White Rose
university consortium
Universities of Leeds, Sheffield & York

eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk/

"Conversations with pigeons": Capturing Players' Lived Experience of Perspective Challenging Games

MATTHEW ALEXANDER WHITBY, University of York, UK
IOANNA IACOVIDES, University of York, UK
SEBASTIAN DETERDING, Imperial College London, UK

Video games are increasingly designed to provoke reflection and challenge players' perspectives. Yet we know little about how such perspective-challenging experiences come about in gameplay. In response, we used systematic self-observation diaries and micro-phenomenological interviews to capture players' (n=15) lived experience of perspective challenges in purposely sampled games including *Hatoful Boyfriend*, *The Stanley Parable*, or *Papers, Please*. We found a sequence of trigger, reflection, and transformation constituting perspective-challenging experiences, matching Mezirow's model of transformative learning. Most of these were game-related or 'endo-game', suggesting that medium self-reflection could be an overlooked part of everyday game reflection and appreciation. Reflections were accompanied by a wide range of emotions, including frequent epistemic emotions, and emotions could change drastically even during short gameplay experiences. Actual perspective change or transformation was rare. We construct a model of granular types of triggers, reflections, and transformations that can aid reflective game design.

CCS Concepts: • **Human-centered computing** → *HCI theory, concepts and models*.

Additional Key Words and Phrases: perspective, reflection, games, perspective challenge, lived experience

1 INTRODUCTION

Long cast as 'mere' entertainment, video games today are recognised as sources of eudaimonic experiences – moments of insight, meaning, resonance, or 'deeper' appreciation [21, 41], or in Rilla Khaled's words, *"highly appropriate vehicles for triggering and supporting reflection"* [44] (p.1). Designers and researchers are therefore trying to understand *how* the design of games affords such reflection [5, 40, 56], especially *transformative* reflection [7] that leads audiences to change their beliefs and attitudes [7, 33, 65]. They variously theorise that reflection arises when gameplay events *challenge* or conflict with a player's existing beliefs, attitudes, or perspective [12, 33, 44]. A recent survey study supported that gameplay experiences that players self-identify as perspective-challenging entail narrative, game-mechanical, and game-external triggers that challenge the player's existing expectations [75].

That said, we lack empirical work actually unpacking when, why, and how certain gameplay moments prompt reflection or even perspective change. Put differently, we know little about the process of perspective challenges in games. Such a grounded understanding would help designers create richer player experiences for both commercial and applied games (especially those hoping to get players reflecting). It requires granularly eliciting and analysing of players' lived experience of such experiences.

Authors' addresses: Matthew Alexander Whitby, University of York, York, UK, maw562@york.ac.uk; Ioanna Iacovides, University of York, York, UK, jo.iacovides@york.ac.uk; Sebastian Deterding, Imperial College London, London, UK, s.deterding@imperial.ac.uk.

To do so, we used a combination of micro-phenomenological interviews [59] and systematic self-observation diaries [63] to capture the lived experience of players' perspective challenges (from here on PCE or perspective challenging experiences), focusing particularly on game mechanic-related PCEs. A total of 15 participants reported 68 such PCEs, from which we developed a typology and model spanning 8 triggers and 5 types of reflections. We found that just like transformations could relate to endo-game and exo-game perspectives, PCEs were triggered by endo-game and exo-game phenomena and involved endo-game or exo-game reflection. However, endo-game triggers could at times produce exo-game reflection. Actual perspective transformations were relatively rare and chiefly revolved around changed playstyles or changed perspectives on games as a medium. This study thus contributes an empirically grounded *Model of Perspective Challenging Experiences* which captures how games can instigate reflection, what kinds of relfection they afford, and how these may lead to actual perspective transformation.

2 RELATED WORK

2.1 Reflection and Perspective Change in HCI and Games Research

HCI research has recognised *reflection* as a desirable design outcome for interactive systems, yet has not developed a strong shared understanding of the term [8, 10, 33]. Baumer's recent conceptual review [7] identified three recurring dimensions: the *breakdown* of smooth, unproblematic perceiving, acting, or thinking by some anomaly; the conscious, intentional *inquiry* of a phenomenon; and the *transformation* of a person's understanding.

In game scholarship, Rilla Khaled's "Reflective Game Design" [44] remains the most explicit attempt at linking reflection and video games. She draws on critical, reflective, and ludic design as well as art games to articulate a number of design principles for games that foster reflection, namely questions over answers, clarity over stealth, disruption over comfort, and reflection over immersion. Similar ideas and strategies have been explored in avant-garde video games [20, 64] or "abusive game design" [76, 77]: these intentionally break with formal game design conventions, resulting in not straightforwardly understandable and enjoyable player experiences that aim to direct attention to the form of games themselves or political and other topics beyond games. Two recent separate studies [48, 75] differently prompted players to report "reflective" or "perspective changing" experiences with video games. Both found that players experienced and enjoyed such moments in games. In another recent study, Iacovides and colleagues [40] designed and evaluated a game for reflection grounded in the Embedded Design Model by Kaufmann and others, finding that reflection was afforded by a balance of psychological distancing (to afford safe engagement with a charged topic) and personal relevance.

Closely related is work on *persuasive games* [12, 25–27, 42], games intentionally designed to change people's attitudes and beliefs. While not explicitly labelling it "reflection", Bogost's influential model of procedural rhetorics posits "simulation fever" [12] as a key stage in people engaging with persuasive games: as they encounter a "simulation gap" or mismatch between the game's and their own mental model of a system, this causes cognitive dissonance motivating them to cognitively resolve this dissonance. Bogost's model has remained untested theory. In recent empirical persuasive games research, Jacobs [43] drew on the elaboration likelihood model (ELM) from general persuasion research to theorise the persuasion process. Based on the ELM, he posits that people are more susceptible to strong (game-based) arguments if they engage with the game critically and deliberately (central route) than superficially (peripheral route), yet found no evidence for this claim.

Research on *eudaimonic experiences* in media entertainment and games approaches the same phenomenon form a player perspective [20, 24, 48, 49]. Eudaimonic experiences broadly describe

experiences of insight, meaning, emotional challenge, resonance, being moved, or self-transcendence – experiences people appreciate as relating to personal growth and leading a meaningful life. A recent scoping review [24] suggested that the concept indeed spans multiple related but distinct experiences. Focusing particularly on emotional challenge, Cole and Gillies [22] have developed an empirically grounded theory of such eudaimonic player experiences, identifying six constituting properties like expectation-setting, ambiguity, or mixed affect. However, what exactly instigates player reflection on or as part of eudaimonic experiences is again not answered.

2.2 Defining Reflection, Perspective, and Perspective Change

Given the lack of strong prior theory in HCI and games research specifying reflection and perspective change, we here ground our own terminology and conceptualisation in a widely recognised and studied theoretical model, sociologist Jack Mezirow's theory of transformative learning [50–52], which has see occasional reference in prior HCI and games work [7, 44]. In everyday language, a *perspective* is a person's point of view. Mezirow defined *meaning perspective* more specifically as *"the structure of cultural assumptions within which new experience is assimilated to and transformed by one's past experience"* [50]. Following Mezirow, perspectives determine "the horizon of our expectations" and are based on our socialisation into psychocultural assumptions, manifesting as "meaning schemes" or more concrete concepts, beliefs, and attitudes shaping how we understand a particular topic [51]. Mezirow argued that when a person's meaning perspective cannot accommodate the abnormalities of a new situation, the person reflects on their held perspective, which he defined as *"attending to the grounds (justification) of one's beliefs"* [51]. Based on such reflection, *"our meaning structures are transformed"* [51]. Thus, transformative learning captures how we change the overall frame, paradigm, or system of predispositions structuring how we perceive, understand, and evaluate the world, as opposed to incremental learning of new beliefs that fit within a frame. (This matches Bogost's [12] conceptualisation of procedural rhetoric reproducing or challenging the framing of a given subject matter, grounded in cognitive linguistics.)

