experience was distinct between the different types, particularly, regarding aesthetic emotions, as well as focus on functional and emotional value. This may indicate that players experience both functional relatedness and emotional relatedness to characters. Moreover, while similarities are found among some of the emotional attachment types and identification (e.g., Admired Paragon and Sympathetic Alter Ego resembling wishful identification [73] and similarity identification [26], respectively), Publication II clarifies the difference in their emotional response.

5. Emotionally Challenging Player Experience

Aesthetic artefacts can challenge people's feelings and personal convictions affording emotionally perturbing but worthwhile experiences [6, 11, 69, 142]. In Publication I, some players reported uneasy and challenging feelings, which resembled such experiences. To further explore this kind of aesthetic emotions, Publication III addressed emotional challenge in digital games.

Challenge is often considered the core of player experience [31, 173], and argued to be a reason why players enjoy games [101, 107]. In general, an in-game challenge is considered a task that is non-trivial for players to complete [1, 156]. Commonly, games are considered to offer two types of challenge: *Physical challenge*, which demands physical skills, such as dexterity, accuracy, endurance and strength [1, 31, 156]. In contrast, *cognitive challenge* tests the players' mental abilities, for instance, memories, puzzle solving, and observation skills [31, 156]. Social challenge – demanding social skills, such as reading an opponent or coordinating teammates [156] – is commonly considered a subtype of cognitive challenge, as it concerns hidden information to be discovered and employed [37, 38, 107].

Recent work [27, 38] introduced the notion of *emotional challenge* in games, which "confronts players with emotionally salient material or the use of strong characters, and a captivating story" (p. 2513; [38]). Analyzing posts of professional game reviewers, Cole et al. [27] found that core games (Triple-A games) were frequently reviewed in light of *functional challenge* – an umbrella term for physical and cognitive challenge, – whereas avant-garde games ('arthouse' games) provided emotional challenge. The pleasure in functional challenge derives from how powerful the player feels, and thus, it promotes few emotions other than the frustration-fiero loop of hard fun [101]. In contrast, the core pleasure of emotional challenge lies in resolving tension built up by narratives, identifying with characters, and exploring emotional ambiguity and solitude [27]. Thus, Cole et al. [27] argue that emotional challenge is not mastered by skill or dexterity, but rather requires players to deal with difficult material and understand the ambiguity in the game, resembling cognitive challenge in films [6, 69].

Emotional challenge is argued to evoke a wider range of emotions than functional challenge, although Cole et al. [27] do not elaborate further on this point.

So far, emotional challenge in games has received little attention compared to more conventional functional challenge [37, 38]. Nevertheless, several related works have emerged in recent years. For instance, players enjoyed and appreciated when games challenged their perspective of gameplay and narrative [187]. Games can also challenge and break players' established norms and convictions, affording a range of emotions, such as shock and disgust, – a phenomenon called transgressive gameplay [124]. Indeed, performing actions violating their personal moral code (e.g., lying, betraying, or permanently killing another player's character) evoked emotions raging from slightly feeling bad to guilt, to extreme regret and feeling horrible [23].

Positive discomfort (i.e., uncomfortable moments that are meaningfully interwoven into the narrative and stimulate reflection) can afford deep emotional experiences [89]. Uncomfortable experiences manifested in various ways, such as being provided with high responsibility but limited choices, or being exposed undauntedly to disturbing themes, evoking diverse negative emotions [63]. Games can be deliberately designed to put players in uncomfortable situations, such as requiring the player to lay in a coffin in order to play a game [21] or to spent 24 hours in a bomb shelter [75]. Others let players deal with difficult topics of rape [123] and human error and blame-culture in health care domain [80], or confront them with their emotional and physical limit of fear, fatigue, and (emotional) pain [105, 113]. However, these studies did not explore emotional challenge directly. Consequently, how players experience emotionally challenging moments – in particular, which aesthetic emotions are involved – and the ways emotional challenge manifests in games are yet largely unclear.

Publication III consisted of an online study, surveying 171 participants about either an 'emotionally challenging' or a 'challenging' game experience. Both psychometric measures from related work in PX [86, 155] and media psychology [135, 189], as well as open-ended questions were included.

Overall, players in Publication III rated their experience high on enjoyment and appreciation, and reported a wide palette of emotions, with negative emotions being more prominent than positive ones. Publication III identified six types of in-game challenges.

