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# “A Game that Makes You Question...” Exploring the Role of Reflection for the Player Experience

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## ABSTRACT

Reflection is a core design outcome for HCI, and recent work has suggested that games are well suited for prompting and supporting reflection on a variety of matters. However, research about what sorts of reflection, if any, players experience, or what benefits they might derive from it, is scarce. We report on an interview study that explored when instances of reflection occurred, at what level players reflected on their gaming experience, as well as their reactions. Our findings revealed that many players considered reflection to be a worthwhile activity in itself, highlighting its significance for the player experience beyond moment-to-moment gameplay. However, while players engaged in reflective description and dialogic reflection, we observed little to no instances of higher-level transformative and critical reflection. We conclude with a discussion of the value and challenges inherent to evaluating reflection on games.

## CCS Concepts

•Human-centered computing → HCI design and evaluation methods; *HCI theory, concepts and models*; Empirical studies in HCI;

## Author Keywords

Reflection; games; reflective game design; player experience.

## INTRODUCTION

Reflection is considered a core design outcome for HCI [42] and a substantial body of research has emerged, spanning a wide variety of applications [4, 19]. Recent work suggests that digital games are particularly well suited for prompting and supporting reflection on a variety of matters [33, 37]. Games often confront players with puzzling or surprising situations, which invite them to plan, experiment and look for new solutions [24, 28, 33]. However, in spite of games’ potential as ‘reflection machines’ [33], reflection has received curiously little attention in player experience research.

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Yet there is much to gain from studying reflection in this context. First, it may add to our understanding of player experience, especially with regards to how games may sustain engagement beyond the moment-to-moment experience of gameplay. Second, reflection is a crucial component of learning [7, 14, 41], where already a substantial body of work considers how games and gaming practice support learning [24, 46, 48]. Third, recent work has explored games to promote thought-provoking ‘serious experiences’ [27, 37] to raise awareness or persuade. Some have pointed towards games as a means to facilitate transformative reflection [44], which could give way to attitudinal and behavioral change [19]. A better understanding of reflection in games may thus serve to inform the design and evaluation of such serious experiences. Finally, reflection may also make for richer aesthetic gaming experiences [10], as exemplified by design approaches such as ludic engagement [23] and slow technology [25].

Nevertheless, it remains largely unclear whether and in what ways games prompt reflection, what constitutes a reflective player experience, and what benefits, if any, players derive from such experiences. To address this research gap, we interviewed 19 players about their reflective experiences and applied Fleck and Fitzpatrick’s ‘levels of reflection’ framework [19] to identify what types of reflection players reported.

The contribution of our work is three-fold: First, we provide evidence in relation to the different forms of reflection games prompt, from lower level reflection on one’s own gaming practices to planning future gameplay, or theorising about how a game was designed to make an impression on players. However, even when reflecting on how gameplay relates to ‘real life’, higher-level transformative and critical reflection appear largely absent from players’ ‘everyday’ experiences. Second, while not all players seek such reflective experiences, many consider reflection on and because of games in itself a worthwhile activity, thus extending the player experience beyond the initial instance of gameplay. Third, we showcase both the value and challenges in applying the ‘levels of reflection’ framework [19] to evaluate players’ reflective experiences. Specifically, we argue that the levels of reflection are not to be conflated with the foci or benefits of reflection, something that will be particularly important to consider in relation to the evaluation of games aimed at supporting reflection.

## RELATED WORK

While a sizable body of work has emerged around the importance of reflection in the design process [3, 42], there has been

increasing focus within HCI on the reflective experiences of ‘everyday’ technology users [3, 39, 40]. Yet many questions remain on how best to facilitate reflective experiences through interaction design [3, 19, 44], which partly stems from the lack of a common understanding of what reflection in HCI entails [4, 19]. For instance, in their discussion of reflective design, Sengers et al. [42], employed the term ‘critical reflection’ to describe “bringing unconscious aspects of experience to conscious awareness” (p. 50), referring to the (usually) unconscious social and ethical values embedded in design. Similarly, Fleck and Fitzpatrick [19] link critical reflection to relating one’s experiences to wider social and ethical implications. In their framework, however, critical reflection only forms the highest and least common level of reflection. The lowest levels (i.e., ‘revisiting / non-reflective description’ and ‘reflective description’) refer to mentally revisiting one’s experiences, but with little to no consideration of alternative explanations or viewpoints. ‘Dialogic (or dialogical) reflection’ denotes both the looking for relationships between one’s knowledge and experiences, as well as the exploration of alternate hypotheses and different perspectives, which may then result in ‘transformative reflection’, that is, the altering of one’s assumptions and/or behavior. More recently, Baumer reviewed different epistemological perspectives on reflection both within and outside HCI [3], and identified three dimensions common to most of these conceptualisations: (1) ‘Breakdowns’ describe moments of surprise, uncertainty, or conflict, which can provide opportunities for (2) conscious, intentional ‘inquiry’ on one’s experiences, knowledge and assumptions, which in turn (3) may (or may not) ultimately lead to ‘transformation’, resembling Fleck and Fitzpatrick’s notion of transformative reflection [19]. However, in contrast to Fleck and Fitzpatrick’s framework, where lower levels of reflection are conceptualised as precursors to higher levels, Baumer [3] argues that while these dimensions are not independent of each other, they do not necessarily form a linear progression.

In addition to considering how to define and categorise reflection, research on reflective experiences has spanned a variety of contexts (see [4] for an overview), including diabetes management [36], social emotional learning [44], monitoring food waste [22], and reflecting within romantic relationships [50]. A growing body of research also concerns itself with the potential of playful interactions (e.g., [23, 32]) and games (e.g., [33]) to promote reflection.

### **Reflection and the player experience**

While there has been a large amount of interest in designing for user reflection, the potential for games to promote reflection in *players* has only recently been explicitly considered [33, 37]. Some work has looked into how *designers*, particularly of serious games, reflect on the game design process [15, 16, 31, 34]. Flanagan and Nissenbaum [16], for instance, promote the idea of “the conscientious designer” as someone who takes an active role in shaping values embedded in their games and engages in reflective practice. However, the extent to which players experience reflection as a result of playing these games (or any others, for that matter) remains unclear.

As reflection is considered a necessary component of learning [7, 14], it has been discussed with regards to games used in formal educational contexts [12, 26, 46], where post-play debriefing sessions [11], or ‘metagaming’ support such as online forums (e.g., [1]) ensure that players can reflect on the required learning outcomes. Within research on the ways commercial games support informal learning, reflection is generally seen as part of gaming practice. Gee [24], for instance, argued that games encourage players to reflect as they form hypotheses about the game world and in terms of considering the relationship between their real world and virtual identities. Similarly, Iacovides et al. [30] note that cycles of micro involvement (instances of gameplay) and macro involvement (activities that occur around play) reinforce a player’s identity as a gamer and can potentially lead to ‘changing as a person’. Gee [24] also argued that through involvement in both gameplay and related activities (e.g. discussing games, creating game guides), players will come to think about and critique games as systems within genres, rather than simply as games that they play. However, learning is usually the main focus of such work, rather than reflection per se, and the research has often involved players who are involved in a particular community of practice. For instance, Choontanom and Nardi [9] describe the process of ‘theorycrafting’ in World of Warcraft, where players reflect on game mechanics that cannot be discovered through ordinary play, but rather through mathematical analysis and discussion on blogs. While theorycrafting is clearly an intense form of reflection, it seems less likely that all games inspire this sort of reflection or that all players engage in it.

