http://dx.doi.org/10.14236/ewic/BCSHCI2024.25

Using Design Fiction to explore player reactions to proposed "dark design" monetization patterns for immersive gaming

John King
School of Engineering and Computing,
University of Central Lancashire,
Preston, UK, PR1 2HE
JKing11@uclan.ac.uk

Dan Fitton
School of Engineering and Computing,
University of Central Lancashire,
Preston, UK, PR1 2HE
DBFitton@uclan.ac.uk

Brendan Cassidy
School of Engineering and Computing,
University of Central Lancashire,
Preston, UK, PR1 2HE
BCassidy1@uclan.ac.uk

"Dark design" patterns are strongly associated with "freemium" monetization of video games. There has been increasing interest in the forms that dark patterns might take in Virtual Reality (VR) games and metaverse applications. VR offers a distinct set of affordances for interacting with users, and there is potential for designers to use this agency for purposes of increasing revenue through in-game microtransactions. The goal of this work was to explore player reactions to proposed VR dark pattern scenarios presented as design fiction prototypes. A total of 21 participants took part in focus group activities in which these prototypes were presented to provoke discussion. Thematic analysis of the discussions revealed characteristics across seven categories (Confrontation, Perceived Intent, Choice Architecture, Knee-jerk Reactions, Gameplay, Sensory Motivation and Social Motivation) and participants' concerns in five areas (Impact on Player, Ethical Concerns, Value-for-Money, Lack of Choice, and Loss of Reality). Through this work the research team seek to highlight users' perceptions regarding VR dark patterns and their worries surrounding possible implementations. This work is particularly pertinent as VR gaming slowly grows in popularity and game publishers move increasingly towards "freemium" monetization models.

dark patterns, deceptive design, virtual reality, design fiction

1. INTRODUCTION

"Dark patterns" may be summarised as *"deceptive designs that influence a user's interactions with an interface to benefit someone other than the user"* (Krauß et al. 2024). The majority of studies in this field focus on e-commerce and mobile apps; there is limited exploration of dark patterns in games (Zagal et al. 2013; Fitton and Read 2019) but this is generally confined to interaction with 2D user interfaces, even on PC and consoles. There is a clear gap in the study of dark patterns in 3D graphical environments and VR.

VR users feel a sense of *presence* in a 3D world and this introduces potential for *proxemic* dark patterns (Greenberg et al. 2014). Hall (1966) explains that the space between people affects their relationship, especially at intimate or personal distances. This may be exploited during interactions with Non-Playing Characters (NPCs) by employing compliance-gaining (Miller et al. 1977) and persuasion strategies (Cialdini 1984). There are also lessons to be learned from the retail industry, which has become adept at utilising 3D space in stores to influence consumer behaviour (Ebster and Garaus 2015; Underhill and Anderson 1999; Drèze et al. 1994). Presence and 3D spatial relationships are not unique to VR, and may be found in other immersive media; however, VR presents a suitable archetype for exploring the effects of these patterns.

This study investigates user reaction to proposed VR dark patterns. The research team seeks to answer three key research questions:

© King et al. Published by BCS Learning and Development Ltd. Proceedings of BCS HCI 2024, UK

1. Regarding "dark design" in VR, what perceptions are formed by users about the designer's intent and subsequent user behaviour?
2. What concerns do users raise about "dark design" in VR?
3. Which of the proposed VR "dark design" patterns is anticipated to be most likely to influence user behaviour?

To achieve this, focus groups were asked to consider four candidate patterns — presented as design fictions — and discuss their opinions on the intent behind the design and the pattern's effectiveness. The discussions were transcribed and subjected to thematic analysis with respect to the research questions.

The study aims to contribute to current understanding about user recognition and perception of dark design in VR, and to provide insight into any patterns that are of concern to users.

2. RELATED WORK

2.1. Dark Patterns

Dark patterns (also known as "deceptive patterns") originated through Harry Brignull's description of manipulative design elements found in ecommerce websites (Brignull 2013). These may be defined as "instances where design choices subvert, impair, or distort the ability of a user to make autonomous and informed choices in relation to digital systems regardless of the designer's intent." (Gray et al. 2023) Lewis (2014) adds that they encourage the user "to give up or jeopardize some resource to an extent that they were not expecting (time, money, social capital)."