A critical review of empirical work on Mezirow's theory [66] found 39 studies using mostly naturalistic research designs to gather retroactive accounts of people's transformative reflective experiences. Studies confirmed that a variety of adults in different stages of their lives, settings, and conditions experienced perspective transformations, in particular that *"the revision of meaning structures seems to be instigated by a disorienting dilemma followed by a series of learning strategies involving critical reflection"* [66] (p.51). The review concluded that while Mezirow's theory is borne out by data, research has been lacking on *"the varying nature of the catalyst of the learning process (disorienting dilemma)"* [66] (p.55).

Following Mezirow, we here will use *perspective* to describe *a person's particular network of attitudes and beliefs towards something or someone*. Attitudes represent how a person evaluates something [2] (e.g., *"I like this game character"*). Beliefs are what a person thinks to be true about something (e.g., *"this game character is friendly"*). *Perspective challenge* describes a breakdown of a network of beliefs and attitudes, prompting *reflection* – conscious deliberation on the perspective in light of the conflicting observation. This reflection *can* result in a *perspective transformation* or change of the attitudes and beliefs comprising a perspective. A *perspective challenging experience* (PCE) denotes the overall experience of this process, while *trigger* denotes the event or observation instigating it.

2.3 Summary and Research Questions

To summarise, both HCI and games research have become interested in designing for reflection and perspective change. Theories variously propose that reflection is afforded when a player's existing perspective clashes with and cannot accommodate gameplay events. Such reflection then

potentially leads to actual perspective change. Prior work points broadly at game-mechanical, narrative, and game-external perspective-challenging experiences (PCEs). However, beyond broad categories, we know relatively little about the specific recurring kinds of PCEs in games, and about the actual process in which they unfold.

In response, this study asks three research questions:

(1) What experiences trigger perspective challenge?
(2) What categories of perspective challenge emerge from these experiences?
(3) What is players' lived experience of games that challenge their perspective?

3 METHODS

Standard games HCI methods are geared towards players post-hoc and summatively quantifying or describing their experience of a whole gaming session or with a whole game [37] (p.1). This also holds for previous work on perspective challenging moments [75]. However, post-hoc retelling of an experience is prone to post-hoc rationalisation [36], where the participants desire to entertain, appear reasoned, self-consistent, or embellish accounts [59]. Unpacking the precise causes and conditions (RQ1) and detail lived experience (RQ3) of perspective challenging moments requires a way of ensuring detailed and 'fresh' lived experience as free of post-hoc embellishments as possible. Add to that the fact that we cannot simply induce or expose a player to a perspective challenging moment, as we could if we wanted to, e.g., study the lived experience of onboarding into a new, unfamiliar game. Whether and when exactly a player experiences a perspective challenge is unpredictable and can only be determined a posteriori, when said player on reflection determines that their past experience constitutes a perspective challenging moment. Qualitative critical incident or biographical interviews ultimately rely on the chance that any interviewed player is *likely* (though not guaranteed) to have experienced such a moment *at some point* – but as a result, may elicit memories of sometimes quite long-ago events, and unsystematic memories that weren't formed with the express intent to pay close attention to the unfolding of these events.

To reliably elicit and capture the lived experience of perspective challenging moments in detail, we used a combination of systematic self-observation diaries [63] diaries and micro-phenomenological interviews [59]. Systematic self-observation diaries instruct participants to not alter their daily behaviour, but simply pay attention over a period of time whether a 'target' experience occurs and then record it in detail right afterwards. This is to ensure a relevant experience is captured as immediately as possible.

Microphenomenological interviews in turn are a structured interview form aimed at eliciting a lived experience in as much detail and with as little post-hoc embellishment as possible. It aims for the *"subject [to] 'relive[.]' the past situation, with all the sensorial and emotional dimensions that it includes"* [59] (p.4). This interview method has been recognised in general HCI research as valuable for capturing tacit dimensions of experience in detail [61], and has been used in games research for studying the motivational effect of playfulness [35] or the felt tension of esport match spectators [30].

Due to the high expected workload for participants arising from this combination, we decided to recruit two sample groups: A *Diary+Interview group* was provided with one of eight pre-selected games to play (see below) over the course of two weeks and asked to diary moments that challenged the way that they thought or felt. At the end of the two weeks (or if they'd completed the game), we conducted a micro-phenomenological interview based on the diaries. The *Interview* group included participants who had already played one of the eight games and had self-disclosed during sampling that they had experienced a perspective challenging moments in a game recently (within the last two weeks). These only did a micro-phenomenological interview on said moment. Both groups

were compensated for their time, either being given a game (to use in the study) or a £10 Amazon Voucher.

3.1 Procedure

We identified a list of eight games which prior work showed to regularly evoke perspective challenging moments [75] via the game's mechanics rather than narrative moments. With narrative being the most frequent cause of perspective challenges across other media such as books, films & plays [57, 75], we chose to focus on mechanics as a *games*-specific affordance of perspective challenges. All eight chosen games were similar in (short) playtime and (low) cost, which ensured that each participant was roughly equally compensated and that it was feasible to play through most of the game within the agreed period of time. The games were:

- *This War of Mine* [1]- A tactical survival game, where you control a group of civilian survivors in a besieged city.
- *Undertale* [68]- A role-playing game where killing enemies is unnecessary.
- *Papers, Please* [47] - A simulation game where you play as a immigration inspector to check paperwork and control who can or can't enter the country.
- *The Beginner's Guide* [31] - A narrative game about playing through a series of mini-games to attempt to understand their creator.
- *Braid* [53] - A puzzle platformer based around manipulating the flow of time.
- *The Stanley Parable* [34] - An exploration game that toys with telling stories within games.
- *Gone Home* [67] - A walking simulator that explores returning back to your recently abandoned home.
- *Hatoful Boyfriend* [60]- An interactive visual novel where you romance pigeons.

Participants of the Diary+Interview group underwent individual 30 minute briefing sessions on the systematic self-observation diary. The diary asked the participant to do the following:

> Go about your gaming experience as you normally do. Observe when you find that the game tries to challenge the way you think or feel about something. Do not alter your behaviour, simply observe it. Once you become aware that the game is trying to challenge a thought or feeling about something: Do not judge or question it. JUST observe it. At the next available opportunity, write about the experience in as much detail as possible. It may assist you to use the template provided below.

For each observation entry, the template then asked to describe the experience in as much detail as possible (including descriptions of thoughts, feelings, and any physical responses), then detail the events that led up to the perspective challenge, and lastly space to report any moments after the experience where they reflected on it. Once the two weeks had ended or the participant reported to have completed the game, the final interview was organised quickly as possible.

The interview procedure was the same for both groups, starting with an exercise to familiarise participants with the micro-phenomenology process. This exercise asked participants to think about a particular creature or object for five seconds. Afterwards, they were asked a series of questions to talk through the thinking experience step by step in as much detail as possible [59] (p.239).

