Start Playing Around - Serious & Persuasive Games as a Viable Counter-Measure Against Deceptive Patterns?

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Abstract

Deceptive patterns trick users into behavior they would not be exhibiting if they were not manipulated. Research suggests that this manipulation is still effective even if users are aware that they are being manipulated, implying that awareness on its own may not lead to better resistance against deceptive patterns. In this position paper, we argue that serious games, and especially persuasive games - games designed to elicit behavioral changes in their players - may prove to be a viable addition to traditional awareness measures (e.g., educational interventions) to combat deceptive patterns. Drawing on lessons learned from our current research on a serious game for deceptive pattern awareness, we discuss how serious and persuasive games work, highlight research into the effectiveness of persuasive games on behavioral changes in their players, and discuss how these findings could be applied as an effective behavioral counter-measure against deceptive patterns.

Keywords

dark patterns, deceptive patterns, manipulative patterns, serious games, persuasive games, awareness

1. Introduction

Many website and app providers offer their services to users at ostensibly no cost. However, to remain profitable, these website and app providers collect user data and use it to run personalized ad campaigns or sell it to third parties outright - effectively making users pay for the services with their data. These data collection practices (and other parts of the provided services, such as online-shopping), often employ deceptive patterns - "tricks used in websites and apps that make you do things you didn't mean to" [1]. Deceptive patterns cause tangible harm to users through invasion of privacy, financial loss, and cognitive burden, as well as harm to the collective welfare through unfair competition or unanticipated societal consequences [2]. Most users are unaware of the extent of the information collected about them [3, 4], and do little to actually protect their data when observed [5, 6, 7]. Many users lack awareness of deceptive patterns [8] and struggle to identify manipulations [9]. Even if they know they are being manipulated, users struggle to counter deceptive patterns [10].

Bongard-Blanchy et al. propose several counter-measures against deceptive patterns, including raising awareness, facilitating detection, and bolstering resistance towards deceptive patterns through educational, design-oriented, technological, or regulatory measures [10]. As awareness of deceptive patterns alone does not seem to help users change their behavior, counter-measures to bolster resistance should strive to do just that - implement behavioral changes.

Serious games - games for non-entertainment purposes [11] - and especially persuasive games - "games created for the major purpose of promoting behavioral change" [12, p.121] - may be a promising counter-measure against deceptive patterns. Serious and persuasive games have been successfully implemented for physical activity [13, 14], disease management [15, 16], privacy issues [17, 18, 19] and - most fittingly - protection against manipulation [20, 21, 22, 23, 24]. However, very few serious or persuasive games cover the topic of deceptive patterns explicitly [25, 26].

In this position paper, we make the case to use serious games, and especially persuasive games, as a counter-measure to deceptive patterns. We present how serious and persuasive games can trigger behavioral changes in players, weigh which persuasive strategies and behavioral theories may be useful in this context, and discuss emerging design questions. We support our discussion with lessons learned from developing and evaluating a serious game for deceptive pattern education from our current research.

2. Deceptive Patterns

In 2010, Conti and Sobiesk identified what could arguably be described as the predecessor to deceptive patterns - malicious interface designs [27], serving as a foundation for further research in this area. Awareness among designers and users however was first raised by Brignull et al., presenting a website to categorize and present examples of what was then referred to as dark patterns [28]. Since then, the term dark patterns has undergone changes due to possible unintended negative associations [29]. To avoid perpetuating harmful stereotypes and in accordance with the ACM guidelines on charged terminology [30], we decided to use the term deceptive patterns, as Brignull et. al have on their original website [29]. Since the emergence of the concept of deceptive patterns, several taxonomies for different contexts have been introduced, including specific taxonomies for deceptive patterns in gaming [31] or for data privacy [32]. One of the most influential deceptive pattern taxonomies has been introduced by Gray et al., influencing many research papers and regulatory decisions since its introduction, even if not consistently cited [34]. Gray et al. have since worked to establish a consistent ontology of deceptive pattern types, paving the way for further transdisciplinary research [34].

To understand why users are vulnerable to deceptive patterns, several mechanisms have been identified [35, 32, 36]. Xiao and Benbasat identified affective and cognitive mechanisms with certain deceptive information practices, while Bösch et al. explained user vulnerability to deceptive patterns via Kahnemann's Dual process theory of System 1 and System 2 thinking [37]. This theory states that humans exhibit two modes of thinking: System 1 - an unconscious and automatic system that trades rationality for speed, and System 2 - a conscious system which allows for rationality but necessitates taking the time to think things through. Bösch et al.

assume that deceptive patterns exploit users' tendency for System 1 thinking, e.g., by presenting a quick and easy solution that just so happens to be tied to giving away personal data [32].