Studies investigating instances of dark patterns in user interfaces of video games (Zagal et al. 2013; Fitton and Read 2019)) have focused primarily on mobile or web-based games with 2D user interfaces. Although there has been some academic investigation of PC and console games with 3D graphical environments, the emphasis has been on predatory monetization mechanisms (such as premium currency, grind and limited-time offers) (Petrovskaya and Zendle 2021) or loot boxes (Zendle et al. 2020; Close and Lloyd 2021).

King et al. (2023) identified "3D" dark patterns in the Roblox game "Adopt Me!": *Emotional Interpersonal Persuasion*, which takes advantage of proxemic interaction (Greenberg et al. 2014) with non-playing characters (NPCs) within the game to apply psychological compliance-gaining techniques (Cialdini 1984; Miller et al. 1977); and *Physical Placement*, by which spatial positioning and distance of objects may affect player choices due to their relative convenience or inconvenience. These patterns show significant potential for application in VR, where it may be more difficult to employ traditional 2D user interface design patterns. Mhaidli and Schaub (2021) explored manipulative patterns in Extended Reality (XR), constructing scenarios by developing existing dark pattern categories (in popular taxonomies) for that context; a similar approach was taken by Wang et al. (2023) for Augmented Reality (AR). These contributions were developed further by Krauß et al. (2024), suggesting further suitable "XR dark patterns" through co-design workshops involving experts in XR and dark patterns.

2.2. Design Fiction

Design fiction may be defined as "the deliberate use of diegetic prototypes to suspend disbelief about change" (Bosch 2012) with an emphasis on "moving the focus away from storytelling and instead [placing] importance on the cohesion of the world and how things and people within that world interact." (Coulton et al. 2017) This often forms part of a practical method, exemplified by the 3-step structure used by (Ringfort-Felner et al. 2022): vision-building (citing the underlying theory and models), world-building (creating credible artefacts, such as 3D models, descriptions, FAQ, etc.) and confrontation (using a market-research focus group of laypeople to explore emerging feelings and thoughts).

3. METHOD

Thomas et al. (2022) demonstrated that *questionable concepts* — a specific form of design fiction focused on provocative proposals and their critique (Vines et al. 2012) — could be used to investigate interaction with proposed digital services. The authors introduced designs to participant groups in the form of a fictional brochure and transcribed the subsequent discussions; these transcripts were then subjected to open-coded thematic analysis (Braun and Clarke 2006; Guest et al. 2011).

The current study follows this same process, but instead presents the prototype in the format of a storyboard. Project plans for the study were scrutinised by university's Science Ethics Review Panel, which granted full approval (reference SCIENCE01037).

3.1. Prototype development

Three academics with prior experience of research involving dark patterns took part in ideation sessions.

A list of example 3D, AR and XR patterns gathered from literature (see Section 2.1) was filtered to isolate patterns that were suitable for use in VR. A brainstorming process was carried-out to develop one scenario per pattern. The team judged that timing of focus groups would allow for four scenarios to be presented; hence, voting was used to select four candidate scenarios that collectively represented a breadth of different types of VR interaction (sensory immersion, interpersonal, proxemic and directional):