While much of player experience research has focused on concepts such as enjoyment [38] or immersion [13], there has also been recent interest in more complex and richer forms of player experience. Marsh and Costello [37], for instance, call for more work on ‘serious experience’, which goes beyond purely positive engagement to consider thought-provoking experiences that linger with players well beyond the immediate experience and encourage reflection. Indeed, Iacovides and Cox [27] suggested a somewhat negative emotional experience within a persuasive game may have been responsible for prompting reflection on blame culture in healthcare. Another study [47] indicated that games for change were most likely to promote prosocial behavior when they also inspired a sense of appreciation – an experiential state characterized by the perception of meaning, insight and reflectiveness [2]. With regards to entertainment games, Cole et al. [10] found that professional game critics were more likely to be reflective when reviewing avant-garde (i.e., ‘arthouse’ indie games) compared to core games (i.e., AAA games). In another study, Bopp et al. [5] had players describe their “thoughts and feelings” brought about by an emotionally moving game moment and rate their experience in terms of how much contemplation it inspired. Finally, Iacovides et al. [28] examined strategies that players use to overcome breakdowns during play, and – drawing from Schön [41], – distinguished between reflection that occurs within the moment of play (reflection in-action) and reflection that occurs during a break in gameplay (reflection on-action). While these studies have provided some initial insight into how reflection may relate to the player experience of specific games, reflection was not their main focus. Thus

questions remain about the range of reflective experiences that gameplay can lead to.

Partly inspired by reflective design [42], Khaled recently outlined an agenda for reflective game design [33] arguing that there are several game design qualities that could potentially facilitate critical reflection. For instance, it is suggested that deliberately designing for player unfriendliness introduces an element of surprise and subverts players' expectations of what constitutes a game. Similarly, ambiguity invites multiple interpretations and can push players towards reflecting on their play experiences. Lastly, if players are to reflect on how their experiences connect to the world, and to continue reflecting on this after play, these experiences must be memorable and 'stick' with the player in some way, similar to Marsh and Costello's notion of 'lingering' [37]. Khaled also critiques dominant practices in conventional game design as running counter to or even directly undermining reflection [33]. Serious games are criticized for offering environments that are too safe and user friendly, and immersion is described as the "almost antithesis" of reflection. Khaled argues that through accepting the situations and characters depicted as 'part of the game', players risk not being able to relate their in-game experiences to the real world. Similarly, Slovák et al. [44] suggest that games might provide the 'right sort of experience' to encourage (transformative) reflection precisely because of their ability to evoke 'real enough' emotional experiences, but suggest that this should be 'not too much', to still afford exploration of alternative actions. In terms of playing games day-to-day however, it still remains unclear whether players actually experience reflection and if so, what type of reflection (e.g., dialogic, transformative etc) is involved.

In summary, while recent work has theorised about how games may be able to inspire reflection and there is some evidence to suggest that engagement in games and gameplay practice can involve reflection, there is still much to be understood about what sorts of reflection occur and how players actually experience reflection in this context. In the following sections, we present a study that focuses on exploring what constitutes a reflective player experience and what benefits, if any, players derive from such experiences.

## METHOD

While measures of 'contemplativeness' have been used to approximate how much reflection players experience [5], the types or content of reflection cannot readily be observed or measured [3, 49]. Hence, we chose semi-structured interviews as a method that would allow us to investigate player experiences of reflection in an exploratory way.

## Interviews

We conducted 19 semi-structured interviews, consisting of 9 women and 10 men (see Table 1), aged 21 to 59 (mean age = 34.42 years), of varying backgrounds, both with regards to occupation (e.g., students, engineers, sales assistants) and location (e.g., US, Germany, India). While most participants had little to no game design experience, P1 is a professional game designer and P4 is a researcher, who designs games for learning. In addition, P17 is a former professional esports

player. Participants were recruited through social media, using the authors' personal contacts, as well as referrals from other participants. The only condition for taking part was that they needed to speak fluent English. We thanked them for their participation with a \$10 Amazon gift card. We intentionally recruited a mix of more regular, as well as casual players to ensure we captured a wide range of gameplay experiences. Participants' game preferences included both indie and AAA games, and encompassed a wide range of genres. Their gaming habits varied considerably, with some playing in short daily bursts, several hours a week, or rare multi-day 'gaming binges' (P9, F, 35).

Interviews were conducted face-to-face or via Skype by the first author, and lasted between 25 to 60 minutes. Reflection is not a clear-cut concept [3], and we were interested in exploring the variety of reflective experiences games might afford, rather than restrict ourselves to a particular type (e.g., critical reflection, [34]) or topic. Hence, we did not provide participants with any definitions or examples. Instead, participants were first asked about their general gaming habits and preferences, before moving on to the following questions: (1) *Outside of actually playing a game, are there times when a particular game or gameplay experience has been on your mind?* (2) *Do you ever intentionally reflect on your gaming experiences?* (3) *Did you ever have any thought-provoking experiences as a result of playing games?* Moreover, as reflection is not an exclusively individual activity [3, 45], we also included follow-up questions about whether participants had discussed their game-related experiences or thoughts with others.

## Analysis

Given the lack of empirical work investigating reflection as part of the overall player experience, we conducted a two-step qualitative analysis. After interviews were transcribed, a thematic analysis was conducted following the protocol of Braun and Clarke [8]. Accordingly, each researcher first examined the data set before developing a set of initial research codes as a group. The developing themes were discussed within the research team until a definitive set was able to account for the instances of reflection observed within the data, where the codes were compiled to form overarching descriptive themes (e.g., 'in-game decisions and consequences', and 'strategy and planning' were collapsed into 'gameplay'). Themes related to when players reflected (i.e., *in-action* vs. *on-action*), how they felt about their reflections (i.e., *enjoyment*, *struggling with reflection*), and what the reflection was about, with the latter subdivided into 4 foci of reflection: (1) *gameplay*, (2) *their own gaming practices*, (3) *game design*, (4) *making parallels between the game and the 'real world'*. Thereafter, two authors reviewed and revisited the transcripts with the final codes.

Next, we applied Fleck's methodological approach to evaluate reflection on experience [17, 18]. This approach is based on Fleck and Fitzpatrick's framework [19], which distinguishes between five levels of reflection, and has previously been applied to evaluate reflection in contexts such as teaching [17, 18] and managing food waste [22]. Every transcript was first split into topic chunks, a section of dialogue about a specific

Participant	Age	Gender	English Native Speaker? *	Game-related Profession? *	Gaming Frequency	Favourite Game Genres
P1	38	M	Yes	Game designer	Once a month	Adventure
P2	45	M	No	No	Several times a week	Strategy, MOBA
P3	22	M	No	Hobbyist game designer	Daily	Strategy, RPG, MMORPG, Puzzle, MOBA, Fighting, Adventure, Visual Novel, Card games, Action
P4	25	F	Yes	Games researcher	Once a month	Strategy, RPG, Puzzle, Fighting, Adventure, Racing, Sandbox
P5	29	F	No	No	Several times a week	RPG, MMORPG, FPS, Adventure, Action
P6	28	M	No	No	Several times a month	Strategy, Simulation, Action
P7	29	F	Yes	Games researcher	Several times a month	RPG, MMORPG, Adventure, Action
P8	33	M	Yes	No	Daily	Arcade/Platformer, Strategy, Simulation, RPG, MMORPG, Puzzle, Fighting, Adventure, Card games, Action, Casual games
P9	35	F	No	No	Once every 3 month	Arcade/Platformer, Puzzle, Adventure, Mobile
P10	27	M	No	No	Several times a week	Arcade/Platforming, Strategy, Simulation, RPG, FPS, Action
P11	22	F	No	Games research student	Daily	Music, Strategy, Simulation, RPG, MMORPG, Visual Novel, Casual games
P12	59	F	No	No	Daily	Puzzle, Casual games
P13	32	M	No	No	Daily	Strategy, Simulation, RPG, MMORPG, Adventure, Card games, Action
P14	21	F	No	Games research student	Less than every 3 month	Music, Strategy, Simulation, RPG, MMORPG, Visual Novel, Casual games
P15	58	M	No	No	Several times a week	Casual games
P16	29	M	No	No	Several times a week	MOBA
P17	26	M	No	No, former professional esports player	Several times a week	Strategy, FPS, MOBA
P18	26	F	No	Games researcher	Several times a week	RPG, Indie games
P19	32	F	Yes	No	Several times a month	RPG, Adventure