Once the exercise was complete, the main interview asked the participant to describe a given perspective challenging moment in the game, and then used further prompts (e.g., *"walk me through what happened"*, *"can you describe that for me?"*, *"how did you feel?"*) to capture as much of the experience as possible. Once one experience was captured this way, the interviewer moved on to the next. Each interview involved discussions about three different experiences:

- A selected experience from their systematic self-observation diary (Diary+Interview group) or from the game they played recently (Interview group).
- Another game that offered a similar perspective challenging experience.
- A final experience where they felt a game had tried to challenge the way they thought or felt, but failed.

After interviews, participants completed a short demographic questionnaire on age, gender, gaming experience, and the last three games they enjoyed playing. All study materials, including interview guide, anonymised transcripts, and interim analysis step documents can be found at https://osf.io/qs8mf/.

3.2 Participants

Before recruitment, we ran a pilot study with two participants to gauge the feasibility of the study design. These allowed participants to report on games outside the shortlisted eight. Since the pilot already generated rich and suitable data, we included it in our analysis.

Recruitment was conducted over a series of drives across social media websites (April-August 2020), asking for adult participants with interest in or past play experience of the eight games. Diaries and interviews occurred throughout summer and autumn of 2020. The most successful was a particularly active post on the r/TrueGaming subreddit. We also posted a call to the study on gaming and games research-focused subreddits (e.g., r/SampleSize, r/Steam, r/Ludology, r/VideoGamesAnalysis), Facebook groups (e.g., Steam Gamers and Role-Playing Games) as well as the researchers' Twitter accounts.

The posts directed potential participants to a screening survey that asked participants to read an outline of Interview and Diary+Interview options, indicate a preference for either, confirm that they are over the age of 18, and give informed consent to participate. Depending on their stated preference, participants were also asked to report which of the 8 games had challenged their perspectives most recently (interview group) and when this occurred, or rank-order the 8 games in terms of preference (diary+interview group). Participants were selected from the screener survey using the following criteria:

- They had completed the screener survey in full.
- For the Interview group, we prioritised those whose experience happened most recently (ideally within two to three weeks).
- For the Diary+Interview group, we prioritised those whose most desired game hadn't already been covered by previous interviews, to capture a range of experiences across games.

3.3 Analysis

We interviewed 22 participants, 14 of whom preferred the Diary+Interview group (the likely richer and far more intensive data) and 8 who opted for Interview only. Of the 22 participants, 17 self-identified as male (M), three as female (F), six as media/agender/non-binary. Age ranged from 18 to 55 (Mean 27.08, SD 7.31). All participants had 5+ years of gaming, and most reported 20+ years of gaming. The average number of gaming sessions per week was between 2 hours with 7-10 sessions, and two-thirds of participants reported the last three games they enjoyed playing either did not capture unique games. About we aimed to avoid that both systematic self-observation and micro-phenomenology interviews are designed to elicit. We therefore moved on to a method of analysis developed by Valenzuela-Moguillansky and Vásquez-Rosati [71] specifically for analysing microphenomenological interviews. This method comprises diachronic and synchronic analysis. The (diagrammatic) diachronic analysis looks to understand the temporal evolution of an experience, for example re-sequencing the participants

description of an experience to have it read out chronologically. Synchronic analysis looks to the structure of the experience and considers how it can be characterised in a given moment.

Diachronic analysis allowed us to inductively extract and categorise the triggers, emotions, and kinds of perspective challenge (RQ1,RQ2). This resulted in a total of 68 *"experience cubes"*, each encapsulating one participant's lived-experience of a perspective challenge. Of the 68 cubes, 51 were derived from the Diary+Interview Group, and 17 from the Interview Group. The 68 experiences also included 15 experiences where the participant believed a game tried but failed to challenge the way they thought or felt. Figure 1 demonstrates an experience where *Portal* instigated the challenge by encouraging the player to consider an inanimate object as a companion. The experience concludes with a betrayal that stems from the participant never expecting to feel the way they did about a digital object.

Dividing each PCE into their own *experience cube* assisted in identifying the triggers and categories of experiences on a meta-level. The cubes then served as the basis for an iterative qualitative coding and diagramming approach, trialling different ways of dimensioning and categorising PCEs and their aspects. In each iteration, we aimed to create a model that captured all experience cubes without remainder. After four iterations, when each of the 68 experience cubes was represented, we considered the analysis complete.
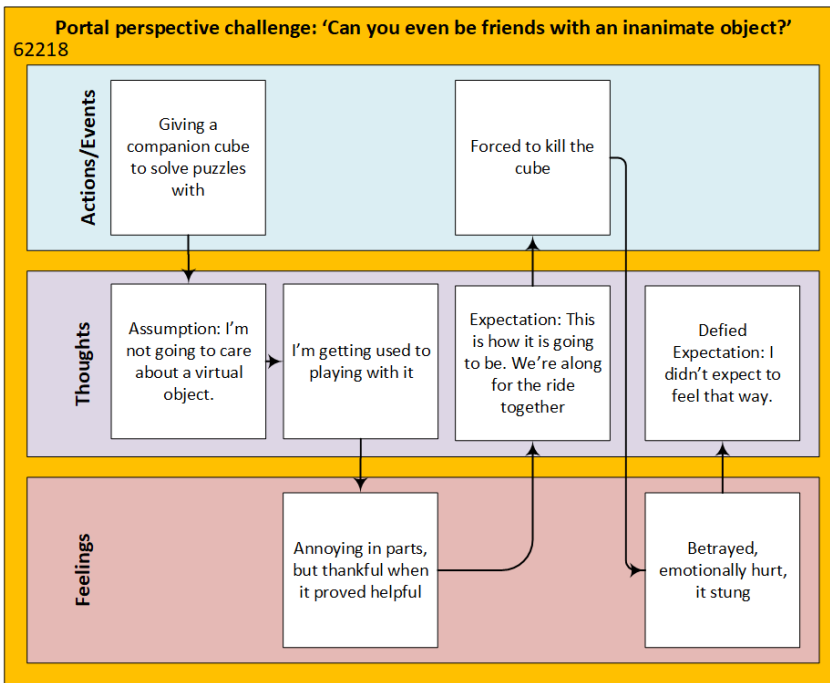
Fig. 1. Experience cube of a player's perspective on being friends with inanimate objects in *Portal* being challenged

4 RESULTS

Our resulting Model of Perspective Challenging Experiences (Figure 2) is grounded in successful PCEs and organises each experience into three parts: (1) the trigger that instigates the challenge (the left column), (2) the resulting reflections (the middle column), and (3) how (if at all) the player's

perspective was transformed (the right column). The thickness of each connecting arrow roughly represents the number of experiences observed that connected a particular trigger to a particular reflection, or reflection to transformation (from 1 experience at its thinnest and 11 experiences at its thickest). These are mainly illustrative.

The model identifies two categories of triggers:

(1) **Endo-game triggers** involve phenomena referring to gameplay, namely (1) the *player encounters a failure state*, (2) the *game reveals mechanic, system, or rule*, and (3) the *game subverts previously established genre tropes or set expectations*.

(2) **Exo-game triggers** involve phenomena beyond gameplay, namely (4) the *game raises philosophical or societal topics* and (5) *player's past experiences (or similar) are represented in the game*.