Several studies attest to the effectiveness of deceptive patterns in manipulating users without them being able to identify the precise manipulations. Di Geronimo et al. performed an online study on deceptive patterns in mobile applications, finding that users struggle to identify deceptive patterns, but show improved identification if they are made aware of the fact that deceptive patterns are used [8]. A similar study by Keleher et al. supports this finding [9]. Additionally, Keleher et al. discovered that experts in deceptive pattern research often overestimate the users' ability to recognize when they are being manipulated. In a survey of 406 individuals Bongard-Blanchy et al. found that even if users are aware of the possibility of being manipulated by a user interface, they may not exhibit better self-defense against deceptive patterns or know what harm exactly deceptive patterns can cause [10]. In conclusion, users both struggle to identify and struggle to resist deceptive patterns. Bongard-Blanchy et al. therefore suggest to raise awareness, facilitate detection, and bolster resistance towards deceptive patterns through educational, design-oriented, technological or regulatory measures [10], a sentiment shared by Lu et al., who suggest focusing on user awareness and user action to facilitate end-user-empowerment. We believe that serious and persuasive games are promising educational (and technological) measures to raise awareness and bolster resistance against deceptive patterns.

3. Serious & Persuasive Games

Serious games serve purposes other than pure entertainment, [39], and can encompass tutoring, teaching, training, communication, or information transfer [40]. Most crucially, however, they can be designed to elicit behavioral changes [12]. In this case, they are referred to as persuasive games. Serious games can increase learning outcomes for visual and spatial processing, complex concepts and abstract thinking, as well as deduction and hypothesis testing [41]. Games are inherently fun - improving learner motivation [39] and the overall happiness of players, influencing learning outcomes [42]. Serious games encourage longer engagement with their educational topics and learners are generally more motivated than in nongame-based learning approaches [43]. In their comparative systematic review of 130 papers on persuasive games, Ndulue and Orji found that the vast majority of persuasive games whose effectiveness was evaluated (100 out of 130 games) showed positive outcomes (75 out of 100 games) or partially positive outcomes (22 out of 100 games) in their intended behavior change [12]. These positive outcomes persist throughout various examined domains, e.g., disease management, physical activity, nutrition, environmental sustainability etc. [12].

Persuasive games are most effective if they employ persuasive strategies (PS) [12]. A key framework in the analysis and development of persuasive games is the persuasive systems design framework by Oinas-Kukkonen and Harjumaa [12, 44]. Oinas-Kukkonen and Harjumaa define 28 persuasive strategies in four categories: primary task, dialogue, system credibility, and social support (see Table 1) [44]. Ndulue and Orji analyzed 130 games for use of persuasive strategies, finding that the "*reward* (79%) PS was the most implemented strategy, followed by *liking* (55%), *simulation* (53%), *punishment* (48%), *self-monitoring* (45%), and *rehearsal* (43%)" [12, p.128] -*penalty* in this case referring to the opposite of the *reward* strategy [12]. "*Authority* (2%),

verifiability (2%), and *third-party endorsements* (2%) were the least implemented PSs" [12, p.128]. Moreover, Ndulue and Orji found an inverse relationship between the number of employed persuasive strategies and the persuasive games' effectiveness, arguing cognitive overload may be responsible for this relationship [12].

Table 1

List of persuasive strategies. *Note.* Adapted from "Persuasive Systems Design: Key Issues, Process Model, and System Features," by Oinas-Kukkonen and Harjumaa, 2009, *Communications of the Association for Information Systems 24* Tables 2 - 5. https://doi.org/10.17705/1CAIS.02428