**Table 1. Participants' demographics information and game preferences.** \*Please note that we do not disclose specific occupation and nationality of participants to ensure their anonymity.

topic. Whenever participants brought up a thematically new topic, or there were long pauses between comments that were obviously not linked, a new chunk was formed. In total, 619 chunks were identified ranging from just a few words (min. 1 word) to multiple sentences (the longest chunk being 615 words long). Following Fleck's final 'operationalised' framework [17, 18] – which provided coherent and distinct codes, and also formed the basis for the definitions provided in our supplementary material – each chunk was then rated for evidence of reflection and sorted into one of the reflection levels. Two of the authors conducted this analysis, where each chunk was discussed until agreement was reached with regards to the described level of reflection. In a next step, we then ascertained the focus of reflection for each chunk, that is, what the reflection was about. In contrast to Fleck's approach [17], which built upon literature on reflection in teaching, there was no pre-existing coding scheme on reflection foci in games we could draw from. Hence, we applied a coding scheme based on our aforementioned thematic analysis, where each chunk was assessed according to whether it related to *gameplay*, *game design*, *gaming practices*, or *making parallels between the game and the real world*. Examples for each level of reflection per reflection focus are provided in the supplementary material.

## FINDINGS

In the following we report first on two initial themes to consider when reflection occurred and how players reacted to reflection. We then introduce the levels of reflection and also consider examples in relation to the third theme, the foci of reflection that were observed i.e. what players reflected on.

Illustrative quotes are labeled according to participant number and participant information, e.g., (P7, F, 29) refers to participant 7, where the participant was female, aged 29.

### When are players reflecting?

Participants' accounts broadly mirrored Schön's notions of *reflection-on-action* and *reflection-in-action* [41]. For instance, in terms of on-action, after playing Quake Live, P17 would, while about to fall asleep, "think about how differently I could have played. I think these moments are kind of a replay in mind, when I'm not playing" (M, 26). Additionally, several players also referred to reflecting during play, that is, in-action, e.g., "During the game, of course I will reflect on it. Because I'm told to think. Because this is what the [puzzle adventure] game is there to do for me" (P9, F, 35). However, the distinction could become somewhat blurred. For example, P7 highlights jumping from play to consulting an external resource as and when required:

"Also when I was playing [World of Warcraft] I'd have the wiki in the background. And then I'd have the white page open. I'd be on it the minute I needed them." (F, 29)

In addition, many participants did not provide explicit details about when particular instances of reflection occurred. In the following example P3 mentions reflecting with friends on Monster Hunter, where this could have occurred during and/or after play:

"So, yeah, we were like four people playing this. We were sometimes reflecting together about strategies or

new weapons and tactics against the monsters and so on. And I also searched strategies on the internet and I've reflected also at home." (P3, M, 22)

Similar to the findings of Mols et al. on everyday reflection [39], some participants explained that "I keep just thinking about things, just randomly they keep popping into my head. Like "Huh, that was really interesting" (P11, F, 22), while others specifically referred to thinking about gameplay when they were in bed (e.g., P17, P9). In contrast, P4 explained that she had started thinking about gameplay only after she set out to design her own game:

"Before it was like "oh, yeah, that was cool" I never stopped and thought about why it was cool until I had to design something that I wanted to be fun myself." (F, 25)

### **Player reactions to reflection**

#### *Enjoying reflection*

Many participants seemed to enjoy the process of reflection, noting that it added depth to their experience of playing a game:

"I definitely prefer games where it's not clear-cut, because I like stories, and I like thinking. I like it when a game presents you with a decision and you're like: Actually, hold on! That feels wrong to me to do." (P7, F, 29)

Many saw this sort of reflection as a natural part of engaging with any form of media, e.g., "I really like thinking and talking about it with people [...] when I consume media, I just enjoy reflecting on it. That's really what I like doing. [...] The same happens to me with games" (P11, F, 22).

For others, they appreciated how games were able to introduce them to new concepts and ideas:

"Gaming exposed me to worlds, to ideas, to concepts that my parents tried to shield me from. Now with a lot of parents that's a good thing. A lot of children can't handle that. Me personally, I happen to be a very cerebral. I like to think a lot about different things." (P8, M, 33)

In addition, P4 reported that it took her a while to enjoy figuring out puzzles in the Zelda games but this was something she eventually found satisfying:

"When I was little I just asked my brother for help, and he'd say 'No, figure it out yourself' [...] As I became older, figuring out by myself would become a point of pride and I would refuse to look up the solution online." (P4, F, 25)

#### *Struggling with reflection*

However, some participants did struggle a little to come up with examples of times where they had been more thoughtful about gameplay:

"The games I play are not sort of deep in any way, so it's not like I go away speculating about the wonders of the world or the merits of the Viking civilisation after having played Civilization." (P2, M, 45)

A small number of participants stated that they did not really reflect about games, e.g., "I don't know if I played games that really made me think deeply about something. I guess not" (P14, F, 21), but yet still managed to come up with examples of times when they had done so, e.g., "what made me think with Pokemon was... I can never do it [referring to the Pokemon narrative], I can't just leave home and just go with my Pokemon 'Bye mom, I will be back or maybe not" (P14, F, 21).

Others also reported feeling somewhat conflicted, especially when thinking about difficult decisions:

"To wield that kind of power, I mean, which is exactly why I play games like that. Where else could you do stuff like that, if not in a game? But I always have it in the back of my mind. This utilitarian philosophy stuff then comes back to me: Which is worth more? What's the outcome? And I don't like that [...] precisely because I've got this power, I think so much about it. And then I can't \*not\* think about it. It doesn't mean I have to like these decisions." (P10, M, 27)

### **Levels and Foci of Reflection**

In the following we describe the different levels of reflection we observed in the data, moving from non-reflective description to transformative reflection [19]. Where relevant, we also indicate how the foci of reflection were coded as relating to *gameplay*, *game design*, *gaming practices*, or *making parallels between the game and the real world*.

#### **R0: Non-reflective description**

Chunks which involved participants describing their experience or certain events without further explanation or evaluation were coded as non-reflective description [17, 18]. This was one of the most common categories, where participants often described the minutiae of *gameplay* or their *gaming practices* but without providing any evidence of reflective thought: "There's no weapons, there's no action. There's nothing you can really do except walk and experience what the game has to offer" (P8, M, 33). Other instances of non-reflective description covered rather general statements about how participants approached certain games: "I'm more of the type that if the dialogues are too long I just click through and it's not something that I particularly invest time in." (P2, M, 45).

Many participants also described reminiscing, through sharing in-jokes with friends (P3, P8, P9, P19) or when going about daily life, e.g., P19 suggests she occasionally thinks about playing Sims 3 "in a daydream sort of way. You know, maybe 'Ok, I'm gonna get home and maybe I'll make her cheat on someone" (F, 32).