This basic endo-/exo-game split already observed by Whitby and colleagues [75] also held for reflections triggered by PCEs:

(1) **Endo-game reflections** refer to reflecting on beliefs and atttitudes about the game in question,

(2) **Exo-game reflections** describe reflecting on beliefs and attitudes about something beyond the game, such as one's own life.
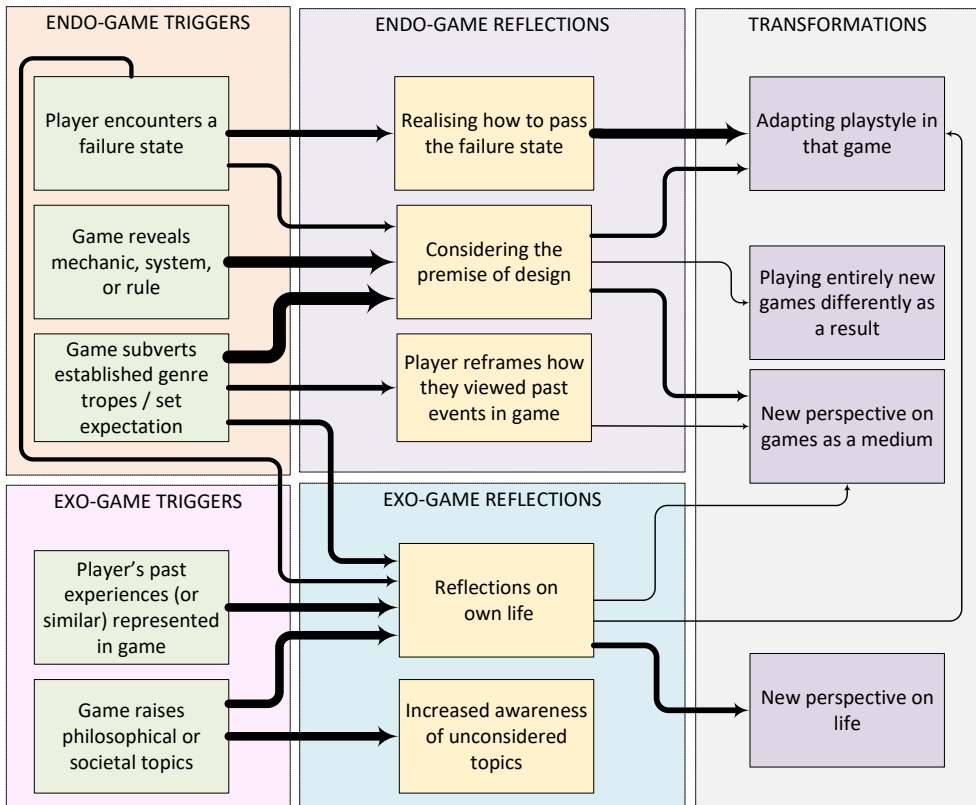

Fig. 2. Model of Perspective Challenging Experiences

In the following, we present our model organised by the types of reflection we constructed from the data. We will present the type of reflection together with the types of triggers that instigated them, emotional responses, and potential perspective transformations. All quotes are attributed with participant+experience number and game title of the experience. For example, "(P1.1, *Gone Home*)" refers to participant 1, with their first PCE within *Gone Home*.

5 ENDO-GAME REFLECTIONS

We categorized 28 endo-game PCEs into what the player was reflecting on: (1) realising how to pass a failure state (5 counts), (2) accepting a premise of the design (19 counts), and (3) reframing how they viewed past events in game (4 counts).

5.1 Realising how to pass a failure state

In this category, the game presents the player with challenges, from difficult moral choices to mechanical tasks, which the player initially fails to overcome due to prior expectation about the solution. In realising how to pass the failure state, the player's initial perspective on the game is challenged. Failure can take many forms. In *This War of Mine*, one participant assumed that any medication would restore health. Yet the game has two separate character states, 'Wounded' and 'Illness'. The 'Wounded' state can be healed using bandages but not medicine, whereas 'Illness' can be healed using medicine but not bandages:

> "So I had figured, you're supposed to get something, some item to heal him ... I ended up getting medication, I thought that would work because I'm still running on video game logic of medication in games being a straight healing item. So that screwed me over. So I believe I did actually get medication for him, but that just didn't work because it wasn't for that. And I kind of felt like an idiot there, but ... that made me stop thinking about it in video game logic and take it seriously." (P6.1, *This War of Mine*)

The player had a preexisting perspective on how medicine in video games should function, which led to in-game failure. This failure challenged their perspective, leading to initial feeling *"like an idiot"*, followed by reflection and a change in said perspective (*"stop thinking in video game logic"*).

In another example, the player realised that the protagonist in *Hatoful Boyfriend* was female not male. This prior faulty assumption had led them to not view any of the characters introduced as romanceable options. Because the player failed to see the male pigeons as romanceable, they couldn't proceed with the central purpose of a dating sims (i.e. dating characters). Failure to progress led them to reflect on the faulty assumption (the protagonist's gender and sexual orientation), change their perspective, and start dating some pigeons.

In all instances, the trigger was *the player encountering a failure state*, be it a traditional 'game over' moment, or a more player-defined failure like feeling stuck (as in the *Hatoful Boyfriend* experience). This failure state arises from a conflict between what the player thinks *should* work and the logic of the game. Such prior player expectations often arise from learned patterns from other games, media, or life experiences.

Players' initial emotional response was to feel frustrated or confused. After realising that their approach needs to change, some participants remarked feeling foolish or silly for having not realised the solution sooner or just how wrong their initial attempt was. The main resulting transformation for some players was to *adapt their play style* by (1) taking the game more seriously, (2) viewing characters in a different light, or (3) attempting different strategies developed from other games.

5.2 Considering the premise of a design

The premise of a game's design is an underlying principle of the *entire* game. The reflection of *considering the premise of design* focuses on how the game differs from players' prior expectation (based on genre or past play experience), or discovering the impact of new mechanics. This was the most common endo-game PCE with 19 recorded moments across 9 unique games. It differs from *realising how to pass a failure state* in that it considers the totality of the game's design, not just a particular moment of failure.

For example, *Metal Gear Solid* is somewhat iconic for breaking the fourth wall and requiring the player to complete actions outside of the diegetic game world to progress in the game. In one situation, the player must find a code that is physically printed on the back of the game box. In this PCE, the participant assumed the code would be somewhere inside the game, eventually resorting to enter every possible code combination.

> *"But I guess that one was interesting because it presented a problem in a game with the solution that I hadn't ever really considered before, like I didn't think that was actually going to be a solution, like nobody puts the answers to the problem, like if you get like a text book or something and on the front it has a math problem, you don't really look at that math problem, but if you're doing all the stuff in the textbook and you get to that math problem you're like what the heck I don't know what this is, your first intuition is not going to be to flip back to the front of the textbook and look at the problem on the front, it is going to be look at the problems that are already in the textbook."* (P11.2, *Metal Gear Solid*)

The player expected *Metal Gear Solid* to act like games they've played before, but upon discovering that the game required them to think outside the box (somewhat literally), they would reflect on this very premise of game design conventions, prompting a challenge.

Another example was a player seeing the game set their expectations only to shatter them moments later. In *Portal*, the player was given an inanimate 'Companion Cube' that the game explicitly mentions will act as a companion, but after getting used to working with the object, they are forced to later destroy it (see Figure 1).

> *"And you're by yourself and they give you a, a companion cube that's … supposed to be your friend … You do puzzles with it, the puzzles helped you and like, the narration of Glados creates it, I guess kind of forces that like this is your friend now. Go through a puzzle and next one you had to kill the cube … I figured like you were going to be part of the game from now on and … then they got rid of it, so like okay, clearly they were just trying to defy expectations of what is going on in the game"* (P13.2, *Portal*)

All triggers related to this type of reflection were endo-game. Some involved the *game revealing a mechanic, system or a rule* – for instance object interactivity in *Gone Home*, character debuffs in *This War of Mine*, or paperwork simulation in *Papers, Please*. In the latter, the game *Papers, Please* revealed that the mundane paperwork simulating mechanics weren't the core of the experience, but the countless moral quandaries being presented and the stress of trying to do the right thing.