Persuasive Strategy	Definition
Primary Task Support	
Reduction	A system that reduces complex behavior into simple tasks helps users perform the target behavior, and it may increase the benefit/cost ratio of a behavior.
Tunneling	Using the system to guide users through a process or experience provides opportunities to persuade along the way.
Tailoring	Information provided by the system will be more persuasive if it is tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group.
Personalization	A system that offers personalized content or services has a greater capability for persuasion.
Self-monitoring	A system that keeps track of one's own performance or status supports the user in achieving goals.
Simulation	Systems that provide simulations can persuade by enabling users to observe immediately the link between cause and effect.
Rehearsal	A system providing means with which to rehearse a behavior can enable people to change their attitudes or behavior in the real world.
Dialogue Support	
Praise	By offering praise, a system can make users more open to persuasion.
Rewards	Systems that reward target behaviors may have great persuasive powers.
Reminders	If a system reminds users of their target behavior, the users will more likely achieve their goals.
Suggestion	Systems offering fitting suggestions will have greater persuasive powers.
Similarity	People are more readily persuaded through systems that remind them of themselves in some meaningful way.
Liking	A system that is visually attractive for its users is likely to be more persuasive.
Social role	If a system adopts a social role, users will more likely use it for persuasive purposes.
System Credibility Support	
Trustworthiness	A system that is viewed as trustworthy will have increased powers of persuasion.
Expertise	A system that is viewed as incorporating expertise will have increased powers of persuasion.
Surface credibility	People make initial assessments of the system credibility based on a firsthand inspection.
Real-world feel	A system that highlights people or organization behind its content or services will have more credibility.
Authority	A system that leverages roles of authority will have enhanced powers of persuasion.
Third-party endorsements	Third-party endorsements, especially from well-known and respected sources, boost perceptions on system credibility.
Verifiability	Credibility perceptions will be enhanced if a system makes it easy to verify the accuracy of site content via outside sources.
Social Support	
Social learning	A person will be more motivated to perform a target behavior if (s)he can use a system to observe others performing the behavior.
Social comparison	System users will have a greater motivation to perform the target behavior if they can compare their performance with the performance of others.
Normative influence	A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behavior.
Social facilitation	System users are more likely to perform target behavior if they discern via the system that others are performing the behavior along with them.
Cooperation	A system can motivate users to adopt a target attitude or behavior by leveraging human beings' natural drive to cooperate.
Competition	A system can motivate users to adopt a target attitude or behavior by leveraging human beings' natural drive to compete.
Recognition	By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behavior.

Ndulue and Orji also report that 64% of the persuasive games they analyzed did not implement known behavioral theories or models in their design, suggesting to include such theoretical grounding in future research. Among the remaining games that used behavioral theories, social cognitive theory [45] was the most widely used, followed by the theory of planned behavior [46], the transtheoretical model [47], and Fogg's behavioral model [48]. Another example of a behavioral theory useful in serious and persuasive games is the theory of intrinsic integration, which provides both educational and motivational benefits by tightly coupling narrative, gameplay, and learning content [49, 50]. With regards to persuasive games specifically concerned with manipulation, Saleh et al. successfully employed inoculation theory [20, 21]. Inoculation theory draws on a comparison to vaccines: by introducing users to a weakened form of an argument (or in our case, a deceptive pattern), the user may become more resistant to stronger forms of them [51]. Inoculation theory has been used in persuasive games to build resistance against manipulation through extremist recruitment [20, 21], as well as through fake news and misinformation [23, 24].

To summarize, serious and persuasive games have been shown to be successful tools for learning and to spark behavior change in a fun and motivating way. Persuasive strategies and behavioral theories can be used to improve the foundation of the game design - strengthening their effect on behavioral change. We will discuss which persuasive strategies and behavioral theories we believe could be beneficial to implement in serious and persuasive games against deceptive patterns in section 5.

## 4. Design of a Narrative-Driven Serious Game against Deceptive Patterns

In our current research, we have developed a narrative-driven serious game to increase awareness and bolster resistance against deceptive patterns. We performed two initial studies using this game [52]. To contextualize our discussion (section 5), we briefly summarize the game concept and corresponding studies.

Our game uses a 3D first-person perspective and focuses on a new employee (the player) at a laboratory on their first day on the job. Their new boss, the head researcher of the laboratory - referred to as the narrator - communicates with the player via speakers within each room, only ever being heard from off-screen. The narrator ostensibly guides the player through an on-boarding process in which the user has to navigate several rooms, getting to know the laboratory and its rules. However, the narrator is not as helpful as it initially seems. The on-boarding process turns out to be an experiment by the narrator to keep the player inside the laboratory as long as possible.

To do so, the narrator employs several deceptive pattern analogies. Each deceptive pattern analogy represents a deceptive pattern concept from the taxonomy introduced by Gray et al.: *Nagging*, *Sneaking*, *Obstruction*, *Forced Action*, and the three sub-types of *Interface Interference* (*Aesthetic Manipulation*, *Hidden Information* and *Preselection*) [33]. Each deceptive pattern analogy is presented in a corresponding room. The player has to find a suitable way around the deceptive pattern analogy to get to the next room.