Similarly, there was also evidence of games creating a lingering effect through providing powerful experiences, e.g., "Aeris' death [in Final Fantasy VII]. Oh my God, that hit! Traumatized me! I was crying for days" (P8, M, 33). However, while it is clear these experiences resonated with players on an emotional level, they rarely led to more involved reflection:

"Like some of the love stories (in role-playing games). They were the things that made you think. Maybe make

you sad as well. You get caught up in that. It just stays with you [...] It's just 'Wow that was a great experience!' and you're kind of attached to it. But there's no serious consideration involved.' (P13, M, 32)

Some instances of non-reflective description implied that participants had actually reflected on gameplay at the time their experience had taken place, but without providing any elaboration on the nature of their thoughts within the interview. For instance, P5 described her struggle when making a final decision in *Life is Strange*:

"I think it took me more than an hour. I thought about it. Then I stopped. I let the game run, but I got up and did something else. I came back, I still couldn't decide, then I started browsing the internet for what other people did and what the repercussions are. And I still couldn't decide." (P5, F, 29)

In a similar example, P7 described how she discussed possible gameplay strategies with another player, though she did not provide any insight into the reasoning involved in the process:

"We'd use to discuss strategies, especially when we've been working... We've been trying those against a big boss. It would be the third attempt or something. What you could be trying, and what are the different variations we can try." (P7, F, 29)

### **R1: Reflective description**

According to Fleck [17, 18, 19], the lowest level of reflection entails description accompanied by some form of reasoning, but with limited analysis and no exploration of alternate explanations. Similar to [18], we observed a variety of reflective description across four different sub-types.

#### *R1.1 Description and explanation*

By far the most commonly observed type of reflection, participants' descriptions were accompanied by explanations they seemed already aware of prior to reflecting [17, 18], that is, almost as though they were factual, with "because" being a common verbal marker. These often regarded *gameplay* deliberations. For instance, P16 elaborated on why he enjoyed the gameplay in *League of Legends*.

"There is not one perfect strategy, you need to adapt every time and I think this is what makes it so addictive as well. Because you try to become better, you try out different things. There is not one perfect way." (P16, M, 29)

In another example, P6 explained his play strategy in *Football Manager*:

"Rather than going for a reputable player... With the young stars, once you discover one it's much easier to transfer them, because they cost little and it's easy to train them." (P6, M, 28)

Many examples of reflective description also concerned participants' *gaming practices*, such as P4, who explained why she was wary of playing *Super Smash Bros* with certain people:

"Competitive games can be fun for me. But they also really stress me out sometimes because, say, if I'm in

room full of guys and playing *Super Smash Bros* with them, I feel like I'm getting some sort of stereotype threat. I'm afraid that I have to represent my gender." (P4, F, 25)

#### *R1.2 Description and theory*

In contrast to the aforementioned examples, some participants seemed more unsure about the reasons for why they played certain games (more than others) or why a game had left a lasting impression on them, but provided tentative explanations. Typical verbal indicators included "maybe" or "I don't know". Overall, this type of reflection was much rarer. Both instances below illustrate an example of this type of reflection that focuses on *gaming practice*, while the second also considers aspects of *game design*.

"I continued playing *Beez* for more than 10 years. But other games only for a half year, or at most 3 years. I don't know why... I think it is already one part of my life." (P12, F, 59)

"I really don't know. I've been wondering this myself, because something is obviously different [between digital and pen and paper RPGs]. The only thing I can think of is that in pen and paper you're completely in charge of your character and in games the character is usually pre-designed." (P5, F, 29)

R1.2 also encompassed players interpreting a game's themes or narrative, but usually in very broad strokes.

"I don't tend to go into details (while thinking about INSIDE), but it's definitely a game that makes you... question... I think a key theme is about humans meddling with life." (P1, M, 38)

#### *R1.3 Evaluation*

Participants also often evaluated their experience of *gameplay*, sometimes simply in terms of what they liked about it: "I used to be involved in a raiding group. It was the thing that I enjoyed the most about the game." (P7, F, 29). Or when evaluating their own *gameplay* decisions and performance: "I tried to help him and that turned out quite horribly [...] I tried to do something nice and I tried to be clever at the same time, and that wasn't that good of an idea." (P10, M, 27). In a few instances, some participants also evaluated the design of a game, but with only limited analysis of what made it noteworthy: "[Her Story] was more an open-ended exploration and somehow more intellectual, I guess. And I think that was quite challenging and a nice form of overall structure of a game." (P2, M, 45).

#### *R1.4 Storytelling*

Longer chunks tended to contain multiple instances of reflective and non-reflective description, with participants progressing through chains of descriptions, explanations and evaluations. Fleck refers to these instances as 'storytelling' [17, 18]. For example, P19 reflected on her experiences of playing *Heavy Rain* in terms of both its *gameplay* and *game design*:

"So you know the way characters go off into different stories based on the choices you made for them [RO description]. As I'm quite interested in that kind of character development, which obviously with something like

Sims is quite limited [R1.1 explanation], because there is only so far you can get in terms of their characters [R1.3 evaluation]. Whereas in Heavy Rain, what was interesting... What kind of did it for me [R1.3 evaluation]: There was a moment in the game where I thought my character is gonna die and I freaked out and tried to get out of it and save it at that moment. And I lost it. I lost the game. Basically. I'd saved over [R0 description]. I did something stupid [R1.3 evaluation]." (P19, F, 32)

In another instance, after describing her experience with the BioShock series, P9 went on to theorise about why the games had been so impactful for her, but also provided an evaluation of *game design* with respect to the series' writing:

"My theory about this is that these stories and these games come from people who know this is hard [R1.2 theory]. They're trying to get emotional responses from emotions that they themselves had [R1.2 theory]. [...] Even if you're trying to write crap, it still comes from your own experience of crap [...] And I don't have any proof of that. Just a hunch [R1.2 theory]. Because I do catch glimpses of humanity in these stories [R1.3 evaluation]. How can you write about something so well [R1.3 evaluation] if you haven't gone through it? [R1.1 explanation]" (P9, F, 35)

## R2: Dialogical reflection

Dialogical reflection goes beyond reflective description, as it entails looking for relationships between instances of experience, consideration of alternative explanations and perspectives, as well as cycles of questioning, hypothesising and interpreting [17, 18, 19]. While all participants had reported instances of reflective and non-reflective description, dialogical reflection was not as common. Dialogical reflection sometimes focused on *gameplay* where participants mentally revisited previous experiences to figure out how to progress or improve in a game. For example, while attempting to solve a puzzle, P9 recalled a previous scene she had witnessed in Gabriel Knight, from which she deduced the puzzle's solution:

"I kept dying by this stupid snake in the museum [...] And as I lay in bed and I closed my eyes, I started thinking 'Ok, what else is in the room?' And as I was thinking about this fan, that it had made the snake very scared... I realized that I had the answer to the puzzle." (P9, F, 35)

In another example, P1 described how playing Journey and INSIDE made him question 'formal' (i.e., conventional) *game design* tropes:

"(Formal games are about) How do you win? What are the rules to win? What is the strategy that players must adopt to reach that goal? Whereas in games like Journey and INSIDE there is no objective. The objective is just your curiosity. Games like this never actually give away the answers. [...] The idea is that you have an understanding more or less of what they intended, but without the explicit answers that formal games usually give you." (P1, M, 38)

Additionally, many instances of dialogical reflection also concerned players *making parallels between a game and real life* e.g. in relation to narrative or mechanics. Interpretation and generalising from experience were prominent, but there was little to no evidence of any change of attitude or behavior. P8, for instance, elaborated on his interpretation of Phantasmagoria's narrative:

"If you water down the point of Phantasmagoria... Don't get freaked out next time you're having an argument, ok? It's just an adult part of life. It doesn't mean your father is going to turn into a demon and shove giblets down your mom's throat. But it does also mean that these things do happen." (P8, M, 33)

In another instance, P5, a clinical psychologist, commented on how Depression Quest afforded her an opportunity to experience the illness from a patient's point of view:

"It's really hard to get into the shoes of somebody, who is suffering from depression. [...] I think Depression Quest gets you to feel these things a bit. Which is different from just reading [clinical] criteria. And it's allowed, because when you're with the patient you shouldn't identify with them. Because that's not your place, your place is to do diagnostics or to do therapy." (P5, F, 29)

## R3: Transformative reflection

Transformative reflection is defined as revisiting an event with the intent to change one's behavior, gain new insights, or reconsider personal assumptions [19, 44]. Similar to previous work on evaluating reflection [17, 18, 22], we observed very few instances of transformative reflection. Participants rarely indicated that playing games had brought about personal change or new insights, with some instead emphasising that games had not really affected them on a fundamental level:

"Just these specific moments within a game that burn into your brain and get revived every once in a while when something similar happens [...] When I go to a forest which reminds me of this game that had terrible graphics, but that made me feel good back in the day. But as a person, I wouldn't say that it affected me that much." (P13, M, 32; R1.4 storytelling)

However, in one example of transformative reflection, P7 recounted how only after playing and relating the mechanics of a game about mindfulness to real life obstacles (i.e., *making parallels to real life* through dialogic reflection), she had a new understanding of the difficulties surrounding being mindful in practice (i.e., conceptual transformation):

"I think it made me more aware actually of how hard it is to be mindful. How hard it is to concentrate on things like your breathing when you've got everything else going on. I think the game with the rowing encouraged you to breathe in line with it, and you'd have all those obstacles. I think that the obstacles would be like everything else that would be going on in your life, when you're trying to concentrate on your breathing. Afterwards I was able to see that relation, how difficult it is actually to just



focus the mind on solely on your breathing. And not be distracted.” (P7, F, 29)

In another example illustrating how transformative reflection builds upon dialogical reflection (this time on *gaming practice*), P3 reported becoming increasingly aware of how playing League of Legends was affecting him negatively, suggesting he eventually learned to become more non-reactive to offending players, as well as in other aspects of his life:

“But with time I thought I won’t see this guy anymore. I will never see him. So, I’m just wasting my time and wasting my emotions and I’m just getting stressed for nothing. And I think that was the time I stopped getting angry. I actually learned something there. Also in reality... Life was easier for me because there are so many things which can make you angry and get stressed from.” (P3, M, 22)

#### **Absence of R4: Critical reflection**

Similar to previous work on analysing reflection [18, 22], we did not observe any evidence of critical reflection. While some players did refer to thinking about ethical and societal issues, there was little evidence to suggest that doing so had impacted their actions or attitudes within these contexts. That is, little to no transformation had taken place. For instance, though the following excerpt concerns ethical questions, the quote is actually an example of dialogical reflection. While P11 does consider different viewpoints, these are related purely to the narrative of the game (rather than real-life societal considerations) and it seems the experience did not influence her beliefs on the topic in any fundamental way, as indicated by her dismissing the game design as ‘hamfisted’ and ‘trying to be somewhat deep’:

“The kids break into the shadow-selves and steal away their distorted desires. It’s really hamfisted, but still [Persona 5] asks you: ‘Is this okay?’ Yeah, you’re making them a better person and you’re creating less harm. But you’re doing it in a way where the only people you’re asking for consent is yourself [...] It makes you reflect if anarchism is okay in a society that says it’s not [...] it tries to be somewhat deep, but it’s also very in your face with everything.” (P11, F, 22)

#### **DISCUSSION**

Recent work has discussed the potential of games as ‘reflection machines’ [34, 37], yet players’ actual experiences of reflection have received relatively little attention. Hence, we set out to explore players’ day-to-day reflective experiences, as well as what benefits, if any, they derive thereof. Our study is also the first to apply Fleck and Fitzpatrick’s [19] levels of reflection framework to games, showcasing its value in assessing the types of reflection players experience. Our interviews revealed that players not only reflect during and around play, but that for many participants, games prompt them to reflect on gameplay, game design, their gaming practices, as well as relating games to other aspects of their lives. In addition, many players enjoy engaging in reflection, as it appears to enrich and extend the player experience beyond a momentary instance of gameplay. With regards to the levels of reflection, reflective

description, in particular when accompanied by some explanation of sorts, was most evident in participants’ accounts, followed by dialogic reflection. In contrast, we observed very few instances of transformative reflection, and no instance of critical reflection, the higher levels of reflection outlined by in the framework [17, 18, 19].

In the following, we discuss the different ways in which players reflected, both with regards to levels and foci of reflection. In addition to considering what players gain from their reflective experiences, we consider the implications our findings may hold for our understanding and the evaluation of reflection in games.

First, many participants reported reflecting on gameplay, both within and outside of play, providing further support that players not only form strategies in-action [28], but also on-action to overcome gameplay breakdowns. Specifically, players provided reflective descriptions, where they evaluated their in-game performance, or engaged in dialogic reflection, where they consciously revisited their past gameplay experiences to hypothesise how to solve puzzles or consider what they could have done differently. These activities relate closely to Baumer’s notion of inquiry [3], whereby ideas are formed, evaluated, and re-examined. In fact, while only one of our participants had played games professionally, many of the others showed a willingness to reflect in this way to improve their skills and progress within a game. These findings provide evidence for how reflection can be a key part of gameplay and the player experience.

Second, participants’ reflection also extended beyond a particular instance of play where they considered their own gaming practice (such as how often they play and in what contexts) and aspects of game design. With respect to gaming habits and preferences, these tended to involve description and explanation, and occasionally related to transformation if change occurred as a result, e.g., playing less due to feeling agitated after playing a specific game. In relation to game design, the examples indicated that players clearly appreciated thinking more about a game in terms of considering how it was created and reflecting on the game’s narrative or the designer behind it. We argue the gain here relates to extending the initial gameplay experience and enriching it by engaging in reflective description and dialogic reflection. This was especially the case when participants felt that the game subverted conventional game tropes (e.g., *INSIDE*), linking to Baumer’s notion of breakdowns of expectation [3]. Similarly, as posited by Khaled [33], some players appreciated when games were not clear-cut or did not provide any explicit objectives, and instead invited them to stop and think.

Third, seemingly counter to the claim that games are particularly well suited to facilitating transformative [44] and critical reflection [33], we observed very few instances of transformative and critical reflection in our study. Some participants even explicitly stated that (reflecting on and because of) games had not affected them personally. However, this is not altogether surprising, as higher-level reflection is considered exceedingly rare [19], and previous work within HCI also reported little to no evidence of transformative and critical reflection [17,

18, 22]. Moreover, several participants did report that games prompted them to draw parallels to real life, and even reflect on ethical and societal matters. There are similarities here to the concept of the 'morally reflective player' who, during play, "factors moral considerations into their decision-making" ([20], p. 213). Though there was some evidence that players engaged in this sort of process by considering the ethical nature of their actions (e.g., P10's grappling with utilitarian philosophy), this was rarely extended outside the confines of the game. Thus, while these reflective experiences were rarely transformative with respect to players' beliefs or behaviour, they did indicate fairly involved forms of (dialogical) reflection, where participants connected their in-game experiences to the real world [33]. This parallels how other forms of entertainment, such as movies, are appreciated for their ability to allow people to "link the content to the viewers' own lives, or to their understanding of the world at large" ([2], p. 125).