Cognitive Challenge demanded players' mental skills, such as figuring out enemy patterns, and *Physical Coordination Challenge* required dexterity and reflexes, which sometimes also called for memorizing (i.e., cognitive challenge) for accurate execution of actions. Emotions in *Social Challenge* were typically evoked by and directed at other players rather than the game itself. These three challenge types evoked a similar emotional pattern: frustration as the prominent emotion when facing the challenge, and

positive emotions, such as happiness and pride, once the challenge was overcome.

In contrast, emotional challenge evoked a wider range of negative emotions, with anger and sadness being most prominent. Players enjoyed emotional challenge just as much as functional challenge, but appreciated it significantly more. Emotional challenge manifested when players confronted *Difficult Themes*, such as death, domestic problems, or social issues. Feeling lost and lonely, and mixed emotional responses were particularly characteristic. Players often reported shock when first confronting the topic, though processing the meaning behind the scene resolved the initial tension. For some players confronting difficult themes raised moral and existential thoughts. Accordingly, this emotional challenge scored highest on appreciation among the challenge types.

Dealing with players' own *Intense Negative Emotions* evoked by the game composed another type of emotional challenge. For instance, some players confronting difficult themes reported that the content of the scene mirrored what they had gone through themselves in real life. Players had to deal with the overwhelming emotions they were re-living, and often needed pauses in between.

Players were also emotionally challenged by tough in-game *Decisions and Player Actions* that had either ambiguous or undesirable consequences, evoking powerlessness and guilt. Sometimes the gameplay advantages and goals clashed with participants' personal convictions, values, or preference for a character, giving rise to remorse and disgust. Witnessing undesired consequences of their previous actions and decisions evoked feeling afraid and a sense of responsibility.

The findings from Publication III provide empirical evidence of how players understand and experience emotional challenge in games. It extends previous work [27, 38] in terms of players' emotional range as well as different subtypes identified, providing a more nuanced notion of challenge in games. Based on these findings, Peng et al. [144] recently conducted an experimental study exploring the experience of emotional and functional challenge. Replicating the findings from Publication III, they found that emotional challenge evoked a wider range of negative emotions, and was appreciated significantly more than experiences of functional challenge [144]. Moreover, Denisova et al. [37] recently interviewed players and researchers to identify attributes of different challenge types. Their findings on emotional challenge overlap with those of Publication III: emotional challenge manifests in players dealing with difficult content, particularly, tough decisions involving moral choices and their consequences [37].

6. Outcomes of Aesthetic Emotions

The literature suggests different downstream effects of aesthetic emotions: A considerable amount of work hints at its potential to foster new insights [5, 11, 76, 141, 160], and stimulating reflection related to the self [7, 138, 165, 189] and others [6, 9, 69, 136, 165], as presented in chapter 2.

In context of games, positive discomfort was argued to provoke reflection and provide new insights [89]. Indeed, uncomfortable emotions not only added to an overall richer player experience, but were found to stimulate reflection on the self and wider societal issues [63]. Processing emotionally disturbing experiences of extreme live-action role-playing games during and after debriefing, players stated to have gained new insights and perspective change [75, 123]. Beyond uncomfortable player experience, persuasive games evoking negative emotions encouraged thoughts on human error and blame-culture in the healthcare domain [80].

Similarly, Publication I and Publication II showcased that players pondered different aspects of their self (e.g., their life, ideal self), and players in Publication III explained that the emotionally challenging experience gave rise to thoughts on existential and moral issues.

These findings indicate that emotional player experiences can provoke thoughts and insights. The relationship between feelings and thoughts, however, was suggested to be bidirectional [7]. That means, thoughts stimulated by the game may also evoke aesthetic emotions. Further, epistemic emotions, such as curiosity and interest, represent a high-level category of aesthetic emotion [76, 168]. Addressing reflective player experiences, thus, may provide insights on benefits (e.g., reflection) as well as players' experience of epistemic aesthetic emotions.