The deceptive pattern analogies show different levels of mapping fidelity to their correspond-

ing deceptive pattern concepts. For example, the deceptive pattern analogy representing the concept of *Sneaking* - dubbed *Sneaky Shop* - consists of a vending machine that adds items to the players' shopping cart without the players' knowledge. This matches very closely to how online shops may add additional goods or services to their users' shopping carts to sell the users more than they wanted to buy initially - a common example of *Sneaking*. *Sneaky Shop* is represented as a 2D graphical user interface (GUI) when interacting with the vending machine, tying the analogy even more closely to the real-world online shop example. Meanwhile, the deceptive pattern concept of *Aesthetic Manipulation*, which deals more with form than function and often causes a false hierarchy between two or more options, causing one to be preferred over the others, is represented more abstractly. The deceptive pattern analogy *Winding Hallway & Shortcut* presents players with a room that is only illuminated in the middle, creating the perception of a preferred path, while and discouraging straying from it. However, following the illuminated path leads to a very long journey to the next room, while exploring the dark areas leads players to a hidden door that provides a shortcut towards the next room. As the narrator's goal is to keep the player in the laboratory for as long as possible, they have manipulated the room's aesthetic to lead the player towards the long journey, rather than the preferable short journey. Conceptually, this mimics real-world examples of *Aesthetic Manipulation* in which e.g., the option preferred by the website or app provider is presented in a visually appealing way (e.g., a colorful button to accept all cookies), while the alternative that is usually preferable for users is presented in a subdued fashion (e.g., a text-only, grey link to reject cookies). However, the specific pattern analogy does not make this connection immediately apparent.
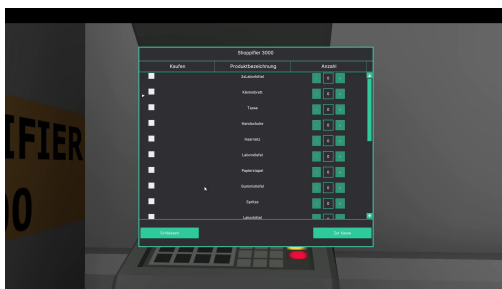
(a) *Sneaking* represented in *Sneaky Shop* as a GUI for a vending machine.

(b) *Aesthetic Manipulation* represented in *Winding Hallway & Shortcut* as a partially illuminated room.

Figure 1: Example deceptive pattern analogies in our game.

To evaluate the game, we first conducted an exploratory laboratory gameplay study in which we presented players with the game without disclosing the fact that the narrator was about to manipulate them or that the goal of the game was to teach players about deceptive patterns. We wanted to examine how players would react to such a game and how they would behave when faced with deceptive pattern analogies without prior knowledge. Our second study, an online survey study based on video clips explaining the deceptive pattern analogies, was aimed at exploring how helpful our deceptive pattern analogies were considered for understanding their respective deceptive pattern concepts.

5. Discussion on Emerging Game and Study Design Questions

With the previous sections as context, we present a discussion on questions that arose during the design of the game and the associated studies along the following themes: game design, game presentation, and study design.

5.1. Game Design

During the initial design phases of our game, we primarily focused on how to convey the deceptive patterns to the players in a way that was intrinsically integrated with our serious game, rather than simply presenting players with virtual examples of deceptive patterns for them to identify and counter. An example of such a game design can be found in "Dark Cookie" by Akinyemi, where players need to identify deceptive patterns in cookie consent banners, embedded in a cover story about animals [25]. While our serious game was not outright designed to be a persuasive game and did not explicitly include persuasive strategies, our goal was to increase awareness about deceptive patterns by showing analogous situations within the game world, paired with in-game counter-measures to combat these situations that mimic real-world counter-measures against deceptive patterns.

Viewed through the lens of persuasive games, this concept follows the persuasive strategy *Simulation* and is intended to work very similarly to inoculation theory - as players are exposed to similar manipulative situations to deceptive patterns, but the situations are "weakened" in the sense that the manipulation is cleared up by the end of the game and is more easily recognizable than the deceptive patterns are in real world-examples. This retrospective analysis of our game leads us to the following question:

> Q1: Which persuasive strategies are best suited to persuade players to change their behavior towards deceptive patterns?

Several persuasive strategies could be useful for this purpose. On a high level, as suggested by Ndulue and Orji, persuasive situations for system credibility support may be helpful to improve persuasiveness for any persuasive game, regardless of the persuasive strategies used as game mechanics. Presenting the games as built upon scientific foundations, as designed by *trustworthy* people with *expertise* in the field, may be helpful for all persuasive games. On a lower level, the persuasive strategies used may need to be changed depending on the target audience. Our game, for example, is single-player only and includes puzzle elements as well as Jump-and-Run segments. This may not be suitable for all players, especially not for those who prefer multiplayer games. These players may be persuaded better by a game implementing *Competition*, *Recognition*, and *Social comparison*. For example, a persuasive game design against deceptive patterns for multiple players may have a turn-based "combat" system, in which one player "designs" a website through some form of editor, while the other needs to recognize the manipulations, based on a given taxonomy. The designing player receives points (*Rewards*) if the recognizing player misses deceptive patterns, while the recognizing player gets points for recognizing deceptive patterns. A ranking system could then provide the players with *social comparison*. Designers of persuasive games against deceptive patterns should consider persuasive strategies at the earliest stages of design and focus their decisions on a few key strategies.