Additionally, our research suggests that it would be misleading to conflate levels and foci of reflection. While players reflected on ethical and societal issues, and drew real life parallels, this was rarely to the extent that it resulted in enduring transformation of their beliefs or behaviour. In contrast, a few participants did seem to engage in prolonged and relatively involved reflection on certain topics (e.g., a specific game's design, how they felt during and after gameplay), which, while not related to global matters, did give way to new insights (e.g., the difficulties of being mindful) and sometimes even personal transformation (e.g., becoming less reactive to stressful situations in-game and in real life).

However, the findings also raise the question whether higher levels of reflection are to be considered 'more desirable' design outcomes for games. Baumer [3] cautions against simply focusing on reflection per se, and stresses the importance of considering what role reflection plays in the contexts in which it occurs and what benefits it provides. Arguably, the conceptualisation of transformative and critical reflection as higher-level forms of reflection [19] might entice one in thinking that reflection in games should ideally result in something 'more' (e.g., behaviour change, re-considering one's beliefs, becoming more aware of societal biases, etc.) [4]. However, while much work within HCI and games has focused on reflection as a means to promote learning or behaviour change [4, 24, 37], our analysis illustrates that many players value reflection on games in and of itself.

Lastly, some participants simply enjoyed reminiscing about past gameplay experiences, on their own or through bonding with friends. In line with previous research [5], several participants referred to emotionally resonant experiences as being particularly memorable. However, these instances rarely connected to reflective thought, supporting notions within HCI [4, 19] that reminiscing, while important, does not constitute reflection. Though previous work on serious experience [37] and reflective game design [33] has theorised that lingering and memorable gaming experiences can promote critical reflection, our findings suggest that these sorts of experiences do not guarantee it. Additionally, we also saw examples where players explicitly struggled with the process of reflection or

were somewhat dismissive of the examples they provided by suggesting it was not something they normally did, or that it was not that 'deep'. As suggested by Schön [41] and previous research on serious experience and ethical gameplay [27, 43], players also need to be willing to engage with games in a more in-depth way in order to experience more critical forms of thought.

### Evaluating reflection on games

In applying the levels of reflection framework [17, 18, 19], it was possible for us to (1) identify evidence of reflective thought in players' accounts, (2) distinguish it more clearly from non-reflective forms of thinking (e.g., when going into a 'real' forest made P13 reminisce about exploring game forests), as well as (3) differentiate between levels of reflection. In doing so, our study highlights that the approach is a promising tool for evaluating reflection on games. For instance, rather than assess whether a game lingers with players [37] or 'how much' reflection an individual experiences [3], the levels of reflection framework might contribute to assessing serious experience in a more nuanced manner [27].

That being said, we encountered several challenges when evaluating the sorts of reflection players experienced from games. First as argued before, one should be mindful of equating evidence of higher-level reflection with a game being 'more successful' at prompting reflection (see also [3]), and instead also take the content of players' reflection into consideration. Relatedly, the framework in itself does not help ascertain *what* players reflected on. Recall, however, that Fleck's approach was based on research on reflection in teaching [17, 18, 19], not games. Our coding scheme provides a starting point for future work on the foci of players' reflection, but would likely benefit from revisions and/or expansions given the research context. For instance, when evaluating emotionally moving game experiences, reflection on difficult decisions and personal ideals seem likely foci [5, 6].

Moreover, evidence of a particular level of reflection is determined by how well participants are able to articulate their experiences. Hence, evaluating reflection proved particularly difficult with participants who tended not to verbalise much, or those who were quick to dismiss their gaming experiences as not being particularly deep. Also, while all our participants were recruited on the condition of being fluent in English, many were not native speakers. Thus, varying language and cultural influences may have impacted the ways in which each articulated their reflective experiences. Additionally, Fleck stresses that the evaluation approach and the framework it is based on, may miss or misattribute reflection, which could explain why levels beyond dialogic reflection were so rarely observed in previous work [17, 18, 22], as well as our own study. Note, however, that these difficulties are not just limited to the present approach, but related to any attempt at capturing reflection [4, 18], as evaluation methods can only provide indirect evidence of reflection and may not accurately capture people's ability to reflect [49]. Future work on evaluating reflection in games might thus benefit from implementing or even combining different theories and frameworks of reflection on experience, such as Baumer's dimensions of reflection

tive informatics [3], the scaffolding components of reflective practicum outlined by Slovák et al. [44], or Khaled's qualities of reflective game design [33].

### Limitations and Future Work

In contrast to Fleck's work on evaluating reflection on experience [18], where participants first revisited their teaching experience through SenseCam prior to being interviewed, our participants were retrospectively interviewed – sometimes long after they had played the games they mentioned. It is therefore likely that their accounts were not as detailed as if we had interviewed them shortly after their experiences. Indeed, we observed instances of non-reflective description that clearly hinted at players having reflected at the time but which were not articulated during the interview. The retrospective interview format may have also prompted our participants to reflect more generally on certain issues such as how gaming exposed them to new ideas. Indeed, it could be argued that retrospective interviews constitute by definition a form of 're-visiting experiences with explanation' [19]. Following Fleck's study [18], future work might therefore explore how player reflection occurs immediately after gameplay, or through the use of prompting with images or recordings of previous gameplay (similar to the SenseCam study).

On the other hand, there may be advantages to ensuring that some time has passed since the initial gameplay experience, as reflective thought takes time to occur [35], especially for more involved forms of reflection [18]. Perhaps an immediate follow-up interview might have missed out on certain aspects of reflective experiences, as "there are only so many fundamental changes in perspective that it would be meaningful to make in a short period of time" ([18], p. 448). Moreover, while our study cannot make any claims on whether lingering experiences facilitate (higher-level) reflection [27, 33, 37], it seems that at least some reflective experiences appear to resonate with players over time, as suggested by participants being able to recount specific examples of particular games and experiences which they had reflected on in the past.

The interview format also made it sometimes difficult to clearly distinguish between participants' accounts of reflection in-action and on-action, although it became apparent that they often seemed to reinforce each other (e.g., trying to solve a puzzle while playing, coming up with the solution outside of playing, then applying the solution). Taking a cue from previous work looking into how reflection-in-action comes about during gameplay [29], future work might hence endeavour to investigate how the moment-to-moment player experience shapes reflection-on-action, how this develops outside of play over time, and how it may feed back into play and affect subsequent reflection-in-action.

One feature of reflection that was not necessarily emphasised in the data set was the role that taking a step back can play. Previous work suggests that critical forms of reflection require a break from immersion [21, 34] and generally occurs outside the diegesis of the game [12]. In our study there were several examples of players progressing after reflecting on-action (e.g., while in bed), and one participant even had to 'stop' playing and 'think' in order to be able to make a decision in Life is

Strange – but this sort of 'distance' was rarely mentioned explicitly. In educational games, reflection is often supported by a debriefing session, which is seen as necessary for ensuring that the play experience can be translated into learning outcomes [11, 12]. Similarly, Slovák et al. [44] highlight the importance of scaffolding, and note that while it is considered integral to reflective practice, it is often overlooked in HCI research on reflection.

Finally, it would be misleading to conclude that games do not prompt higher-level critical reflection, just because we did not observe this in our study. Recall that our participants reported mainly on (mainstream) entertainment games, with arguably few games that were designed with the explicit intent to prompt critical reflection (notable exceptions being perhaps the mindfulness game and Depression Quest). If anything, our findings showcase that players do theorise about what messages might be conveyed through game design, and that they do draw parallels between games and their own real life experiences through engaging in dialogic reflection. Hence, more research is required on how people respond to games specifically designed for transformational or critical reflection, especially in terms of comparing players that are inclined to enjoy doing so and those that are not. Perhaps more importantly, future work can investigate how game design [34] or the particular gaming contexts [46] may promote higher levels of reflection, and whether this results in different experiences or enduring transformation.

