

Finding Dark Patterns in Casual Mobile Games Using Heuristic Evaluation

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Received: 27 November 2020 | Accepted: 27 Juni 2022 | Published: 28 November 2022

ABSTRACT

The popularity and monetary success of casual games are owed to many factors, but some of them that are not entirely honest and ethical. One of them comes in the form of the implementation of a dark pattern, a design pattern that negatively affects the experience of playing the game they are implemented. This research unveils the dark patterns most commonly used in popular and profitable casual mobile games, using heuristic evaluation conducted by five undergraduate student evaluators that have sufficient domain knowledge and experience of the topic at hand. Three of those dark patterns are (1) Pay to Skip: When the game sells various game elements that allow the players to skip some of its core challenges, (2) Grinding: When the game forces the players to sit through repetitive mechanics to make progress in the game, and (3) Playing by Appointment; When the game forces the player to play it during a specific time, through the use of rewards or punishments. The findings of this research should act as a counter-guideline on developing a casual game, as well as and provide the basis on future discussions on ethical game design.

Keywords: Dark pattern, game design, human-computer interaction

ABSTRAK

Popularitas dan kesuksesan secara keuangan dari permainan kasual disebabkan oleh banyak faktor, namun beberapa di antaranya disebabkan oleh faktor yang tidak jujur dan kurang etis. Salah bentuknya adalah penggunaan dark pattern, suatu pola desain yang berdampak negatif terhadap pengalaman bermain game. Penelitian ini mengungkap berbagai dark pattern yang paling umum digunakan dalam permainan kasual pada perangkat seluler yang populer dan sukses secara finansial. Penelitian dilakukan dengan menggunakan evaluasi heuristik oleh lima evaluator yang merupakan tingkat sarjana yang memiliki pengetahuan dan pengalaman yang memadai tentang topik yang dibahas. Tiga dari dark pattern tersebut adalah (1) Pay to Skip: Saat permainan menjual berbagai elemen permainan yang memungkinkan pemain untuk melewati beberapa tantangan utama, (2) Grinding: Saat permainan memaksa pemain untuk menjalankan suatu mekanisme berulang agar mencapai kemajuan dalam permainan, dan (3) Playing by Appointment; Ketika permainan memaksa pemain untuk memainkannya selama waktu tertentu, dengan penggunaan hadiah atau hukuman. Hasil dari penelitian ini diharapkan menjadi pedoman dalam mengembangkan permainan kasual, serta sebagai landasan bagi penelitian selanjutnya tentang desain permainan yang etis.

Kata kunci: Dark pattern, desain permainan, interaksi manusia dan komputer

1. INTRODUCTION

Many factors contribute to the spread and ubiquitousness of casual games on the general public. One of these factors come in the form of a dark pattern, a user experience (UX) design patterns that are used as tricks to exploit and manipulate users (or in this case, players) into doing something they are not fully consenting to, and/or to generally worsen the user experience, sometimes done with malicious intents in order to benefit the owner of the application or website [1],[2].

There have been a couple of extensive academic research on the dark pattern, such as the dark pattern in shopping websites [3] and video games in general [2]. While [2] has documented the use of dark patterns in video games, it is lacking in specifying the exact game mechanics used in different game genre. Therefore, this research tries to fill that in the casual genre. This research aims to find what type of dark patterns are most commonly used in popular and profitable casual mobile games, and what is the assumed impact on player experience in those instances? This result of this research aspires to inspire an understanding and rationale on how dark patterns are used in casual mobile games.

As of the writing of this research, Android still holds overwhelming domination in the smartphone operating system (OS) market [4], [5]. Thus the games analyzed will be games that are available on the Play Store, the official app store for Android OS based on popularity (the downloads count in the Play Store, regardless of the game rating) and profit (how much players are spending real money in the game).

2. METHODOLOGY

2.1. Sample Selection

Two metrics determine the games that are going to be chosen, popularity (the downloads count in the Play Store, regardless of the game rating) and profit (how much players are spending real money in the game). Thus, five games are going to be chosen from the "Top Free", "Trending", and "Top Grossing" charts in the "Casual" genre in the Google Play Store.

Ten games from each top charts are listed and are given scores that are inversely proportional to their rankings (e.g. first ranking gets 10 points, second-ranking gets 9 points, third-ranking gets 8 points, and so on). The three lists are then compared, and the five games that both appear in at least two charts and have the highest scores are the ones that are going to be used in this research.