Besides games applied in educational context [36, 68] and designing games for a purpose [50, 68], related work addressed reflection by exploring ways commercial games promote learning [57, 81]. For instance, analysing the strategies players use to overcome moments of surprise, uncertainty, or conflict, Iacovides et al. [81] found that reflection occurs both within gameplay and during a pause. However, the primary focus of this body of work typically lies on learning, rather than reflection. Recently,

Khaled [96] discussed the potential of entertainment games to encourage reflection, and proposed game design qualities that are expected to facilitate transformative reflection – reflection leading to perspective or behavior change [51]. Moreover, Arjoranta [3] suggested yet another type of challenge – the *interpretative challenge*. Interpretative challenge demands a player to use contextual information from outside the game world to be able to successfully interpret and progress the game. Resembling challenge of modern artworks [127, 128], ambiguity is considered key to both interpretative challenge [3] and reflective game design discussed by Khaled [96]. Similarly, games providing only minimal narrative outline were argued to encourage players to make sense of the narrative, story and characters by themselves, a form of agency termed fictional interpretive agency, which is distinct from mechanical ones [28]. Further, games that lack or provide contradicting feedback on player actions were suggested to promote reflection about the significance and moral value of their actions [28]. However, these studies did not address players' emotional response to reflective experiences.

Publication IV analyzed data of 19 semi-structured interviews. Participants were interviewed about times when (1) a particular game or gameplay experience has been on their mind, (2) times when intentionally reflecting on their gameplay experiences, and (3) whether they ever had any thought-provoking experiences as a result of playing games.

Epistemic emotions (e.g., interest, curiosity, insight) often accompanied reflection on a variety of contents, such as gameplay, own gaming habits, as well as drawing parallels to the real world. Emotionally powerful experiences, for instance, intensely sad moments, were found to linger with players. However, while players reminisced about these moments, they rarely led to more involved reflection. With or without emotions, generally the process of reflecting was enjoyed, and reported to have occurred both during and outside of gameplay. Players especially enjoyed reflecting, as it extended the player experience beyond the momentary gameplay. They valued when the game introduced new concepts and ideas as it added depth to their experiences. Moreover, while players frequently engaged in lower level reflection (e.g., providing explanations on why an in-game event happened), instances involving higher-level reflection of real-life attitude and behavior change were rarely reported.

Publication IV showcases that games, similar to other art forms [76, 168], evoke various epistemic emotions. However, different from emotional experience provoking new insights (e.g., [63, 89]), intense emotional moments seem to play a less prominent role in everyday reflective experiences. Moreover, only few instances of higher-level reflection were observed in Publication IV. Based on this observation, Whitby and Iacovides [187] recently explored players' experience of perspective changing moments in games. Similar to Publication IV, instances of perspective change lead-

ing to personal attitude and behavior change and new insights outside of games were rare. However, perspective change that remained within the gameplay context (e.g., modifying their gameplay strategy, or altering their view on an in-game character) was much more frequent and 'mundane' [187].

Reflection is, however, only one potential outcome of aesthetic emotional experiences. Aesthetic artifacts encourage people to take up the artists' perspective and to imagine how they perceive the world, which in tun, fosters empathy and a better understanding of others [18, 165]. Indeed, empathy was a recurring topic in Publication I and Publication II (e.g., players referring to Sympathetic Alter Ego), and gaining new insights about real-world events (e.g., World War I in *Valiant Hearts* [181]) reported in Publication III may indicate that players acquired a better understanding of others (e.g., both sides suffer from war). However, due to the employed method (i.e., online surveys assessing players' experience retrospectively) in Publication I to Publication III, the relationship between the game, aesthetic emotions, empathy and other-understanding remained vague. Hence, Publication V explored emotional experiences by letting participants play a game deliberately designed for the study aiming at fostering empathy for others.

In PX research, especially with the rise of virtual reality, a growing body of work aims to foster empathy, and encourage players to concern themselves with specific people in distress [25, 72, 97, 125]. So far, the vast majority of interactive virtual reality experiences aiming at fostering empathy offer players the opportunity to virtually inhabit another in distress (e.g., [72, 97, 125]). Such a first person approach offers a spatial sensation and emotionally engaging experiences, mimicking the implied presence of another [130]. However, it does not necessarily transfer knowledge about the other [130], and it bears a risk that players may feel and think as if the experience was their own, becoming self-absorbed [97]. In turn, players in such cases may never actually consider and empathise with the other in distress [10, 130].

Empathy is an ill-defined psychological phenomenon with many conceptualizations [32]. This thesis exclusively draws on the definition of the psychological state called empathy (hereafter called empathic states) by Batson and Ahmad [10]. They split empathic states into self-oriented empathic states (i.e., focus on what I feel and think, as well as feeling the same emotion as the other) and other-oriented empathic states (i.e., focus on what does the other feel and think, as well as having feelings for the other).