### CONCLUSION

Despite the amount of attention reflection has received in HCI, it has rarely been examined within the context of digital games. Through developing themes and applying the levels of reflection framework, our analysis provides evidence for the variety of reflective experiences that result from playing games, while also indicating that higher-levels of reflection are less common within people's day-to-day gaming experiences. Reflection can occur both during and outside of play, ranging from a focus on gameplay to how a game relates to the world outside of it. In addition, many players consider their gaming reflections to be worthwhile in and of themselves, furthering our understanding of the player experience and how this can extend beyond the instance of play. Finally, we have argued that the levels of reflection should not be conflated with the foci or benefits of reflection, something that will be especially important to consider when creating and evaluating games designed to support reflection.

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### REFERENCES

1. Sasha Barab, Michael Thomas, Tyler Dodge, Robert Carteaux, and Hakan Tuzun. 2005. Making learning fun: Quest Atlantis, a game without guns. *Educational*

- Technology Research and Development* 53, 1 (01 Mar 2005), 86–107. DOI: <http://dx.doi.org/10.1007/BF02504859>
2. Anne Bartsch, Anja Kalch, and Mary Beth Oliver. 2014. Moved to Think: The role of emotional media experiences in stimulating reflective thoughts. *Journal of Media Psychology* 26, 3 (2014), 125–140. DOI: <http://dx.doi.org/10.1027/1864-1105/a000118>
  3. Eric P.S. Baumer. 2015. Reflective Informatics: Conceptual Dimensions for Designing Technologies of Reflection. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15)*. ACM, New York, NY, USA, 585–594. DOI: <http://dx.doi.org/10.1145/2702123.2702234>
  4. Eric P.S. Baumer, Vera Khovanskaya, Mark Matthews, Lindsay Reynolds, Victoria Schwanda Sosik, and Geri Gay. 2014. Reviewing Reflection: On the Use of Reflection in Interactive System Design. In *Proceedings of the 2014 Conference on Designing Interactive Systems (DIS '14)*. ACM, New York, NY, USA, 93–102. DOI: <http://dx.doi.org/10.1145/2598510.2598598>
  5. Julia Ayumi Bopp, Elisa D. Mekler, and Klaus Opwis. 2016. Negative Emotion, Positive Experience?: Emotionally Moving Moments in Digital Games. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*. ACM, New York, NY, USA, 2996–3006. DOI: <http://dx.doi.org/10.1145/2858036.2858227>
  6. Julia Ayumi Bopp, Klaus Opwis, and Elisa D. Mekler. 2018. “An Odd Kind of Pleasure”: Differentiating Emotional Challenge in Digital Games. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, Article 41, 12 pages. DOI: <http://dx.doi.org/10.1145/3173574.3173615>
  7. David Boud, Rosemary Keogh, and David Walker. 1985. Promoting reflection in learning. *Reflection: Turning experience into learning* (1985), 18–40.
  8. Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3, 2 (2006), 77–101. DOI: <http://dx.doi.org/10.1191/1478088706qp063oa>
  9. Trina Choontanom and Bonnie Nardi. 2012. Theorycrafting: The Art and Science of Using Numbers to Interpret the World. In *Games, learning, and society: Learning and meaning in the digital age*, Constance Steinkuehler, Kurt Squire, and Sasha Barab (Eds.). Cambridge University Press, 129–153.
  10. Tom Cole, Paul Cairns, and Marco Gillies. 2015. Emotional and Functional Challenge in Core and Avant-garde Games. In *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '15)*. ACM, New York, NY, USA, 121–126. DOI: <http://dx.doi.org/10.1145/2793107.2793147>
  11. David Crookall. 2010. Serious Games, Debriefing, and Simulation/Gaming as a Discipline. *Simulation & Gaming* 41, 6 (2010), 898–920. DOI: <http://dx.doi.org/10.1177/1046878110390784>
  12. Sara de Freitas and Martin Oliver. 2006. How can exploratory learning with games and simulations within the curriculum be most effectively evaluated? *Computers & Education* 46, 3 (2006), 249 – 264. DOI: <http://dx.doi.org/10.1016/j.compedu.2005.11.007>
  13. Alena Denisova, A. Imran Nordin, and Paul Cairns. 2016. The Convergence of Player Experience Questionnaires. In *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '16)*. ACM, New York, NY, USA, 33–37. DOI: <http://dx.doi.org/10.1145/2967934.2968095>
  14. J. Dewey. 1933. *How we think: a restatement of the relation of reflective thinking to the educative process*. D.C. Heath and company.
  15. Mary Flanagan, Daniel C. Howe, and Helen Nissenbaum. 2005. Values at Play: Design Tradeoffs in Socially-oriented Game Design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '05)*. ACM, New York, NY, USA, 751–760. DOI: <http://dx.doi.org/10.1145/1054972.1055076>
  16. Mary Flanagan and Helen Nissenbaum. 2014. *Values at play in digital games*. MIT Press.
  17. Rowanne Fleck. 2008. *Exploring the potential of passive image capture to support reflection on experience*. Ph.D. Dissertation. University of Sussex.
  18. Rowanne Fleck. 2012. Rating Reflection on Experience: A Case Study of Teachers’ and Tutors’ Reflection Around Images. *Interact. Comput.* 24, 6 (Nov. 2012), 439–449. DOI: <http://dx.doi.org/10.1016/j.intcom.2012.07.003>
  19. Rowanne Fleck and Geraldine Fitzpatrick. 2010. Reflecting on Reflection: Framing a Design Landscape. In *Proceedings of the 22Nd Conference of the Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction (OZCHI '10)*. ACM, New York, NY, USA, 216–223. DOI: <http://dx.doi.org/10.1145/1952222.1952269>
  20. Paul Formosa, Malcolm Ryan, and Dan Staines. 2016. Papers, Please and the systemic approach to engaging ethical expertise in videogames. *Ethics and Information Technology* 18, 3 (01 Sep 2016), 211–225. DOI: <http://dx.doi.org/10.1007/s10676-016-9407-z>
  21. Gonzalo Frasca. 2001. Rethinking agency and immersion: video games as a means of consciousness-raising. *Digital Creativity* 12, 3 (2001), 167–174. DOI: <http://dx.doi.org/10.1076/digc.12.3.167.3225>