2.2. Evaluators Selection

Instead of utilizing experts or "usability specialists" as the participant [6]–[8], five evaluators who are "novice specialists" are going to be involved in this research [9], [10] which are expected to find 74-87% problems.

2.3. Designing Heuristic Evaluation

Dark patterns in video games [2] consists of three different categories based on the effects that they inflict on the players, as describes in Table 1. The heuristic evaluation refers to this categorization in assessing dark pattern in casual mobile games and adding a column for any new dark patterns not mentioned in those categories.

2.4. Evaluation Preparation

Before the actual evaluation process is conducted, the evaluators are first briefed the following:

1. A recap on Human-Computer Interaction (HCI) and heuristic evaluation to help evaluators recall their knowledge on the concept of usability, usability goals, usability evaluation.

2. The definition of dark patterns and some notable examples to solidify their understanding of dark patterns and paint the picture of what exactly they are going to look for during the evaluation.
3. Evaluation procedure which describes the technicalities of the activities that they are going to be conducting.

Table 1. Descriptions of the Dark Pattern Categories

Category	Description	Sub-Category	Description
Temporal Dark Patterns	Dark patterns that revolve around manipulating players' time commitment when playing the game.	Grinding	It is forcing players to perform repetitive tasks to make progress in the game.
		Playing by Appointment	Incentivizing or even forcing players to play the game during a specific range of time.
Monetary Dark Patterns	Dark patterns that involve requiring players to make a financial investment in the game.	Pay to Skip	Allowing or even encouraging players to spend money to make progress in the game easier and faster.
		Playing by Appointment	It requires players to pay to unlock certain content despite it being already included in the game (i.e. in the installation disc or the downloaded files).
		Monetized Rivalries	Allowing or even encouraging players to spend money to gain a competitive edge against other players.
Social Capital-Based Dark Patterns	Dark patterns that involve social or human capital interactions.	Social Pyramid Schemes	Encouraging or sometimes forcing players to invite people to join them in the game to gain in-game incentives or make progress.
		Impersonation	They are showing representations (impersonations) of people related to the players, to make the game more relatable, leading to a negative impact on their social relations.

2.5. Heuristic Evaluation

After a briefing session, evaluators then proceed to evaluate the games independently, with as little communication with one another as possible, to reduce bias in the insight gained from them [11]. Since the dark patterns are scattered across the whole game, the evaluators are allowed to approach each game with no particular instruction. They are required to repeat an interaction sequence (e.g. choosing a level, playing the level, and then returning to the main menu) at least twice. The first iteration to get the general flow of the interface, and the second one to focus on a specific element and how they affect the bigger picture.

Due to the simplistic nature of the games evaluated, the evaluators are only given about thirty minutes to finish exploring and trying out the various mechanics of a single game before moving on to the next one, with a half-an-hour extension if they need extra time.

After finishing a game, the evaluators then fill out a heuristic evaluation form which contains two columns; Score and Notes. The Score column is for the severity rating, a grading system to rate a usability problem [12], for each dark pattern. The description of the score presented in Table 2 is a modification from [12] to better suit the context of this research. The Notes column is to document where, when, and how the dark pattern appears in the game and their opinions on how they think it might affect the players. Since a severity rating from a single evaluator is hardly enough to judge the accuracy of said rating accurately, the mean of a set of ratings given by at least three evaluators will be used in this research[12].

Table 2. Descriptions of the Severity Ratings/Score

Score	Description
0	This dark pattern is not found in the game.
1	This dark pattern exists but poses little to no harm to the playing experience.
2	This dark pattern exists and minorly affect the playing experience; it annoys the player but is not that big of a hurdle that they cannot overcome themselves.
3	This dark pattern exists and majorly affect the playing experience; enough to frustrate them into considering seeking external help to play the game (e.g. looking up game walkthroughs, using real money to get power-ups or to skip a challenging level).
4	This dark pattern actively harms not only the playing experience, but also the player's mentality in approaching the game or ones similar to it (e.g. conditions them to rely on in-app purchases whenever they face a difficult situation), or even quitting the game entirely.