> *"So what made me kind of realize that it wasn't just a paperwork simulator … is the way it manages to make you realize that the paperwork simulation, and the kind of banality of the repeated exercise is not the endgame. … it's a means to an end more than anything and nothing, it's something that I think it very cleverly like on day one and two of the game, you don't really experience a massive amount of that and it starts to show, and you start to realize that you're one small part of a bigger picture. … And yeah, I found myself making kind of, actually having to actively make decisions, consciously make decisions between*

what was considered to be morally right and what would give me the best outcome in terms of gameplay." (P8.1, *Papers, Please*)

Here, P8 reflected on how the core premise of the game isn't about paperwork but making moral decisions within its surrounding political systems.

Emotional responses to this type of reflection were mixed, spanning enjoyment or satisfaction at a build-up and release of tension, disbelief over constant genre subversion in *Hatoful Boyfriend*, to guilt and frustration when discovering the depression mechanic in *This War of Mine*.

Participants noted three kinds of transformations: (1) a new perspective on games as a medium (3 counts), (2) adapting their playstyle in that game (3 counts), and (3) actively choosing to play other games differently (1 count). Positive experiences in *Metal Gear Solid* and *Undertale* had the players expecting more from other games, whether that is in the form of more fourth wall breaks or trope subversions, whereas *The Stanley Parable* provided a player a new lens to view games from a developer's standpoint. Both *Undertale* and *This War of Mine* managed to present the act of killing another character to have dire consequences or guilt them enough that players would choose to avoid killing people in that game (adapting their play style), or avoid the *"evil"* route in RPG games (playing new games differently).

5.3 Player reframes how they viewed past events in game

The last four endo-game PCEs involved the game offering a new frame to view some aspect of the game. This could be by newly revealed information or subverting established tropes or genre conventions. Participant 14 went into *Hatoful Boyfriend* looking for subversions on the conventions of dating simulators. When shown artistic and humanised visualisations of the pigeons, they realised the following:

> *"To have that option where you can view them as their anime boy counterparts, I thought, ... doesn't that make it like a conventional dating sim anyway? So I was surprised that they did that, but I did like it because ... it was cute and I did pick that option and ... it is interesting because when I was playing the game having seen those human counterparts even though I was looking at the pigeon on screen I did find myself visualising the humans in my head because it was so difficult to think of myself having this conversations with pigeons, taking that serious."* (P14.1, *Hatoful Boyfriend*)

By reframing the pigeons as humans, however briefly, it allowed them to feel less silly when interacting with the characters. However, this led to a secondary reframing; by imagining the characters as human, the player had assumed the characters were pigeons solely as a joke, only to discover that it is integral to the game's narrative.

> *"Actually now that you say that, it did because when I went in I thought to myself oh wait I think this is, its sort of around then when the true subplot is revealed that I thought oh it is really significant that they are, that they're pigeons and not, its not just a surface thing it is really important to the plot that they are pigeons and human in this world."* (P14.1, *Hatoful Boyfriend*)

This two-part PCE hinges on both the player's genre expectations as they entered the game and the game setting up an expectation to later be subverted. In both cases, the player gained a new perspective in which to view the game. Another participant reflected on their interactions with *The Stanley Parable*'s narrator after feeling guilty for *"ruining"* his story, only to follow the narrator's instruction and realise that *"the narrator is a little too human because he's got that cruelty streak to him. And that kind of caught me off guard too because he seems so desperate to do the happy ending and everything and then its all a ruse anyway."* (P12.1, *The Stanley Parable*). After feeling tricked, the player no longer felt guilty for their past actions, and provided a *"a moment of clarity, like I*

understand now why this, what kind of message this game is kind of sending" (P12.1, *The Stanley Parable*).

These experiences are instances of the *game subverting genre, trope, or set expectations*. This trigger consists in breaking with prior genre or trope expectations. Thus, *Spec Ops: The Line* subverts the shooter genre, in which the player is generally expected to solve any problem by shooting people:

> *"And rather than have a dialogue tree of shoot the mob, shoot in the air, you just have to figure that out. Which I thought was absolutely fascinating partly because yes this gameplay is about shooting, I should make a decision based off shooting."* (P15.2, *Spec Ops: The Line*)

This perspective challenge was triggered by encountering a situation in a shooter that doesn't necessitate shooting NPCs. Not only did this prompt the player to reflect on how all *choices* align with the mechanics of the game, but also gain a *New perspective on the medium of games*:

> *"I was aware of a lot more, this idea of like using the gameplay in order to make choices ... this game lets you make choices with your guns because ... the gameplay loop is ... about using guns, like whether or not to shoot people is most of the big choices in this game and that was another thing I remember thinking that all three of these ideas just go for this idea of the big way it changed playing games especially with that game, was how I looked at and analysed games."* (P15.2, *Spec Ops: The Line*)

A few players reported feeling stressed or uncertain when what they've intentionally been led to believe wasn't going as expected. However, there was no general trend of emotions across these experiences. One participant was aware of how *Danganrompa* (a visual novel where groups of teens are forced to play "murder games") let them build trust with a character, only to just as quickly kill them off: *"And that's the worst part, when you get attached, [...] the next day in the game we found out that, this character got murdered"* (P5.2, *Danganrompa*). In the *Hatoful Boyfriend*, *The Stanley Parable*, and *Danganrompa* experiences each featured some sudden twist of emotions after the event reframes events, whether that is surprise, relief, or sadness.

6 EXO-GAME REFLECTIONS

For some participants, reflections triggered by PCEs related to perspectives on matters outside the game, namely (1) *reflections on their own life* or (2) previously *unconsidered topics*, often philosophical or societal.

6.1 Reflections on one's own life

The second most prominent kind of PCE, with 18 accounts, involved the participant being challenged in their own person or life. The majority stemmed from first-person narrative games like *Gone Home* (five experiences), *The Stanley Parable* (four experiences), or *The Beginner's Guide* (two experiences). The remaining seven experiences were spread across *Bloodborne*, *Braid*, *Last of Us*, *This War of Mine*, *Hatoful Boyfriend* and two in *Undertale* (from different participants on the exact same moment in the game).

As an example, the story of *Gone Home* unfolds through audio logs to reveal the details of a budding lesbian relationship. One participant had originally assumed that the logs described a heterosexual relationship, but the dawning realisation that this was not so resonated with their own biography.

> *"It actually reminded me of my own experience with my first girlfriend. The whole "uhm what's happening here" story that the character talked about was pretty much what I went through as well. Being bi/gay is not really ok where I come from, so I couldn't share that*

> *experience with others without playing down the emotional part of it. It was interesting listening to this in a third-perspective, I hadn't realised my experience could also have been perceived as a sweet love story as well. It was much easier to see as an observer."* (P4.1 *Gone Home*)

As the participant elaborates, seeing their own experience represented in the game challenged their own perspective of their own first relationship – allowing them to reframe it as "a sweet love story as well."

Interestingly, both endo-game and exo-game triggers could challenge players' perspectives on their own lives. Endo-game triggers we found were encountering a failure state (2 counts) and subverted expectations (4 counts). One failure state in *Bloodborne* had the player reflecting on how the challenge in the game was them, not the obstacles the game placed in the way. As an example for a subverted expectation, one player constantly expected to find something horrifying in *Gone Home* (e.g. blood in a bathtub), prompting them to reflect on how they always assumed the worst for no reason.