22. Eva Ganglbauer, Geraldine Fitzpatrick, and Florian Güldenpfennig. 2015. Why and What Did We Throw out?: Probing on Reflection Through the Food Waste Diary. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15)*. ACM, New York, NY, USA, 1105–1114. DOI : <http://dx.doi.org/10.1145/2702123.2702284>
23. William W. Gaver, John Bowers, Andrew Boucher, Hans Gellerson, Sarah Pennington, Albrecht Schmidt, Anthony Steed, Nicholas Villars, and Brendan Walker. 2004. The Drift Table: Designing for Ludic Engagement. In *CHI '04 Extended Abstracts on Human Factors in Computing Systems (CHI EA '04)*. ACM, New York, NY, USA, 885–900. DOI : <http://dx.doi.org/10.1145/985921.985947>
24. James Paul Gee. 2014. *What video games have to teach us about learning and literacy*. Macmillan.
25. Lars Hallnäs and Johan Redström. 2001. Slow Technology – Designing for Reflection. *Personal Ubiquitous Comput.* 5, 3 (Jan. 2001), 201–212. DOI : <http://dx.doi.org/10.1007/PL000000019>
26. Casper Hartevelde, Rui Guimaraes, Igor S. Mayer, and Rafael Bidarra. 2010. Balancing Play, Meaning and Reality: The Design Philosophy of LEVEE PATROLLER. *Simulation & Gaming* 41, 3 (2010), 316–340. DOI : <http://dx.doi.org/10.1177/1046878108331237>
27. Ioanna Iacovides and Anna L. Cox. 2015. Moving Beyond Fun: Evaluating Serious Experience in Digital Games. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15)*. ACM, New York, NY, USA, 2245–2254. DOI : <http://dx.doi.org/10.1145/2702123.2702204>
28. Ioanna Iacovides, Anna L. Cox, Ara Avakian, and Thomas Knoll. 2014. Player Strategies: Achieving Breakthroughs and Progressing in Single-player and Cooperative Games. In *Proceedings of the First ACM SIGCHI Annual Symposium on Computer-human Interaction in Play (CHI PLAY '14)*. ACM, New York, NY, USA, 131–140. DOI : <http://dx.doi.org/10.1145/2658537.2658697>
29. Ioanna Iacovides, Anna L. Cox, Patrick McAndrew, James Aczel, and Eileen Scanlon. 2015. Game-Play Breakdowns and Breakthroughs: Exploring the Relationship Between Action, Understanding, and Involvement. *Hum.-Comput. Interact.* 30, 3-4 (May 2015), 202–231. DOI : <http://dx.doi.org/10.1080/07370024.2014.987347>
30. Ioanna Iacovides, Patrick McAndrew, Eileen Scanlon, and James Aczel. 2014. The Gaming Involvement and Informal Learning Framework. *Simulation & Gaming* 45, 4-5 (2014), 611–626. DOI : <http://dx.doi.org/10.1177/1046878114554191>
31. Katherine Isbister, Mary Flanagan, and Chelsea Hash. 2010. Designing Games for Learning: Insights from Conversations with Designers. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '10)*. ACM, New York, NY, USA, 2041–2044. DOI : <http://dx.doi.org/10.1145/1753326.1753637>
32. Charlene Jennett, Ioanna Iacovides, Anna L. Cox, Anastasia Vikhanova, Emily Weigold, Layla Mostaghimi, Geraint Jones, James Jenkins, Sarah Gallacher, and Yvonne Rogers. 2016. Squeezy Green Balls: Promoting Environmental Awareness Through Playful Interactions. In *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '16)*. ACM, New York, NY, USA, 389–400. DOI : <http://dx.doi.org/10.1145/2967934.2968102>
33. Rilla Khaled. 2018. Questions Over Answers: Reflective Game Design. In *Playful Disruption of Digital Media*, Daniel Cermak-Sassenrath (Ed.). Springer Singapore, 3–27.
34. Rilla Khaled and Gordon Ingram. 2012. Tales from the Front Lines of a Large-scale Serious Game Project. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '12)*. ACM, New York, NY, USA, 69–78. DOI : <http://dx.doi.org/10.1145/2207676.2207688>
35. Robert J. Lewis, Ron Tamborini, and René Weber. 2014. Testing a Dual-Process Model of Media Enjoyment and Appreciation. *Journal of Communication* 64, 3 (2014), 397–416. DOI : <http://dx.doi.org/10.1111/jcom.12101>
36. Lena Mamykina, Elizabeth Mynatt, Patricia Davidson, and Daniel Greenblatt. 2008. MAHI: Investigation of Social Scaffolding for Reflective Thinking in Diabetes Management. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '08)*. ACM, New York, NY, USA, 477–486. DOI : <http://dx.doi.org/10.1145/1357054.1357131>
37. Tim Marsh and Brigid Costello. 2013. *Lingering Serious Experience as Trigger to Raise Awareness, Encourage Reflection and Change Behavior*. Springer Berlin Heidelberg, Berlin, Heidelberg, 116–124. DOI : [http://dx.doi.org/10.1007/978-3-642-37157-8\\_15](http://dx.doi.org/10.1007/978-3-642-37157-8_15)
38. Elisa D Mekler, Julia Ayumi Bopp, Alexandre N Tuch, and Klaus Opwis. 2014. A systematic review of quantitative studies on the enjoyment of digital entertainment games. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems*. ACM, 927–936. DOI : <http://dx.doi.org/10.1145/2556288.2557078>
39. Ine Mols, Elise van den Hoven, and Berry Eggen. 2016. Informing Design for Reflection: An Overview of Current Everyday Practices. In *Proceedings of the 9th Nordic Conference on Human-Computer Interaction (NordCHI '16)*. ACM, New York, NY, USA, Article 21, 10 pages. DOI : <http://dx.doi.org/10.1145/2971485.2971494>

40. Corina Sas and Alan Dix. 2009. Designing for Reflection on Experience. In *CHI '09 Extended Abstracts on Human Factors in Computing Systems (CHI EA '09)*. ACM, New York, NY, USA, 4741–4744. DOI : <http://dx.doi.org/10.1145/1520340.1520730>
41. Donald A Schön. 1984. *The reflective practitioner: How professionals think in action*. Vol. 5126. Basic books.
42. Phoebe Sengers, Kirsten Boehner, Shay David, and Joseph 'Jofish' Kaye. 2005. Reflective Design. In *Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility (CC '05)*. ACM, New York, NY, USA, 49–58. DOI : <http://dx.doi.org/10.1145/1094562.1094569>
43. Miguel Sicart. 2013. *Beyond choices: The design of ethical gameplay*. MIT Press.
44. Petr Slovák, Christopher Frauenberger, and Geraldine Fitzpatrick. 2017. Reflective Practicum: A Framework of Sensitising Concepts to Design for Transformative Reflection. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. ACM, New York, NY, USA, 2696–2707. DOI : <http://dx.doi.org/10.1145/3025453.3025516>
45. Petr Slovák, Anja Thieme, David Murphy, Paul Tennent, Patrick Olivier, and Geraldine Fitzpatrick. 2015. On Becoming a Counsellor: Challenges and Opportunities to Support Interpersonal Skills Training. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing (CSCW '15)*. ACM, New York, NY, USA, 1336–1347. DOI : <http://dx.doi.org/10.1145/2675133.2675190>
46. Kurt D. Squire. 2005. Educating the fighter: buttonmashing, seeing, being. *On the Horizon* 13, 2 (2005), 75–88. DOI : <http://dx.doi.org/10.1108/10748120510608106>
47. Sharon T. Steinemann, Elisa D. Mekler, and Klaus Opwis. 2015. Increasing Donating Behavior Through a Game for Change: The Role of Interactivity and Appreciation. In *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '15)*. ACM, New York, NY, USA, 319–329. DOI : <http://dx.doi.org/10.1145/2793107.2793125>
48. Constance Steinkuehler, Kurt Squire, and Sasha Barab. 2012. *Games, learning, and society: Learning and meaning in the digital age*. Cambridge University Press.
49. Jennifer Sumsion and Alma Fleet. 1996. Reflection: can we assess it? Should we assess it? *Assessment & Evaluation in Higher Education* 21, 2 (1996), 121–130. DOI : <http://dx.doi.org/10.1080/0260293960210202>
50. Anja Thieme, Jayne Wallace, James Thomas, Ko Le Chen, Nicole Kraemer, and Patrick Olivier. 2011. Lovers' box: Designing for reflection within romantic relationships. *International Journal of Human-Computer Studies* 69, 5 (2011), 283 – 297. DOI : <http://dx.doi.org/10.1016/j.ijhcs.2010.12.006>