2.6. Analysis

After clarifying any ambiguity from the data with the evaluators and conducting further literature studies, the data gathered is then compiled, and a detailed report is composed, consisting of:

1. The mean of each dark pattern's severity ratings.
The severity of the dark patterns found in the evaluated games is determined from a set of ratings from at least three evaluators [17].
2. The percentage of each dark pattern's commonness.
Commonness is different from frequency, one of the factors to consider in severity rating; it refers to the percentage of the evaluators' encounters with a particular dark pattern, and is measured to either contrast or complement the severity of a dark pattern. For instance, if there are five games and five different evaluators, every dark pattern has up to twenty-five chances of being encountered by an evaluator in any given game. Commonness refers to the number of encounters out of those twenty-five chances of it appearing. A dark pattern may be considered severe if it has a severity rating average of 3.5, but it can also be considered rare if it only appears 5 out of 25 times; a 20% percentage of commonness. An

encounter is counted as found every time any evaluator gives a severity rating between 1-4 to any given game in a particular dark pattern, and not found for every 0 severity rating.

3. Pattern analysis on where, when and how each dark patterns appear in the games.

The evaluators' commentaries on the Notes column in the heuristic evaluation form are coded. Coding is a qualitative data analysis method in which a text-based data set is thoroughly inspected in order to generate a generalized group of ideas based on keywords and related concepts [13]–[15].

The data analysis follows these four stages; (1) in vivo coding, where interesting and distinct ideas are noted and are given appropriate labels, or codes, (2) grouping codes into several concepts based on their similarity, (3) transforming concepts into a set of categories based on their relationships with each other, and (4) theory formulation, where all the categories will then be appropriately theorised, and the result would be a list of game mechanics that are used in a particular dark pattern [13].

3. RESULT AND ANALYSIS

3.1. Chosen Games

As of 23rd February 2020, the following are the top-ranked games in the 'Casual' genre in Google Play Store:

1. Little Big Snake (LBS), a player-versus-player (PVP) game in which a large number of players control a snake and try to outgrow everyone by eating various foods scattered across the game arena and by blocking opposing players' path (the game character dies when it bumps to other players).
2. Candy Crush Saga (CCS), a 'match-3' puzzle game [16] in which the player goes through various levels by matching three or more same-coloured candies tiled on top of the variously-shaped game board in order to clear the board using as few moves as possible.
3. Homescapes (HS) and Gardenscapes (GS), also a match-3 game, but with the added mechanic of decorating your house and garden respectively, using the points you accumulated by playing the main game.
4. Township (TS), a city management simulation game in which the player is tasked with the management and expansion of a city by constructing various buildings such as houses, factories, farms. Lewis et al. referred this type of game as a 'Ville type game, derived from its similarity by a game named FarmVille, one of the few games that brought SNG (Social Network Game) to the mainstream [17].

3.2. Chosen Evaluators

The five evaluators chosen are senior-year undergraduate computer science students, who have graduated from their HCI class and have finished the student project associated with it. The evaluators have also played a variety of video games for a total of 10,000+ hours, and have experience in amateur game development.

Their educational background and personal experience equip the evaluators with sufficient technological and game literacy to put them between "regular" and "double" specialist group [13] and should be enough to find ~80% of the dark patterns that are present in the games they are evaluating. The initials that they have consented to be addressed as in this research are AAS, AFH, AFR, MRD, and MRW.

3.3. Evaluation Result

The first data that needs to be discussed is the severity ratings of each dark pat-terns. The ratings should give an estimate of how prevalent the dark patterns are in games evaluated in this research, given that they represent how frequent, impactful, and persistent they are in hampering the playing experience of said games, as previously explained. The result for severity is summarized in Table 3, and the commonness of each dark pattern is presented in Table 4.

Table 3. Severity ratings of each dark patterns

No.	Dark Pattern	Game	Evaluator					Mean
			AAS	AFH	AFR	MRD	MRW	
1. Temporal Dark Patterns								
A.	Grinding	LBS	3	0	3	1	3	1.8
		CCS	2	2	2	1	2	
		HS	2	2	2	1	2	
		GS	2	2	2	1	2	
		TS	3	0	2	2	1	
B.	Playing by Appointment	LBS	0	2	2	0	1	1.44
		CCS	1	1	3	1	0	
		HS	1	1	2	1	2	
		GS	1	1	2	1	2	
		TS	2	1	2	3	3	
2. Monetary Dark Patterns								
A.	Pay to Skip	LBS	3	2	3	0	2	2.16
		CCS	3	1	2	2	0	
		HS	3	1	3	1	3	
		GS	3	1	3	1	3	
		TS	4	3	1	3	3	
B.	Pre-Delivered Content	LBS	0	1	2	1	0	0.52
		CCS	0	1	0	0	0	
		HS	0	2	0	0	0	
		GS	0	2	0	0	0	
		TS	0	2	0	2	0	
C.	Monetized Rivalries	LBS	3	1	0	2	3	0.76
		CCS	2	2	3	0	0	
		HS	0	1	0	0	0	