Considering empathic states as introduced by Batson and Ahmad [10], the critique regarding the fist person victim perspective [10, 97, 130] seems to be aimed at self-oriented empathic states. In contrast, other-oriented empathic states, due to the focus on others rather than the self, might

Figure 6.1. *Permanent* is a first-person exploration virtual reality game developed for Publication V. Its narrative is based on interviews with evacuees from the 2011 Fukushima Daiichi nuclear disaster in Japan, who are still living in temporary housing (A). Players explore the virtual temporary housing (B-C), while interviewing an evacuee by picking up objects and triggering respective vignettes (D-F). Finally, players select three objects they considered important (G) and draft their report (H). Image retrieved from Publication V.

be the key to encouraging 'other-understanding' [165]. A way to foster other-oriented empathy, hence, might be to let players inhabit an in-game character other than the one in distress (i.e., partaker-perspective, rather than a victim-perspective). *Injustice* [25] explored partaker-perspective by letting a player slip in the role of a bystander witnessing racial discrimination and demanding them to make moral decisions. However, they focused exclusively on the game design. Consequently, how players experience partaker-perspective, including their aesthetic emotional response, and whether this approach really promotes feelings for the other in distress is yet unclear.

Following a Research through Design approach [194], a virtual reality game *Permanent* was developed under the leading design research question "How can we foster other-oriented empathic states through virtual reality games?" in Publication V. *Permanent* is a first-person exploration game subjecting the life of the evacuees from the 2011 Fukushima Daiichi nuclear disaster in Japan (Figure 6.1; a short video can be found on `https://youtu.be/m6-ZLFO5YF8`). To foster other-oriented empathic states (and indirectly also other-understanding), two main design considerations were postulated: (1) The game engages the player in a partaker-perspective by casting them into the role of a reporter, who is tasked to conduct an interview with an evacuee about the life in temporary housing. This way, the player has an in-game character (i.e., the reporter) whom they inhabit and try to understand how the others in distress (i.e., the evacuees) may feel and think. (2) As an in-game task, the players are asked to summarize a draft of the report highlighting the most important findings from the interview (Figure 6.1 G&H). This aimed to prompt reflection on the situation

and conditions of the other in distress.

Permanent was deployed at two public expositions in the Netherlands and Japan as an interactive documentary artwork. Players were asked whether they agreed to participate in an interview immediately after they interacted with *Permanent*. A total of 78 players agreeing to participate in the interview were asked (1) to elaborate on their choice of objects listed in the report drafting task, (2) to openly describe and discuss about their experience with *Permanent*, and (3) articulate their thoughts and feelings on the subjected situation.

Players from both countries reported more than twice as often other-oriented empathic states compared to self-oriented empathic states. *Permanent* afforded mixed emotional experiences, such as feeling lonely when looking out of the window, yet feeling the beauty of the scenery. Players also expected the interviewee character to feel mixed emotions, which evoked various feelings in players (e.g., being sad for the interviewee who is feeling mixed emotions). Indeed, players stating mixed emotions exclusively reported other-oriented empathic states.

Moreover, players frequently referred to in-game objects, people, or events to discuss real-life objects, people, or events, and vice versa. For instance, a player explained that getting to know how untrue news were spread within the game world led to a realization about the severity of the situation in the affected areas of the real world. Players also tried to understand the interviewee character's situation and emotional state by filling in the gaps within the narratives with their own real-life experiences (e.g., from their first-hand experience, or what they previously saw in the media). Progressing the game at players' own pace, and deciding which narrative branch to follow by themselves further supported interpretation and understanding of the others' situation, thoughts and feelings.

Publication V highlights that games deliberately designed to foster other-oriented empathic states by employing a partaker perspective and an in-game reflection task, can afford mixed emotional experiences as well as feelings for others. Previous work argued that passive gameplay states encourage players to reflect, and in turn feel empathy and understand the others [34, 97]. In contrast, having high agency, players might get caught up in the gameplay, resulting in low empathy [34]. However, having agency over the pacing and the narrative branch in *Permanent* facilitated other-understanding. Acting as a partaker of an in-game event, players may have had more room to consider the feelings and thoughts of the other. Further, players in Publication V filling in the gaps themselves resembles Cole et al.'s [28] fictional interpretive agency. Publication V, hence, highlights the importance of a more nuanced understanding of empathy, agency, and characters involved (i.e., with whom and in which role players should empathize) when exploring and designing games affording other-understanding.