That said, a more common, exo-game trigger is seeing the *player's past experiences (or similar) represented in game*. The above example from *Gone Home* is a good case in point – and shows that this biographic resonance is logically player-dependent: represented experiences could align with the player's own, sit antithetical to them, or just not resonate. For example, two other players alternatively reported very different biographical resonances – one reflected on how (in contrast to their own experience) a character wasn't welcomed home after returning after a long time away, the other or how an academic parent in the game wasn't anywhere near as supportive as their own parent.

Another frequent exo-game trigger (6 counts) are the *game raising societal or philosophical topics*. For example, one conversation with a pigeon *Hatoful Boyfriend* focuses on how birds have a much shorter lifespan than humans. The game argues that all relationships end (whether by drifting apart, arguments, or death), but that doesn't make them any less worthwhile, which one participant found profound:

> *"I reflected that it was true, all relationships end eventually, if not during our lifetime then through death - and it was both sobering to think this, and also helped me reframe these relationships as positive, if temporal experiences, that did not end tragically but instead naturally."* (P14.1, *Hatoful Boyfriend*)

Reported emotions varied with the represented moments of a player's past and whether they were seen to align or contrast. Guilt for instance occurred in three experiences across *Undertale* and *The Stanley Parable*. Here, players actively chose to betray a character, which was amplified by seeing their own past lives in these moments. Other emotions included disappointment, discomfort, surprise, and emotions aligning with those the portrayed character felt.

As for transformations, multiple participants reported that this kind of reflection did lead to a new perspective on life, in addition to adapting their play style or a new perspective on games as a medium, such as that games can tell stories about real human relations. In the *Hatoful Boyfriend* experience mentioned, the participant reframed a number of negative experiences in their lives into positive ones. Whereas *The Beginner's Guide* helped one participant realise that you can sometimes do things for yourself without needing it to be for others' benefit. *The Last of Us* left one participant with more hesitancy in asking people to make personal sacrifices.

6.2 Increased awareness of unconsidered topics

Just like raising philosophical or societal topics could act as an exo-game trigger, so there were exo-game reflections involving topics that the player hadn't previously considered, specifically

the nature of narratives, media literacy, and representation. For example, one player reported how *Far Cry 5* challenged the perspective about how games tackle representation. *Far Cry 5*'s advertising had set the player's expectation of the game to represent a *"hyper-conservative, fascist, white-supremacist"* doomsday cult. When actually playing the game and being presented with a diverse range of character creation options, they started to feel more aware of the wider topic of representation in games:

> *"I remember, kind of being faced with a character creation tool, and you're creating the person that is going to be kind of, you know, knowing who the bad guys were in that game, from the marketing material and things like that, and as I've kind of explained very evocative of this kind of far right, hyper-conservative kind of things, and I ended up developing what felt right to me was to create a female, a black female character as my protagonist for the story, because it felt like to me that that was the person that I wanted to be going out and beating those bad guys, in that particular situation. And I think that kind of in a way, got me thinking a lot more about those things than I maybe normally would do. ... And I think what I can reflect on is actually how video game representation still has a very long way to go, and there is still a lot of games that don't necessarily give you quite that level of, even when there is character customization and things they like, they're obviously still very skewed towards a white male perspective and a white male player base in a way."* (P8.2, *Far Cry 5*)

The trigger in this moment were character creation mechanics with diverse representation standing out against the background of political inspirations of the game and wider game design conventions. In their own words, the experience of playing *"as that character, I think it almost made it feel perhaps a little bit more personal"* (P8.2, *Far Cry 5*).

All of these reflections on unconsidered topics involved a 'matching' exo-game trigger in which the game raised said philosophical or societal topic. Thus, in *Papers, Please*, the game routinely presented difficult moral choices in which there is no clear right answer, raising the topic of moral dilemmas. For instance, the player would have to decide whether to allow partners to be united even though they didn't have the right paperwork, when doing so would risk the wellbeing of their character's own family.

Emotional responses ranged from feeling caught off-guard to overwhelmed by the shift in topic. When *Hatoful Boyfriend* for instance describes Yakitori (marinated meat on a skewer) from a sentient bird's perspective, reflecting on their own meat consumption led one player to feeling revolted. As participants continue to reflect on the topic broached, reported emotions again diversified, ranging from increased attachment towards certain characters to frustration towards society as a whole to interest towards the game.

There were two instances of self-reported transformations tied to this type of reflection. One player reported a perspective challenge in *Metal Gear Solid 2* around media literacy led them to transform their view on games as much more than just entertainment (i.e. *new perspective on games as a medium*). Another participant noted that the terrible moral choices of *Papers, Please* raised their awareness of people living in exceedingly complicated situations, which resulted in feeling fortunate and greater empathy towards people in those situations (i.e. a *new perspective on life*).

7 DISCUSSION

The following section teases out contributions and implications of our findings relative to the current literature. We begin discussing components of our model – the process, triggers, reflections, transformations –, switch to the cross-cutting themes of fluctuating and epistemic emotions and

self-referential or endo-game reflections, and end with limitations and future work and implications for practice.

7.1 The Process of Perspective Challenge

In HCI, Baumer [7] suggested that breakdown, inquiry, and transformation are more or less parallel dimensions of reflective experience. In persuasive games, Bogost [12] proposes a sequence of simulation gap (player-game model mismatch), simulation fever (player working through that gap), and persuasion (attitude and belief change). Mezirow's model [50] proposes a similar causal chain from an anomaly that cannot be resolved leading to reflection, leading to perspective transformation. Our empirically grounded Model of Perspective-Challenging Experiences broadly aligns with and supports Mezirow: Some game event (*trigger*) instigates some *reflection* on a perspective in the player (often accompanied by some *emotional response*), which, importantly, may *or may not* then lead to a *transformation* of said perspective. Vis-à-vis Baumer, this suggests that breakdown, inquiry, and transformation are *not* parallel dimensions that can occur independently of each other. Counter to Bogost, our data also clearly shows that not all PCEs lead to perspective change – many 'bottom out' in reflection. So what determines whether reflection produces change? We could not construct a clear answer from our data. We have to contend here with pointing this out as an important area for future work.

7.2 Triggers: What Instigates Perspective Reflection and Transformation in Games?

Maybe the main contribution of this work is unpacking the wide range and commonalities of game events triggering a PCE, spanning game-related or endo-game triggers and non-game-related or exo-game triggers. We found endo-game triggers to be both the most frequent – instigating 34 of 52 (65%) of all PCEs – and leading to a wider range of reflections, including exo-game. Exo-game triggers in contrast only ever prompted exo-game reflections. This may be because exo-game triggers by definition bring the non-game world into the gameplay, and/or because *"the player is bringing more of themselves to the gameplay experience than they may do in mainstream games"* [20] (p.11), as Cole suggests. Be that as it may, our finding of frequent endo-game triggers also prompting exo-game reflection and transformation contradicts prior suggestions by Mezirow or Bogost that perspective change only arises from a (game) event contradicting a player's prior perspective on the wider (exo-game) world.