A different question that arose during the design phase of our game dealt with the granularity of what we were trying to convey. We decided to give each deceptive pattern we wanted to convey its own room - aiming to educate players on the different types of deceptive patterns that exist on the web - but present the deceptive patterns as analogies that are consistent with the game world rather than real-world examples.

Q2: In what level of detail should the persuasive game convey deceptive patterns?

This question may be answered more specifically by defining the persuasive goal of the game. Researchers should decide whether they aim for players to categorize examples of deceptive patterns if they are faced with them, or if players should be able to recognize that they are being manipulated - even if they cannot exactly say how, or if the main goal is to convey possible counter-measures against manipulations. If the goal is to convey specific knowledge about deceptive patterns, they should be conveyed in a high level of detail, ideally using real-world examples. If the goal is to improve resistance against deceptive patterns, the game may use deceptive patterns in more abstract ways to manipulate the player characters - exposing them to a "weaker", possibly more obvious version of the deceptive patterns in line with inoculation theory. In that case, similar deceptive patterns may be grouped as well, instead of presented separately. The specific goal of the persuasive game not only influences which level of detail is used to convey deceptive patterns but also influences how the game is presented to players and how it needs to be evaluated.

5.2. Game Presentation

During the design of the studies to evaluate our game, we came across a key realization: If we explain the fact that the game is trying to manipulate the players, the players might react differently to the game than originally intended. For example, we implemented the deceptive pattern *Preselection* as *Insensible Key Mapping*: The narrator asks players at the beginning of the game whether they would like to use a predetermined key mapping. If players have an initial level of trust in the narrator, they are more likely to expect the narrator to provide them with a helpful key mapping. Explaining the game's context to the players prior to them playing it might make them wary of the narrator from the start. This may cause them to counter the *Preselection* without experiencing the negative consequences of falling for the deceptive pattern - potentially hindering the game's persuasive success. Therefore we ask the question:

Q3: How should persuasive games against deceptive patterns be presented to players prior to playing them?

Particularly, researchers should carefully evaluate which effects disclosing the context of the game may have on its persuasiveness and educational success. This may not be an issue in a game where players need to recognize deceptive patterns as a core game mechanic, as in the multiplayer game described above - in fact, it is indeed necessary that players know which deceptive patterns exist in the game, both as designing player and as recognizing player. Meanwhile, a game that aims to convey the deceptive patterns and their manipulative effects via *Simulation*, as our game does, may suffer from players knowing too much about the game a priori. In such cases, materials players get to see prior to playing the game need to be designed with special care to provide as much information as necessary but keep what is effectively a "plot twist" secret from the players - as many educational games do.

5.3. Study Design

Our initial study was intentionally exploratory, letting participants experience the game in a laboratory setting to analyze their reactions and behaviors. Our second study, an online survey study, was a result of a question that arose from the exploratory study: How well can users match the deceptive pattern analogies as presented in our game with their corresponding deceptive pattern concepts? This question necessitated a quantitative measurement tool. While this type of knowledge-oriented question can be addressed via an online survey, persuasive games promise behavioral changes, which motivates the question:

Q4: How to robustly measure behavioral change towards deceptive patterns?

This question is again influenced by the specific goal of the persuasive game, as this defines what a successful behavioral change looks like - and therefore how to measure it. However, any goal beyond knowledge acquisition raises the question of how sustainable such a behavioral change might be. Does playing the game influence players in the long term, or just immediately after playing it? Does repeatedly playing the game cause more retention of the behavior? Questions like these influence which methods need to be employed to evaluate success. Longitudinal studies, for example via diary studies, may be able to answer the more long-term oriented questions in this case. As a more technology-oriented solution, deceptive pattern researchers could develop a browser extension or mobile app to track user behavior on websites known to employ deceptive patterns (e.g., by comparing them to Brignull et al.s website [28]) for an amount of time before and after playing the game, and compare user behavior quantitatively. Such a solution could also be used to measure the effectiveness of other deceptive pattern counter-measures, allowing for comparative, qualitative research at a large scale. Naturally, as with any tracking of user data, ethical considerations would have to be discussed and participants would have to provide informed consent.

6. Conclusion

Research shows that serious and persuasive games are effective at promoting behavioral changes in a variety of research areas. We, therefore, believe that using serious and persuasive games may be especially effective at bolstering resistance against deceptive patterns, as users struggle to combat deceptive patterns even if they are aware of them. Based on our current research and existing literature, we discuss several questions on game design, game presentation, and study design for serious and persuasive games against deceptive patterns. We believe the discussed questions can help researchers to thoroughly consider the specific challenges of designing serious and persuasive games against deceptive patterns.