- **Toll Road**, based on Krauß (2022)'s example "make [the] user step on things they do not want to step on". In the scenario here, the player needs to travel between game locations and must choose one of two tunnels (equal length, both leading to the same destination). One tunnel is dark, dingy, littered and contains swarms of flies that buzz around the player; the other tunnel is clean and pleasant but has a pay barrier.
- **Eager Trader**, based on King et al. (2023)'s *Emotional Interpersonal Persuasion*. Within a street area, an NPC emerges from a doorway and approaches, welcoming and flattering the player. Looking directly into the player's eyes, the NPC moves very close (into their personal space) and teasingly offers a magic potion — "This *was* 20 credits, but I like you ... so you can have it for 10 credits."
- **Choice Lobby**, based on King et al. (2023)'s *Physical Positioning*. A music-based game begins with a "soundtrack selection" room. The room contains plinths, each supporting a touchable floating disc (representing a music soundtrack for the game) and labelled with a price. The player spawns directly in front of a cluster of "cheap" discs. Nearby there is a cluster of "premium" discs (by well-known musicians). There are also some "free" discs, but these are located more than a dozen steps away.
- **Gaze Nagging**, based on Wang et al. (2023)'s *haptic grabbing*. The player must choose between two mini-golf holes: one cheap, one more expensive. If the player looks toward the expensive hole, they hear gentle music and the hand controllers vibrate in a pleasant manner. If they player looks toward the cheap hole, the controllers buzz and vibrate jarringly; they hear a (directional) voice beckoning them to look back at the expensive hole.

The team followed the world-building emphasis of Coulton et al. (2017) and Ringfort-Felner et al. (2022) to develop prototypes illustrating each candidate scenario as a sequence of mock-up images (illustrating what the player might see at key stages) accompanied by explanatory notes.

3.2. Participants

Participants were recruited from a UK university through a poster campaign targeting undergraduates and postgraduates aged 18+ who play computer games and study User Experience (UX) as part of their course. Industry demographic data (ESA 2022; UKIE 2021) indicates that age ranges 18-24 and 25-34 have the highest proportions of game-playing adults (respectively 70% and 60%) and 35-64 the lowest (approximately 35%). Prior experience of VR was not a requirement, reflecting the fact that some VR gamers will be novices in the medium. Study of UX was stipulated because the research team felt that discussions would benefit from participants having insight into the methods used by designers to influence player behaviour, and that their common academic background would ensure that focus groups were peer-based (Curry 2015). In addition, participation could benefit the students personally: they would gain end-user experience of a research method commonly used in the UX industry. Ethics protocols were put in place to ensure that there was no imbalance of power, authority or status.

In total, 21 participants took part in in-person focus groups (maximum 5 participants per group), with each focus group activity lasting less than 1 hour.

3.3. Procedure

Every focus group began with a scripted introduction from the facilitator, reminding them of the aims of the study and that the meeting would be recorded and transcribed (using pseudonyms). Each scenario was then presented and discussed, in turn, with pre-set questions used to prompt discussion: "What do you think the designer wants the player to do, and why might they do it?" and "Do you think this design would actually influence players?" These questions reflect the questions used in a preceding study by the authors (King et al. 2023). This was followed by a comparative evaluation of the scenarios, asking participants: "Which of the scenarios do you think is most likely to influence player behaviour?" and prompting them to identify any elements of the scenarios that they felt concerned or annoyed by. The focus group concluded with an outline of intended publication plans, and participants were thanked for their time and contributions.

3.4. Data analysis

Recordings of discussions at each focus group were transcribed manually. The transcripts were analysed using NVivo software, following a standard phased

Table 1: *Codebook for aspects of "dark design" identified by participants*

Theme	Code name	*n*	Description
Confrontation	Discomfort	15	Capitalises on player's feelings of dislike or annoyance.
	Fear	11	Exploits the player's fears or phobias.
	Sales technique	9	Uses pressure or flattery to encourage purchase.
	Aggression	4	Aggressive or intimidating interaction with the player.
Perceived Intent	Profit-driven	19	Strong perception that "they want you to spend".
	Mimics reality	7	Replicates a real-world technique.
	Habit-building	9	Encourages player to develop a spending habit.
Choice Architecture	Laziness	12	Uses default selections, or makes a choice inconvenient.
	Framing	9	Use of decoy options to make an item appear favourable in comparison.
	Draw focus	5	Draws the player's attention, or an obstacle blocks other options.
Knee-jerk Reaction	Pay-averse	11	Player may have a tendency to reject demands for money.
	Suspicious	6	Feels suspicious or like a scam.
	Fail-to-notice	6	The player could easily miss a choice option.
	Currency type	4	Decision depends on whether in-game currency is earned or purchased.
	Enmity	3	The player may actively dislike an NPC.
	First impressions	2	Player choice strongly influenced by the initial encounter.
Gameplay	Impact on play	10	Decision influenced by its impact on future gameplay.
	Quality	9	Overall game quality is the major influence on decisions.
	FOMO	6	Fear of missing-out on gameplay features.
Sensory Motivation	Sensory hit	12	Stimulation from combined visuals, audio and haptics.
	Lurid VR	6	Some VR fans would actively prefer gruesome visceral experiences.
	Environment	2	Decision affected by context, for example day/night or city/village.
Social Motivation	Obligation	5	Feel obliged to buy, either through likeability or pity.
	Friendly NPC	2	The NPC offers positive social interaction.
	Royalties	1	Desire to support game contributors (such as musicians).