7. Discussion

The studies presented in this thesis provide empirical evidence of the aesthetic emotions players feel (RQ1), the reasons they value these experiences (RQ2), game-based and personal aspects that facilitate such experiences (RQ3), as well as the downstream effects such experiences may be followed by (RQ4).

These findings highlight the wide range of positive, negative, mixed, and epistemic emotions that digital games may afford, including those typically associated with art encounters (e.g., [7, 55, 76, 117, 168]). Particularly, the publications in this thesis also showcase that games evoke aesthetic emotions, such as remorse, guilt, and a sense of responsibility, that are unique to the medium by requiring players to take undesired actions or tough decisions by themselves. Players enjoyed and appreciated these diverse aesthetic emotional experiences for different reasons: they valued intense emotions that were inherently gratifying (Publication I; [5, 117, 134]), and appreciated games that inspired reflection (Publication I, Publication III, and Publication IV).

Throughout all studies, players identified various game-related aspects facilitating their aesthetic emotional experience. Beyond narrative aspects, such as confronting difficult themes (Publication III; [6, 136]), games afforded aesthetic emotions by demanding or denying player action. For instance, letting players themselves take on tough decisions that involved undesired consequences invoked positive discomfort [89] by evoking a sense of complicity [88].

Player-related aspects shaped the emotional experiences as well: In Publication III, unwanted actions and decisions clashed with players' personal norms and convictions evoking various uncomfortable emotions [23, 124]. Moreover, Publication I and Publication III showed that a game event can trigger players' 'emotion memory' [133] letting them re-experience emotions associated with their personal memory. In some instances, this involved emotions that players had to restrain in everyday life, suggesting that games may support players in processing emotions they have not yet assimilated [111].

Table 7.1. Benefits of aesthetic emotional player experience reported in the studies.

Emotions as inherently gratifying	Self-understanding	Other-understanding
• Sadness	Self-reflection	Stimulate thoughts
• Intense emotions	• Ideal self	• Insights on existential, social, & moral issue
	• Current & future life	• Insights on others
	• Self-examination	Empathy
	Memory	• Other-oriented empathic states
	• Trigger 'emotion memory'	
	• Re-live & potentially process emotions of past life-event	

Various benefits of aesthetic emotions were identified (Table 7.1): As showcased by Publication I, Publication II, Publication III, and Publication IV, aesthetic emotional experiences encourage self-reflection on players' current and future life [136], the ideal self, and how they would have reacted if they were confronted with the same situation in real life, enabling self-examination [56]. Aesthetic emotions were also associated with insights on existential, social and moral issues (Publication III). Encouraging players to reflect as part of gameplay, combined with partaker-perspective in Publication V, promoted other-oriented empathic states [18, 165]. This not only improved players' understanding for the in-game character's situation [98, 165], but also for real-world people the character embodied. In the following, we discuss the implications of these findings.

7.1 Expanding the Notion of Good Player Experience

PX research, so far, predominantly engaged with fun and enjoyment [101, 114], need satisfaction [179], and immersion and flow [31, 173] when exploring good player experience. Emotionally rich experiences, as provided by other media through aesthetic emotions [33, 118], received little attention, leaving the appeal of such player experiences unclear. The findings reported in this thesis extend our understanding of what constitutes and contributes to good player experience.

The studies in this thesis showcased that games afford players a wide range of aesthetic emotions, including those typically considered negative. Nevertheless, the findings highlight that players greatly enjoyed

and appreciated these experiences for varying reasons. First, intense emotions, including negative and mixed ones, were valued as players perceived experiencing them as inherently gratifying. For instance, sadness in Publication I not only was a prominent emotion characterizing emotionally moving experiences, but positively correlated with enjoyment and appreciation. As argued in relation to interactive art [11], films [5], music [143], and poems [117], experiencing negative and mixed emotions, thus, can be inherently entertaining and rewarding, contributing to our conceptual understanding of how negatively valenced emotions may constitute good player experience. Second, players valued when emotional moments inspired reflection on the self and others and inspired new ideas (Publication I, Publication III, and Publication IV), similar to how people find emotional film experiences intellectually gratifying [5, 7]. Notably, Publication IV showcases that reflection extends the player experience beyond moment-to-moment gameplay.