Acknowledgments

References

[1] H. Brignull, M. Leiser, C. Santos, K. Doshi, Deceptive patterns – user interfaces designed to trick you. deceptive.design., 2023. URL: https://www.deceptive.design/types.

[2] A. Mathur, M. Kshirsagar, J. Mayer, What Makes a Dark Pattern... Dark? Design Attributes, Normative Considerations, and Measurement Methods, in: Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems, CHI '21, Association for Computing Machinery, New York, NY, USA, 2021. URL: https://doi.org/10.1145/3411764.3445610. doi:10.1145/3411764.3445610.

[3] F. M. Farke, D. G. Balash, M. Golla, M. Dürmuth, A. J. Aviv, Are Privacy Dashboards Good for End Users? Evaluating User Perceptions and Reactions to Google's My Activity, in: 30th USENIX Security Symposium (USENIX Security 21), USENIX Association, 2021, pp. 483–500. URL: https://www.usenix.org/conference/usenixsecurity21/presentation/farke.

[4] L. Vervier, E.-M. Zeissig, C. Lidynia, M. Ziefle, Perceptions of Digital Footprints and the Value of Privacy, in: Proceedings of the 2nd International Conference on Internet of Things, Big Data and Security, SCITEPRESS - Science and Technology Publications, 2017. URL: http://dx.doi.org/10.5220/0006301000800091. doi:10.5220/0006301000800091.

[5] A. Acquisti, J. Grossklags, Privacy and rationality in individual decision making, IEEE Security & Privacy 3 (2005) 26–33. doi:10.1109/MSP.2005.22.

[6] A. Acquisti, L. Brandimarte, G. Loewenstein, Privacy and human behavior in the age of information, Science 347 (2015) 509–514. URL: https://www.science.org/doi/abs/10.1126/science.aaa1465. doi:10.1126/science.aaa1465.

[7] E. Van den Broeck, K. Poels, M. Walrave, Older and wiser? facebook use, privacy concern, and privacy protection in the life stages of emerging, young, and middle adulthood, Social Media+ Society 1 (2015). doi:10.1177/2056305115616149.

[8] L. Di Geronimo, L. Braz, E. Fregnan, F. Palomba, A. Bacchelli, UI Dark Patterns and Where to Find Them: A Study on Mobile Applications and User Perception, in: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, CHI '20, Association for Computing Machinery, New York, NY, USA, 2020, p. 1–14. URL: https://doi.org/10.1145/3313831.3376600. doi:10.1145/3313831.3376600.

[9] M. Keleher, F. Westin, P. Nagabandi, S. Chiasson, How Well Do Experts Understand End-Users' Perceptions of Manipulative Patterns?, in: Nordic Human-Computer Interaction Conference, NordiCHI '22, Association for Computing Machinery, New York, NY, USA, 2022, pp. 1–21. doi:10.1145/3546155.3546656.

[10] K. Bongard-Blanchy, A. Rossi, S. Rivas, S. Doublet, V. Koenig, G. Lenzini, "I Am Definitely Manipulated, Even When I Am Aware of It. It's Ridiculous!" - Dark Patterns from the End-User Perspective, in: Proceedings of the 2021 ACM Designing Interactive Systems Conference, DIS '21, Association for Computing Machinery, New York, NY, USA, 2021, p. 763–776. URL: https://doi.org/10.1145/3461778.3462086. doi:10.1145/3461778.3462086.

[11] N. Kara, A Systematic Review of the Use of Serious Games in Science Education, Contemporary Educational Technology 13 (2021) ep295. URL: http://dx.doi.org/10.30935/cedtech/9608. doi:10.30935/cedtech/9608.

[12] C. Ndulue, R. Orji, Games for Change—A Comparative Systematic Review of Persuasive Strategies in Games for Behavior Change, IEEE Transactions on Games 15 (2023) 121–133.

doi:`10.1109/TG.2022.3159090`.

[13] R. Orji, J. Vassileva, R. L. Mandryk, LunchTime: A Slow-Casual Game for Long-Term Dietary Behavior Change, Personal and Ubiquitous Computing 17 (2013) 1211–1221. doi:`10.1007/s00779-012-0590-6`.

[14] L. Chittaro, R. Sioni, Turning the Classic Snake Mobile Game into a Location–Based Exergame that Encourages Walking, in: M. Bang, E. L. Ragnemalm (Eds.), Persuasive Technology. Design for Health and Safety, Springer Berlin Heidelberg, Berlin, Heidelberg, 2012, pp. 43–54.

[15] T. Ruiz-López, S. Sen, E. Jakobsen, A. Tropé, P. E. Castle, B. T. Hansen, M. Nygård, FightHPV: Design and Evaluation of a Mobile Game to Raise Awareness About Human Papillomavirus and Nudge People to Take Action Against Cervical Cancer, JMIR Serious Games 7 (2019) e8540. doi:`10.2196/games.8540`.