Table 2: *Codebook for concerns raised by participants*

Theme	Code name	*n*	Description
Impact on Player	Variability	14	Some effects will vary substantially between players.
	Expectations	6	Good-or-bad interaction with isolated patterns will prejudice players' attitudes to the whole game.
Ethical Concerns	Deceptive	5	Attempts to deceive or trick the player.
	Manipulative	5	A general dislike of being manipulated.
	Abusive	3	Specific use of fear or phobia to terrorise a player into spending money.
Value-for-Money	Scale of cost	5	Decisions would depend more on the actual prices.
	Free trial	2	Many players would exhaust free options before paying.
	Repeated payment	1	Decisions would depend on whether payments were one-off (unlocking) or were repeated (per-use).
Lack of Choice	Restricted options	3	Players may feel less manipulated if given more than two choices.
	Poverty	2	A lack of real-world money will limit the player's options.
Loss of Realism	Bypassing	3	Certain patterns could be bypassed by adopting a suitable strategy.
	Unreality	1	A player may suffer a loss of immersion.

method (Braun and Clarke 2006): familiarisation with data; documentation of patterns to produce initial codes; combination of codes into overarching themes; review of themes; defining and naming themes. The use of thematic analysis is well-established in investigating user perception of dark patterns (Gray et al. 2021; Maier 2020).

The lead researcher became familiar with the data, then looked for patterns with reference to the research questions. Due to the natural speech patterns of participants, brief phrases were used as units for open coding. A first pass was carried-out to generate a list of initial codes, and a second pass to process the data into these codes. The interactive nature of conversations between participants meant that there was a great deal of repetition; therefore, repeated uses of the same code by a participant within a scenario were removed before tallying instances of these codes. Finally, randomly-selected samples were checked to verify the accuracy of the coding.

Codes were arranged in a pool and combined into thematic clusters. This was an iterative process which developed as the codes were reviewed in relation to the research questions. The themes identified were arranged into codebooks (see Table 1 and Table 2, then named and defined.

Finally, responses to the question "Which of the scenarios do you think is most likely to influence player behaviour?" were tallied to give an indication of the overall opinions in this matter. Two participants were unable to decide between a pair of scenarios, with participant GB-P1 noting, "they're using very different tactics, but both are quite effective in what they're trying to achieve"; these were counted as separate votes for each. Overall, it was anticipated that Eager Trader (n=8) and Choice Lobby (n=9) would be be more likely to have an effect than the other two scenarios (each n=4).

4. RESULTS

Detailed analysis is still ongoing, but preliminary results are promising.

User perceptions of "dark design" in VR (RQ1) fell into two main groupings. The first grouping has been designated *Designer Agency* and represents themes of Confrontation, Perceived Intent, and use of Choice Architecture. The second grouping, *Player Reactions*, covers themes of Knee-jerk Reactions, Gameplay, Sensory Motivation, and Social Motivation.

Participants raised a number of concerns and matters of interest (RQ2). The most prominent themes were Impact on Player, Ethical Concerns, Value-for-Money, Lack of Choice and Loss of Realism.