That said, all triggers we found fit prior notions of a hard-to-accommodate anomaly (Mezirow), dissonant gap (Bogost), or breakdown (Baumer) in that the trigger *contradicts the player's prior expectations*. Endo-game, this could be a faulty expectation about how to achieve a game task, leading to (1) a *failure state*, learned expectations about the game that get extended by the (2) *reveal of a new mechanic, system, or rule*, or implicit (3) *genre trope* or *explicitly set expectations that the game subverts*. Even exo-game triggers, that is, representing (4) *players' past experience* or (5) *philosophical and societal topics* in the game, became triggers prompting reflection only if the framing or perspective on said topic or life experience was unexpected to the player, or if it was unexpected to see such a topic or experience represented in a game.

One notable difference between endo- and exo-game triggers is how well they can be designed for. Endo-game triggers can be readily afforded by, e.g., withholding the reveal of a mechanic, setting genre expectations by labelling, packaging, marketing, or initial gameplay, or guiding and identifying player's likely solution strategies through onboarding and playtesting. When it comes to exo-game triggers, developers have more control over representing philosophical and societal themes (such as the reality of moral dilemmas in *Papers, Please*) – yet it is hard to control whether said representation itself will be unexpected to a given player. Biographical resonance is obviously the most outside the direct control of game designers, although marketing can help players with

likely resonances to self-select into playing the game, with the added complexity that this lessens the possibility of *unexpected* resonances (as in the case of a lesbian relationship in *Gone Home*, at least for players not spoiled by media coverage).

Still, all this suggests that PCEs depend on the expectations a given player brings to the game (see also [4]), which can only ever be predicted or shaped to *some* extent – more in the case of endo-game triggers, less so for exo-game triggers. In the titular quote of Denisova and colleagues' analysis of designers of emotionally impactful games: "Whatever the emotional experience, it's up to them" – meaning the players [28]. This may be one reason why the designers they interviewed had a particular experience in mind but ultimately aimed to *"provide space for unique and personal experiences and interpretations"* [28] (p.9). In the language of literary theory, if triggers only function as triggers against the player's horizon of prior experience and perspectives, and if this horizon cannot be easily controlled or predicted, then game designers can fall back on either operating with (tested or untested) assumptions about their 'ideal player', or create more modernist "open works" [29] that intentionally offer multiple resonances and readings to maximise the odds of producing some appreciated reflection in players.

7.3   Perspective Challenges: What Do Players Reflect on?

Just like we found endo- and exo-game triggers, so we found endo- and exo-game reflections. Endo-game reflections spanned (1) *realising how to pass a failure state*, (2) *considering the overall premise of a game's design*, and (3) *reframing past events in game.* Exo-game reflections spanned (4) *reflections on the player's own life* and (5) reflecting on and increased awareness of *previously unconsidered philosophical and societal topics*. These variously echo prior findings.

Thus, the frequent sequence of encountering a failure state (trigger), realising how to pass it (reflection), and adapting one's play style (transformation) mirrors Iacovides' observation of breakdowns and breakthroughs as a core dynamic of game learning and involvement [39], and similar arguments in education that gameplay uniquely affords safe learning through failure [45]. Iacovides observes that engaging breakthroughs in action (overcoming an obstacle) can be had without underpinning breakthroughs in understanding (changing perspective). We did not find instances of this – likely because we prompted players to record moments they perceived as perspective-challenging, suggesting that *unreflected* action breakthroughs would not have been captured. We add that any breakthrough in understanding – pertaining to game learning or deeper learning beyond the game – requires *some* reflection.

Players reflecting on their own lives matches the wider evidence that eudaimonic experiences involve players connecting their in-game experiences to the real world [40, 44, 48]. Similarly, unconsidered philosophical and societal topics match the stated aims of independent game designers and researchers interested in the persuasive potential of video games.

7.4   Perspective Transformations

Roughly a third (19 of 52) PCEs we observed entailed some kind of perspective transformation (i.e., going from understanding a situation one way, to something else). This lends weight to our own prior finding that perspective transformation was rare [75] .What's more, only 4 if the 19 transformative PCEs were exo-game or what prior HCI literature would consider as transformative, that is, changing how people view the world or themselves outside games. These four exo-game transformations concerned how to approach life's challenges less emotionally (*Bloodborne*), media literacy (*Metal Gear Solid 2*), meat consumption, and prior relationships (both from *Hatoful Boyfriend*).

This again foregrounds the (overlooked) reality and frequency of game-related or endo-game PCEs, with nine transformations involving changing one's play style and six changing how one viewed games as a medium or what games one played. Importantly, changing one's play style is

not exhausted by just learning to play, or play more 'optimally' [38]: players adopted play styles that better aligned with their new perspective. For instance, killing an NPC in *This War of Mine* caused the player guilt, resulting in them avoiding this from happening again.

Notable for persuasive games and serious games research, reflections on *unconsidered topics* (like lack of representation in video games or meat consumption) did also in the main not transform people's prior perspective beyond increased awareness (something we similarly found in an earlier study [75]). This might suggest that belief and attitude change effects reported in prior, often lab-based persuasive games research [25, 42] may not be as ecologically valid or robust under everyday, 'in-the-wild' conditions.

In sum, our findings suggest that games are indeed *"highly appropriate vehicles for triggering and supporting reflection"* [44] (p.1), but more so for reflection *on games* than other topics, and *reflection* than transformation.

7.5 The Varied and Fluctuating Emotions of Perspective Challenge

Researchers have been greatly interested in the emotional quality of reflective, meaningful, or eudaimonic gameplay experiences [14, 15, 20, 22, 48], potentially partially due to the game equivalent of the "sad film paradox" [54] that games producing face-value negatively valenced emotions can still be positively enjoyed or appreciated (and actively sought out) by players [15]. In fact, "emotionally challenging" content [20, 22] is seen as a major source of eudaimonic gratifications like personal growth, meaning, or resonance. We were particularly interested in emotion as our own prior work surprisingly found that players self-reported everyday perspective-challenging moments in games as uniformly highly enjoyable, counter to prior work suggesting that affectively challenging moments (in movies) were not felt as fun [6].

Across PCEs, players reported *different emotional states at different stages* (trigger, reflection, transformation), suggesting that even within a single experience, the emotional quality is not uniform. In fact, especially for exo-game triggers, there were significant emotional reversals, e.g. from joviality and trust to regret and guilt. This could be particularly pronounced when a game made very harsh unexpected tonal shifts, such as *Doki Doki: Literature Club*. We arguably could capture this temporal variation even at the level of short gameplay moments due to our microphenomenological method. Methods which ask people to summatively score or label emotional experiences as a uniform quality could obfuscate this nuance and temporal variation. This warrants future research into how representative singular summative self-reports of emotional experience in games actually are of moment-to-moment lived experience.

Second, reported feelings spanned a wide range, including frustration, confusion, stress, uncertainty, disbelief, or shock, followed by feelings like surprise, relief, disappointment, discomfort, embarrassment or guilt, but also enjoyment and appreciation. Despite the large number of reported negatively valenced emotions, players still overall spoke of their PCE positively. This supports that the emotional range of more avant-garde videogames is wide [20], and that in line with the sad film paradox, players do *"appreciate[.] experiencing negatively valenced emotions, such as sadness"* [15].

In exo-game reflections, negative emotions like guilt, stress, or sadness usually related to empathising with the emotional situation of a character, or arose from negative self-evaluations of one's own past or character, e.g., discovering and reflecting on the fact that one was willing to betray another person, and be it a virtual character. In endo-game reflections, negatively valenced feelings like uncertainty, frustration, or embarrassment related more to not knowing how to overcome a particular game challenge, followed by negative self-evaluations about lacking gaming skill or intelligence. This suggests a potential trade-off for avant-garde games using novel mechanics or genre subversion to convey messages: these may be at once frustrating to play and then appreciated in their innovation – when and if the player understands them.