		GS	0	1	0	0	0	
		TS	0	1	0	0	0	
3. Social Capital-Based Dark Patterns								
A.	Social Pyramid Schemes	LBS	2	1	1	1	0	0.72
		CCS	1	1	0	0	0	
		HS	1	1	0	1	0	
		GS	1	1	0	1	0	
		TS	2	1	0	2	0	
B.	Impersonation	LBS	2	2	0	0	0	0.64
		CCS	2	1	3	0	0	
		HS	0	0	3	0	0	
		GS	0	0	3	0	0	
		TS	0	0	0	0	0	

Table 4. The commonness of each dark patterns

No.	Dark Pattern	Encounter (Out of 25)		Commonness
		Found	Not Found	
1. Temporal Dark Patterns				
A.	Grinding	23	2	92%
B.	Playing by Appointment	22	3	88%
2. Monetary Dark Patterns				
A.	Pay to Skip	23	2	92%
B.	Pre-Delivered Content	7	18	28%
C.	Monetized Rivalries	11	14	44%
3. Social Capital-Based Dark Patterns				
A.	Social Pyramid Schemes	15	10	60%
B.	Impersonation	7	18	28%

3.4. Analysis

Each dark pattern severity rating and commonness are sorted in descending order, as shown in Table 4. Table 5 shows that at most, the evaluators only deem all of the dark patterns to be of a lower-priority usability problem, given that the highest overall mean of the severity ratings is 2.16, and the lowest is 0.52. The result shows that pay to skip and grinding are the most common dark patterns used in popular and profitable casual mobile games. Although both dark patterns have the same commonness, pay to skip has a higher severity rating than grinding.

The game mechanics that are used in each dark pattern are analyzed using coding approached based on evaluators' comments in the notes column. The dark pattern with the highest severity rating, Pay to Skip, using game mechanics Power-ups, Second Chance, Delay Skipping. Power-ups are usually single-use items that give various advantages to the player. While the cheaper power-ups only provide minor conveniences to the player, the more expensive ones grant such a significant advantage that they almost entirely nullify the challenges that the players would typically have to face. These items are usually sold using a premium in-game-currency, that they have to buy with real money [18], [19].

Second Chance is, as the name implies when the game a second chance/life in all of the games that have a specific losing condition. Usually, when the player dies in a match or fails to complete a level, the game offers an opportunity to "play on". Allowing the player to continue playing after they are supposed to lose is essentially taking away half of the challenge that the players are expected to be able to overcome on their own.

Delay Skipping is unique to Township and other 'Ville type of games. The point of these games is constructing buildings and producing resources. All of which are preceded with a proportional delay to the quality of said buildings and resources. To play 'normally', the player would have to pace themselves and frequently check back to the game every so often so that their town could still be productive even when they are away [17]. However, the players can entirely skip these delays, by paying with in-game currency, that once again can be purchased with real money.

As the player advances further into the game, any meaningful progress that can be made is walled with an increasingly substantial amount of delay, and thus paying to skip becomes less of an option and more of a necessity.

Table 5. Result summary

Rank	Dark Patterns	Mean Severity	Commonness	Game Mechanic(s)
1	Pay to Skip	2.16	92%	Power-ups, Second Chance, Delay Skipping
2	Grinding	1.8	92%	Core gameplay
3	Playing by Appointment	1.44	88%	Daily Attendance, Daily Challenge, Daily Draw
4	Monetized Rivalries	0.76	44%	Paid Upgrades, Leaderboard Bait
5	Social Pyramid Schemes	0.72	60%	Referral Bonus
6	Impersonation	0.64	28%	Leaderboard Fear Of Missing Out (FOMO)
7	Pre-Delivered Content	0.52	28%	Starter Pack, Premium Cosmetic

Grinding which emphasis on the player's time commitment on the game over their skill that is usually acquired by actively practicing the game's mechanics [2] is the core gameplay in all of the games mentioned above. The goal and mechanic stay the same no matter how much the player has

progressed in the game. However, the existence of this dark pattern can also be said to be the unavoidable consequence of games of the casual genre. That is, since the gameplay is inherently simplistic, the players would naturally grow to feel that the game is becoming repetitive and even dull the further the game progresses [20], [21].