When comparisons were encouraged at the end of each focus group, Eager Trader and Choice Lobby were anticipated to be the most likely to influence player behaviour (RQ3); however, during earlier discussion for that individual scenario, Eager Trader polarised opinions: across all focus groups 38% (n=8) felt that it would actually influence spending, 43% (n=9) that it would not, and only 19% (n=4) undecided. For Choice Lobby, there was some discussion over whether adjustments to visibility would also make a difference, such as locating items just within peripheral vision or deliberately placing them so that players would need to turn to see them.

5. CONCLUSION

For now, early indications are that the study has answered the indicated research questions adequately. The themes of Choice Architecture and Social Motivation reflect findings from a prior study of dark patterns in 3D (King et al. 2023), supporting the idea that these patterns are potentially translatable to VR. Discomfort (n=15) was identified as a motivating factor in all four scenarios, as suggested by Krauß (2022); however, the Toll Road scenario took this further by exploiting fears or phobias (n=11), with some participants (n=2) raising ethical concerns about such an approach — although it was noted that effects may vary between different players.

The results still need to be evaluated in more detail and discussed with respect to existing literature, and also compared with recent and contemporaneous publications such as Hadan et al. (2024), Krauß et al. (2024) and Recki et al. (2024). It is the hope of the research team that this evidence that may inform the study of dark patterns in the HCI community and inform future work in this area.

REFERENCES

Bosch, T. (2012, March). Sci-fi writer Bruce Sterling explains the intriguing new concept of Design Fiction. `https://slate.com/technology/2012/03/bruce-sterling-on-design-fictions.html`. Accessed: 2023-06-13.

Braun, V. and V. Clarke (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology 3*(2), 77–101.

Brignull, H. (2013). Dark patterns: inside the interfaces designed to trick you. `https://www.theverge.com/2013/8/29/4640308/dark-`

patterns-inside-the-interfaces-designed-to-trick-you. Accessed: 2020-09-18.

Cialdini, R. B. (1984). *Influence: Science and Practice*. Boston, MA: Pearson Education.

Close, J. and J. Lloyd (2021, April). Lifting the lid on loot-boxes: Chance-based purchases in video games and the convergence of gaming and gambling. Technical report, Gamble Aware, London, UK.

Coulton, P., J. Lindley, M. Sturdee, and M. Stead (2017, March). Design fiction as world building. In *Proceedings of the 3rd Biennial Research Through Design Conference*.

Curry, L. (2015). Fundamentals of qualitative research methods: Focus groups. https://www.youtube.com/watch?v=cCAPz14yjd4. Accessed: 2023-06-23.

Drèze, X., S. J. Hoch, and M. E. Purk (1994, December). Shelf management and space elasticity. *Journal of Retailing 70*(4), 301–326.

Ebster, C. and M. Garaus (2015). *Store Design and Visual Merchandising* (2nd ed.). Business Expert Press.

ESA (2022). Essential facts about the video game industry 2022. https://www.theesa.com/wp-content/uploads/2022/06/2022-Essential-Facts-About-the-Video-Game-Industry.pdf.

Fitton, D. and J. C. Read (2019, June). Creating a framework to support the critical consideration of dark design aspects in free-to-play apps. In *Proceedings of the 18th ACM International Conference on Interaction Design and Children, IDC 2019*, IDC, pp. 407–418. ACM.

Gray, C. M., J. Chen, S. S. Chivukula, and L. Qu (2021, October). End user accounts of dark patterns as felt manipulation. *Proceedings of the ACM on Human-Computer Interaction 5*(CSCW2), 1–25.

Gray, C. M., C. Santos, and N. Bielova (2023). Towards a preliminary ontology of dark patterns knowledge. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems*, CHI EA '23, New York, NY, USA. Association for Computing Machinery.

Greenberg, S., S. Boring, J. Vermeulen, and J. Dostal (2014). Dark patterns in proxemic interactions: A critical perspective. In *Proceedings of the Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, DIS, pp. 523–532. ACM.

Guest, G., K. MacQueen, and E. Namey (2011, January). *Applied Thematic Analysis*. California, United States: SAGE Publications, Inc.