[16] S. L. Yoon, A. Godwin, Enhancing Self-Management in Children with Sickle Cell Disease Through Playing a CD-ROM Educational Game: A Pilot Study, Pediatric Nursing 33 (2007) 60–72.

[17] A. Ganesh, C. Ndulue, R. Orji, Tailoring a Persuasive Game to Promote Secure Smartphone Behaviour, in: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems, CHI '23, Association for Computing Machinery, 2023, pp. 1–18. URL: https://dl.acm.org/doi/10.1145/3544548.3581038. doi:`10.1145/3544548.3581038`.

[18] A. Ganesh, C. Ndulue, R. Orji, PERMARUN- A Persuasive Game to Improve User Awareness and Self-Efficacy Towards Secure Smartphone Behaviour, in: Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems, CHI EA '21, Association for Computing Machinery, 2021, pp. 1–7. URL: https://dl.acm.org/doi/10.1145/3411763.3451781. doi:`10.1145/3411763.3451781`.

[19] C. Ndulue, O. Oyebode, R. Orji, PHISHER CRUSH: A Mobile Persuasive Game for Promoting Online Security, in: S. B. Gram-Hansen, T. S. Jonasen, C. Midden (Eds.), Persuasive Technology. Designing for Future Change, Lecture Notes in Computer Science, Springer International Publishing, 2020, pp. 223–233. doi:`10.1007/978-3-030-45712-9_17`.

[20] N. F. Saleh, J. Roozenbeek, F. A. Makki, W. P. Mcclanahan, S. V. D. Linden, Active Inoculation Boosts Attitudinal Resistance against Extremist Persuasion Techniques: A Novel Approach towards the Prevention of Violent Extremism, Behavioural Public Policy (2021) 1–24. doi:`10.1017/bpp.2020.60`.

[21] N. Saleh, F. Makki, S. Van der Linden, J. Roozenbeek, Inoculating against Extremist Persuasion Techniques – Results from a Randomised Controlled Trial in Post-Conflict Areas in Iraq, advances.in/psychology 01 (2023) 1–21. doi:`10.56296/aip00005`.

[22] D. Aladawy, K. Beckers, S. Pape, PERSUADED: Fighting social engineering attacks with a serious game, in: S. Furnell, H. Mouratidis, G. Pernul (Eds.), Trust, Privacy and Security in Digital Business, Lecture Notes in Computer Science, Springer International Publishing, 2018, pp. 103–118. doi:`10.1007/978-3-319-98385-1_8`.

[23] J. Roozenbeek, S. van der Linden, Fake News Game Confers Psychological Resistance against Online Misinformation, Palgrave Communications 5 (2019) 1–10. doi:`10.1057/s41599-019-0279-9`.

[24] J. Roozenbeek, S. van der Linden, T. Nygren, Prebunking Interventions Based on "Inoculation" Theory Can Reduce Susceptibility to Misinformation across Cultures (2020).

[25] O. P. Akinyemi, "Dark Cookie" - A Serious Game to Train Users to Spot and Interact with Dark Patterns in Cookie Banners, 2022.

[26] I. Tjostheim, V. Ayres-Pereira, C. Wales, A. Manna, S. Egenfeldt-Nielsen, Dark Pattern: A Serious Game for Learning About the Dangers of Sharing Data, European Conference on Games Based Learning 16 (2022) 774–783. doi:10.34190/ecgbl.16.1.872.

[27] G. Conti, E. Sobiesk, Malicious interface design: exploiting the user, in: Proceedings of the 19th International Conference on World Wide Web, WWW '10, Association for Computing Machinery, New York, NY, USA, 2010, p. 271–280. URL: https://doi.org/10.1145/1772690.1772719. doi:10.1145/1772690.1772719.

[28] H. Brignull, M. Miquel, J. Rosenberg, J. Offer, Dark patterns-user interfaces designed to trick people, in: Proceedings of the Poster Presentation, Australian Psychological Society Congress, Sydney, NSW, Australia, 2015, pp. 21–23.

[29] H. Brignull, M. Leiser, C. Santos, K. Doshi, Deceptive Patterns - About Us, https://www.deceptive.design/about-us, 2024. Last accessed on 27.02.2024.

[30] A. for Computing Machinery, Words Matter: Alternatives for Charged Terminology in the Computing Profession, https://www.acm.org/diversity-inclusion/words-matter, 2024. Last accessed on 27.02.2024.

[31] J. P. Zagal, S. Björk, C. Lewis, Dark Patterns in the Design of Games, in: Foundations of Digital Games 2013, 2013.