7.2 Clarifying Player Experience Concepts

The study findings refine our conceptual understanding of challenge, character attachment, and reflection in games, thereby rendering them more concrete and available for future empirical PX studies. As such, they contribute to conceptual-empirical problem solving [139] in player-computer interaction.

While games research has already intensely engaged with more conventional, functional challenge (e.g., [1, 31, 156, 173]), players' experience of emotional challenge has hitherto not been empirically investigated. Publication III extends previous work on emotional challenge [27, 38] by identifying subtypes of emotional challenge and clarifying players' emotional response. These findings contribute to a more nuanced notion of emotional challenge, as well as provide a more integrated understanding of in-game challenge in general. Indeed, a recent study [144] conceptualized emotional challenge according to the findings of Publication III, and another employed the findings as guidance when developing a challenge questionnaire [37].

In contrast to previous conceptualizations of character attachment (e.g., [83, 155]), Publication II showcases that players do not experience a uniform sense of attachment to game characters, but instead identified seven distinct types of character attachment, each characterized by different aesthetic emotional qualities. Moreover, Publication II identifies emotional qualities characteristic of wishful identification [73] and similarity identification [26], as well as suggests a more granular conceptualization of relatedness to in-game characters based on functional and emotional relatedness.

The role of reflection in games, especially, players' day-to-day reflective experience has previously received little to no attention in PX research. Publication IV highlights the variety of reflective experiences, showcasing foci of reflection, when players reflect, and players' attitudes towards such experiences. These findings constitute a first step towards conceptualizing reflection from players' perspective. As such, the study forms a starting point for subsequent PX research on related topics, such as perspective challenging moments in games [187].

7.3 Design Implications for Aesthetic Emotions

Publication V provides different design implications to foster other-oriented empathic states in virtual reality games: Games may present a character's backstory step by step, and include story vignettes that hint at characters' mixed emotional state to enhance emotional closeness to and understanding of the character. Moreover, casting players into a partaker-role was effective in affording other-oriented emphatic states. Alternatively, games may also let players engage as themselves without being assigned a specific role. An in-game task providing an opportunity for players to reflect on others' situation and their emotional state also invoked other-oriented emphatic states. In contrast, care should be taken when presenting objects that embody potential symbolic meaning as it may distract players from considering a character's personal story and their emotional state, and in turn, impede developing feelings for the character.

The other publications, while not per se providing concrete and actionable design implications, highlight different game aspects players identified as contributing to their aesthetic emotional experiences. For instance, loss of characters in Publication I was prominent for emotionally moving experiences evoking intense sadness. Requiring players to actively take tough decisions, afforded emotionally challenging experiences, which were linked to guilt and powerlessness (Publication III). The identified game aspects may support game designers in envisioning and targeting specific aesthetic emotions, as Spectrum cards [148] may serve ideation of new emotional experiences.

7.4 Methodological Impact on PX studies

So far, PX research, compared to studies on other media, provided little insights on how to empirically explore emotionally rich player experiences. The methodological approach taken in Publication I and Publication III (e.g., instructions on guided recall process, appreciation scale [135]) has had impact on subsequent PX studies exploring related topics: Recent stud-

ies on uncomfortable player experience [63] and perspective challenging moments in games [187] both based their empirical approach, questions and measures on Publication I and Publication III.

7.5 Limitations and Future Research

All publications included in this thesis are of an exploratory nature, and hence, no causality can be drawn from the findings. Still, the thesis identified factors, such as tough decisions or personal memories, influencing aesthetic emotions in games, which may inform future empirical work. Publication I to Publication III employed online surveys as the goal was to reach as many potential participants as possible to cover a sizable spectrum of players' emotional responses. This approach, however, does not allow for asking additional questions or elaborating a response. Further, Publication I to Publication IV asked players to recall past game experiences. Retrospective evaluation, however, may differ from moment-to-moment experience, especially for emotionally loaded ones [93]. Hence, future studies may explore how players experience aesthetic emotions during or immediately after playing, similar to Peng et al.'s [144] study and Publication V.