Playing by Appointment uses game mechanics Daily Attendance, Daily Challenge, and Daily Draw. Daily Attendance is when the game gives the player various rewards when they open it for the first time in a day, be it a power-up (e.g. Candy Crush Saga has Boosters that can help the player clear up a level) or in-game currency (e.g. Coins and Tcash in Township, the former is mainly used to construct buildings, grow crops. while the latter is often used to speed up those processes). The reward is changed every day, and usually the player can only claim one that day. There is usually a reward with much better quality or rarity once the player reaches a particular milestone of attendance, which incentivizes them to open the game at least once every day.

Daily Challenge is when the game gives a challenge to the player in order to gain rewards in addition to the ones that they get from daily attendance. While daily attendance incentivizes the player to simply open the game, daily challenge incites them to play it. Since the challenges are usually simple and easy enough to complete, it can be said that this the game developers' way of 'warming up' the players to play for a short while, to which they may be tempted to keep playing even after they have completed all of the challenges.

Daily Draw is when the game gives a randomized reward to the player every day. The visual varies from game to game, some use chests or crates, some uses a spinning wheel or slot machine, but the primary purpose is to draw out the player's gambling-like behaviour [22].

All forms of Playing by appointment prods the players to make some sort of appointment with the game. However, one critical point to consider is that all of the rewards presented to the players using the above methods are not integral to the progression of the game. While it is true that some levels in some of the games are hard to the point that most players would resort to using said rewards. It is still entirely possible to beat them conventionally, which is why the mean severity is relatively low.

The fourth rank dark pattern, Monetized Rivalries, utilizes paid upgrades and leaderboard bait. Paid Upgrades is when the game sells certain upgrades to the player's character that can give them a competitive advantage against others who do not buy them. This mechanic exists almost exclusively in PVP games, and it strikes an imbalance in a game that should solely base the outcome of its matches on the players' skill, not their financial investment in the game [23], [24].

Leaderboard Bait is when the game shows a leaderboard to tempt players to buy previously mentioned game mechanics (e.g. Power-ups and Second Chance) so that they can rank higher in the said leaderboard. This mechanic can spur rivalries in even a non-competitive type of game [25]. The evaluators found that these competitive elements to be of little importance to their enjoyment in playing the games, which is reflected in the mean severity.

Referral Bonus that is used in Social Pyramid Schemes is when the game offers various rewards to the player by inviting their friends also to play the game. However, the evaluators found that these bonuses are relatively minor and are thus not tempting to the players, which is why the mean severity is low.

Impersonation dark pattern uses Leaderboard FOMO is when the game uses the players' real-life social relations in the form of the leaderboard in order to trigger their FOMO tendencies [22], [26]. The aim is that by showing familiar people in the game, the players would be more inclined to be more active in the game from the fear of being left out.

Pre-Delivered Content uses Starter Pack and Premium Cosmetic game mechanics. Starter Pack is when the game offers the players a way to unlock a multitude of power-ups and bonuses right from the beginning by paying a certain amount of in-game-currency, something which would generally require playing the game for a few hours to unlock. Premium Cosmetic is when the game sells decorative elements in the game (e.g. a character “skin” or a custom game avatar) using real money through in-game currency. This mechanic usually exists in PVP games, where players have a better incentive to differentiate themselves from others in the game. Both of these mechanics provide little to no actual mechanical advantage to the player, which becomes the reason that the mean severity is low.

4. CONCLUSION AND FUTURE RESEARCH

Using heuristic evaluation, this research has documented the occurrence and the prevalence of dark patterns in casual mobile games. While the evaluation process failed to unveil a new type of dark pattern in game design, the details in which when, where, and how a particular dark pattern is employed could give an insight on the common behaviour of a particular pattern and can be used as a basis on a future discussion on ethical game development, as well as predict future game design trends that can potentially be used for malicious purposes.

Given the sample size of the games evaluated in this research and the evaluators involved, it is recommended that future research include more evaluators or include evaluators with higher qualifications in order to produce a more accurate and insightful result, as well as widen the range of the sub-genre of the games that are going to be used as the research object. Lastly, the heuristic evaluation used in this research is only one of many usability evaluation techniques out there, and future research could use a different approach or even combine multiple alternative methodologies if additional resources are available.

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