[32] C. Bösch, B. Erb, F. Kargl, H. Kopp, S. Pfattheicher, Tales from the Dark Side: Privacy Dark Strategies and Privacy Dark Patterns, Proceedings on Privacy Enhancing Technologies 2016 (2016) 237–254. doi:10.1515/popets-2016-0038.

[33] C. M. Gray, Y. Kou, B. Battles, J. Hoggatt, A. L. Toombs, The Dark (Patterns) Side of UX Design, in: Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, CHI '18, Association for Computing Machinery, New York, NY, USA, 2018, p. 1–14. URL: https://doi.org/10.1145/3173574.3174108. doi:10.1145/3173574.3174108.

[34] C. M. Gray, C. Santos, N. Bielova, T. Mildner, An Ontology of Dark Patterns Knowledge: Foundations, Definitions, and a Pathway for Shared Knowledge-Building, 2023. doi:10.48550/arXiv.2309.09640. arXiv:2309.09640.

[35] B. Xiao, I. Benbasat, Product-Related Deception in E-Commerce: A Theoretical Perspective, MIS Quarterly 35 (2011) 169–195. URL: http://www.jstor.org/stable/23043494.

[36] C. Lewis, Irresistible Apps: Motivational design patterns for apps, games, and web-based communities, 2014. URL: https://link.springer.com/content/pdf/10.1007/978-1-4302-6422-4.pdf.

[37] D. Kahneman, Thinking, Fast and Slow, Farrar, Straus and Giroux, [S.I.], 2011.

[38] Y. Lu, C. Zhang, Y. Yang, Y. Yao, T. J.-J. Li, From Awareness to Action: Exploring End-User Empowerment Interventions for Dark Patterns in UX (2024). arXiv:2310.17846.

[39] K. Becker, What's the difference between gamification, serious games, educational games, and game-based learning, Academia Letters 209 (2021) 1–4.

[40] J. Alvarez, D. Djaouti, et al., An introduction to Serious game Definitions and concepts, Serious games & simulation for risks management 11 (2011) 11–15.

[41] M. Dondlinger, Educational Video Game Design: A Review of the Literature, Journal of Applied Educational Technology 4 (2007).

[42] N. N. M.Nazry, D. M. Romano, Mood and Learning in Navigation-Based Serious Games,

Computers in Human Behavior 73 (2017) 596–604. doi:`10.1016/j.chb.2017.03.040`.

[43] Y. Zhonggen, et al., A meta-analysis of use of serious games in education over a decade, International Journal of Computer Games Technology 2019 (2019).

[44] H. Oinas-Kukkonen, M. Harjumaa, Persuasive Systems Design: Key Issues, Process Model, and System Features, Communications of the Association for Information Systems 24 (2009). URL: https://aisel.aisnet.org/cais/vol24/iss1/28. doi:`10.17705/1CAIS.02428`.

[45] A. Bandura, Social Cognitive Theory: An Agentic Perspective, Annual Review of Psychology 52 (2001) 1–26. doi:`10.1146/annurev.psych.52.1.1`.

[46] I. Ajzen, The Theory of Planned Behavior, Organizational Behavior and Human Decision Processes 50 (1991) 179–211. doi:`10.1016/0749-5978(91)90020-T`.

[47] J. O. Prochaska, C. C. DiClemente, Stages and Processes of Self-Change of Smoking: Toward an Integrative Model of Change, Journal of Consulting and Clinical Psychology 51 (1983) 390–395. doi:`10.1037/0022-006X.51.3.390`.

[48] BJ. Fogg, 7A Behavior Model for Persuasive Design, in: Proceedings of the 4th International Conference on Persuasive Technology, Persuasive '09, Association for Computing Machinery, New York, NY, USA, 2009, pp. 1–7. doi:`10.1145/1541948.1541999`.

[49] E. Naul, M. Liu, Why Story Matters: A Review of Narrative in Serious Games, Journal of Educational Computing Research 58 (2020) 687–707. URL: https://doi.org/10.1177/0735633119859904. doi:`10.1177/0735633119859904`.

[50] M. P. J. Habgood, S. E. Ainsworth, Motivating Children to Learn Effectively: Exploring the Value of Intrinsic Integration in Educational Games, Journal of the Learning Sciences 20 (2011) 169–206. doi:`10.1080/10508406.2010.508029`.

[51] W. J. McGuire, Resistance to persuasion conferred by active and passive prior refutation of the same and alternative counterarguments., The Journal of Abnormal and Social Psychology 63 (1961) 326.

[52] K. Kronhardt, K. Rolfes, J. Gerken, Trickery: Educational Dark Pattern Analogies for Use in Serious Games, 2024. `arXiv:2401.06247`.