Differing language skills may interfere with players' accounts of their emotional experiences, which all publications were based on. To address this, future studies may combine physiological measures with subjective description and ratings to explore aesthetic emotions in games. For instance, goosebumps are closely associated to being moved [99, 162, 185], as previously assessed by a camera (i.e., the 'goosecam') tracking the arm or leg skins while watching emotional film scenes [185]. However, it should be kept in mind that when exploring negative and mixed emotions (e.g., being moved) people may react differently or suppress their emotional response in the presence of others due to embarrassment [39]. Also, people expecting fun or enjoyable gameplay might not become as engaged when playing games evoking negative emotions [80].

Games recounted by participants in Publication I to Publication IV were predominantly Triple-A games. While these games were not deliberately targeted in the publications, the rather homogenic participants recruited from game related social media groups (e.g., reddit) in Publication I to Publication III may have led to this tendency. Future studies ought to address emotional experiences beyond main-stream games, either by explicitly targeting specific indie and avant-garde games, similar to Cole et al's [27] study, or by recruiting players from communities of game platforms hosting avant-garde games, such as itch.io.

While some overlaps in players' experience between emotional challenge and being moved were found, the underlying psychological mechanism

might differ: Emotional challenge was characterized by a moment of discrepancy [142], such as the gameplay advantages, goals, and narratives clashing with players' personal convictions, expectations and desires. In contrast, the values conveyed in emotionally moving moments may have harmonized, rather than clashed, with people's personal values, as argued by literature on being moved [30, 116, 141]. Future studies may, for instance, let people play a game that violates versus harmonizes with a specific norm (e.g., bribery vs fairness) and assess players' general conviction regarding the norm. Comparing those experiencing discrepancy with those feeling harmony regarding emotional response (e.g., being moved, sadness) may distinguish the two experiences.

Processing emotional experiences that result in new insights was argued to take some time [63, 75, 141]. Diary studies, or follow-up questions on players' thoughts and feelings asked days or weeks after initial gameplay (e.g., in a lab) may be promising. For instance, players may note their thoughts and feelings every time they reminisced and reflected on their experience. This might clarify how new insights are provoked, and whether such experiences could lead to being moved after some time [30, 142].

While ambiguity was discussed in relation to visual presentation [126, 127, 128], characters [98], goal of interaction [16, 56], and narrative and story of games [3, 27], it was only explicitly mentioned regarding consequences of tough decisions in Publication III and Publication IV. Hence, exploring how ambiguity of various game aspects influences aesthetic emotions, particularly whether they shape different emotional experiences, may prove interesting. A possible approach might be to experimentally manipulate the degree of ambiguity of specific game aspects, and compare players' emotional experience. For instance, high ambiguity in visual representation of the game world may evoke interest [126, 127, 128], whereas an ambiguous player character may enhance feelings of sympathy and closeness [98].

Lastly, epistemic emotions may be particularly associated with interpretative challenge, which requires employing and combining information from outside the game to successfully progress [3]. Future research may explicitly address interpretative challenge, for instance, by asking players about either a challenging, emotionally challenging, or "intellectually challenging" [6] experience, similar to Publication III. This may provide a more nuanced understanding of cognitive, interpretative, and emotional challenge, as well as insights into how games evoke epistemic emotions.

8. Conclusion

Games' capacity for affording aesthetic emotions has been mostly overlooked in player-computer interaction, resulting in empirical, conceptual, and methodological research gaps. This thesis compiled findings from five exploratory empirical studies addressing players' experience of aesthetic emotions and their downstream effects in context of digital games.

Findings showcase that games evoke a wide range of aesthetic emotions, including those typically experienced with other artworks. Games also evoke aesthetic emotions unique to the medium, highlighting the emotional spectrum they may afford. Players enjoyed and appreciated such experience, in some instances precisely because games evoked intense emotions and promoted reflection, expanding our notion of what contributes to good player experience. Several game aspects were identified that facilitate the experience of aesthetic emotions, such as attachment to and loss of characters, game atmosphere, tough decisions, and partaker-perspective. Players' memories and personal convictions shaped such experiences as well, showcasing how games can have a profound personal impact. Benefits of aesthetic emotions include stimulating self-reflection; insights on existential, social, and moral issues; other-oriented empathic states; and a better understanding of people in distress. These empirical findings also provide conceptual contributions by refining core PX concepts, such as challenge and character attachment. Lastly, it outlined questions and concepts, such as ambiguity and interpretative challenge for future studies to explore. Taken together, these findings showcase the potential of digital games to afford emotionally rich experiences, deserving to be taken seriously as a cultural medium.

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