Another more general upshot is the prevalence of *epistemic emotions* in player reports on PCEs, that is, emotions related to knowledge, such as uncertainty, surprise, doubt, disbelief, confusion, etc. [3, 72, 73]. These were particularly prevalent in endo-game reflections, but also occurred in exo-game PCEs. It seems logical that gameplay experiences of reflecting on one's own prior beliefs would come with epistemic emotions. Bogost as a games studies scholar coins a whole term, "simulation fever", for describing the experience of working through the cognitive dissonance produced by effective persuasive games [12]. But it is notable that games HCI work on eudaimonic gameplay has arguably prioritised empathetic and moral feelings, largely ignoring epistemic feelings – an oversight that similarly holds for wider games HCI, e.g. in the study of casual puzzle games [46]. This warrants future research – especially since epistemic emotions have been found to motivate learning and conceptual change [72, 73], arguably a key desired outcome of many serious and avant-garde games.

7.6   Meta-Games and the Self-Referentiality of Perspective Challenge

One pattern cutting across our findings is that *endo-game* PCEs are highly common, if not predominant. Whitby and colleagues previously observed that "endo-transformative reflection" dominate the (rare) occurrences of PCEs in everyday video game play [75]. If anything, this predominance is even more pronounced for endo-game triggers (34 of 52 observed) and transformations (15 of 19), while reflections where more evenly split (28 endo-game, 24 exo-game). Failure states, new mechanics, and explicit subversions of genre tropes led players to consider the basic premise of a game's design, repeatedly (though not always) resulting in a transformed perspective on games as a medium. All this suggests that a good portion of PCEs in games are *self-referential reflections about games*. To exaggerate a bit, when games *make us think*, they often make us think *about games*. This may be unsurprising given that our sample of games includes many 'indie' games that are in some meaningful way metagames [13] or "games on games" [18] (like *The Stanley Parable*, *The Beginner's Guide*, *Spec Ops: The Line*, *Undertale*), use self-referential aesthetic strategies like fourth wall breaks (*Metal Gear Solid*, *Doki Doki Literature Club*), or are hailed for expanding what is possible in games as a form (*Gone Home, Papers, Please*).

Thus, the frequency of endo-game or self-referential PCEs may respond to the rise of what Schrank called *avant-garde videogames* [64]: games using modernist aesthetic strategies like breaking formal conventions to advance the medium or a political agenda. Khaled's reflective or Wilson and Sicart's abusive game design principles very much fit this mould [44, 76]. But it may also respond to video games maturing and institutionalising as an aesthetic medium. As we create institutions of video game reflection and appreciation (media focusing games criticism, university degrees, museums, books, and the like), and as games and their players accrue a history of the medium, self-referential media reflection is likely to become a far more frequent part of everyday, "mundane" play experience [69]. In slight contrast, games HCI research to date has arguably predominantly considered Schrank's category of "complicit formal" games that make relatively minor innovations in form and content to evoke eudaimonic experiences about the world outside games. If our findings generalise, they suggest that what game literate players *reflect on* and *appreciate* in a game may (far more often) be how it comments on and advances its own medium.

7.7   Limitations and Future Work

Our targeted sample of short games that prior work showed evoked PCEs via game mechanics (rather than narrative means) likely biased the relative frequency of certain kinds of triggers (and consequential reflections and transformations). This was somewhat counterbalanced by allowing participants to report PCEs from any other games they remembered – and players did report on such games and PCEs not grounded in game mechanical reveals. Still, this clear sampling bias together

with the qualitative nature of the present study caution against drawing strong inferences as to the relative frequency of game-mechanical versus narrative PCEs. We don't think this disqualifies our observations regarding the prevalance of endo-game triggers, reflections, and transformations, as these are borne out (for transformations) by our previous study with an unbiased prompt, [75], and the fact that much 'endo-media' self-referentiality in other, narrative-dominant media similarly revolves around narrative [19].

Our recruitment targeted game hobbyist communities and as a result sampled individuals whose commitment to and literacy in video games may be higher than the general population. While this again may have impacted the relative frequency of certain PCEs over others, we don't think it invalidates the processes and types our model constructed.

Systematic self-observation and micro-phenomenological interviews are deliberately designed to minimise the impact of poor or biased memory and post-rationalisation on captured lived experience, yet we grant that they cannot fully eliminate these valid concerns [11, 36].

Obvious future work would involve more quantitative work with less skewed game and participant samples to determine the representativeness and relative frequency of the categories we constructed. Also, as noted, we could not answer why certain instances of reflection did lead to transformation and others didn't. This remains an open question of clear practical import. We also noted how PCEs depended on the players' incoming expectations. How expectations interact with (or even, co-constitute) triggers, and how (much) designers can shape expectations are further practically important questions arising here.

In terms of more general implications for future games HCI, our findings underline self-referential and other endo-game reflections and epistemic emotions as common yet mostly overlooked aspects of perspective-challenging experiences with games. And they suggest that even short gameplay moments can contain a varied sequence of (oppositely valenced) emotions that may get lost in summative self-reports.

7.8 Implications for Practice

Where prior theories like procedural rhetoric merely suggest to somehow afford a breakdown, anomaly, or simulation gap, our five triggers arguably identify more concrete, micro-level, and therefore easier to design for targets for developers interesting in affording PCEs. Our model also gives some guidance as to what triggers are likely to lead to what reflections and potential transformations. Another practical upshot of our findings is considering the horizon of incoming players' expectations and prior perspectives, and recognising that it can be somewhat steered by marketing messaging and initial, onboarding gameplay. That said, we recognise that game developers are, simply put, unlikely to read academic papers, and that the paper format does not lend itself to ready implementation [23, 55, 58]. Readers interested in a more *"digestible"* format [9] are pointed to a recent white paper *"Designing Games to Challenge the Stigma Around Mental Health*, which we collaboratively developed with the mental health non-for profit *Take This* [74].

8 CONCLUSION

Under headers like persuasive games, reflective or abusive game design, avant-garde videogames, or eudaimonic experiences in games, designers and researchers have become interested in games that prompt players to reflect on or even change their perspectives. In response, we conducted and analysed systematic self-observation diaries and microphenomenological interviews to construct an empirically grounded model of the process and kinds of perspective-challenging experiences in video games. We found that these experiences follow a sequence of a trigger event contradicting players' incoming expectations, reflection, and potential, though rare, perspective transformation, matching Mezirow's model of transformative learning. Both triggers and reflections could be game-related

(endo-game) or non-game related (exo-game), yet endo-game experiences predominated, including frequent self-referential reflection on games as a medium. Such self-referential media reflection could be a common, overlooked dimension of mundane video game appreciation. Actual perspective transformations were rare and in the case of exo-game transformations, limited to increased awareness of a topic. This raises the question when and why PCEs in games do change players' perspectives. Counter to prior theory that perspective change only arises from games directly challenging players' perspective on a non-game topic, we found that endo-game reflections did also lead to exo-game transformations, if rarely. More broadly, we observe that the expectations players bring to a game event co-constitute and shape perspective-challenging experiences, foregrounding expectation setting as an important design consideration. Also, we found that emotions during PCEs frequently entailed epistemic emotions (like uncertainty, disbelief, puzzlement) and changed and even reversed in valence over time – something summative uniform emotion self-reports even on short gameplay moments may obfuscate. Lastly, our *Model of Perspective Challenging Experiences* presents a concrete set of granular triggers and likely resulting reflections that we hope can support the design of intentionally reflective games.

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