Hadan, H., L. Choong, L. Zhang-Kennedy, and L. E. Nacke (2024, May). Deceived by immersion: A systematic analysis of deceptive design in extended reality. *ACM Comput. Surv. 56*(10), 1–25.

Hall, E. T. (1966). *The Hidden Dimension*. Anchor Books, New York.

King, J., D. Fitton, and B. Cassidy (2023, October). Investigating players' perceptions of deceptive design practices within a 3D gameplay context. *Proc. ACM Hum.-Comput. Interact. 7*(CHI Play), 876–892.

Krauß, V. (2022). Towards XR's dark side. https://xrcon.de/talk/veronika-kraus-towards-xrs-dark-side-tech-research/. Accessed: 2023-06-13.

Krauß, V., P. Saeghe, A. Boden, M. Khamis, M. McGill, J. Gugenheimer, and M. Nebeling (2024, April). What makes XR dark? examining emerging dark patterns in augmented and virtual reality through expert co-design. In *ACM Trans. Comput.-Hum. Interact.*, New York, NY, USA. Association for Computing Machinery.

Lewis, C. (2014). *Irresistible Apps Motivational Design Patterns for Apps, Games, and Web-based Communities* (1st ed.). New York, NY: Apress.

Maier, M. (2020). Dark design patterns — an end-user perspective. *Human Technology 16*(2), 170–199.

Mhaidli, A. H. and F. Schaub (2021). Identifying manipulative advertising techniques in XR through scenario construction. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Miller, G., F. Boster, M. Roloff, and D. Seibold (1977). Compliance-gaining message strategies: A typology and some findings concerning effects of situational differences. *Communications Monographs 44*(1), 37–51.

Petrovskaya, E. and D. Zendle (2021, October). Predatory monetisation? A categorisation of unfair, misleading and aggressive monetisation techniques in digital games from the player perspective. *Journal of Business Ethics 181*(4), 1065–1081.

Recki, L., K. Kroth, V. Krauß, L. Klöckner, C. Pakusch, P. Bossauer, L. Böhm, F. Peters,

A. Stöbitsch, and A. Boden (2024). *Digitale Verantwortung [Digital Responsibility]*, pp. 203–260. Berlin, Heidelberg: Springer Berlin Heidelberg.

Ringfort-Felner, R., M. Laschke, S. Sadeghian, and M. Hassenzahl (2022, January). Kiro: A design fiction to explore social conversation with voice assistants. In *Proceedings of the ACM on Human-Computer Interaction*, Volume 6. Association for Computing Machinery.

Thomas, L., J. Vines, and P. Briggs (2022, February). Exploring digital support for the student transition to university through questionable concepts. *Personal and Ubiquitous Computing 26*(1), 79–92.

UKIE (2021). Player diversity & demographics. `https://ukiepedia.ukie.org.uk/index.php/Player_Diversity_%26_Demographics`. Accessed: 2022-08-26.

Underhill, P. and R. Anderson (1999). *Why We Buy: The Science of Shopping*. Simon & Schuster.

Vines, J., M. Blythe, S. Lindsay, P. Dunphy, A. Monk, and P. Olivier (2012, May). Questionable concepts: Critique as resource for designing with eighty somethings. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '12, Austin, Texas, USA, pp. 1169–1178. SIGCHI: Association for Computing Machinery.

Wang, X., L.-H. Lee, C. B. Fernandez, and P. Hui (2023). The dark side of augmented reality: Exploring manipulative designs in ar. *International Journal of Human–Computer Interaction 0*(0), 1–16.

Zagal, J. P., S. Björk, and C. Lewis (2013). Dark patterns in the design of games. In *Proceedings of the 8th International Conference on the Foundations of Digital Games (FDG 2013)*, Chania, Greece, pp. 39–46. Society for the Advancement of the Study of Digital Games.

Zendle, D., R. Meyer, and N. Ballou (2020). The changing face of desktop video game monetisation: An exploration of exposure to loot boxes, pay to win, and cosmetic microtransactions in the most-played steam games of 2010-2019. *PLoS ONE 15*(5), 1–13.