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Dark patterns in games: how do they influence players' experiences and their willingness to give up personal information?

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Abstract

Dark patterns are designs that use behavioural psychology to influence customers into making decisions that are not in their best interests. Dark patterns are widespread in online spaces, cookie pop-ups, web stores and social media. This phenomenon has also spread to video games, where dark patterns are used for various purposes to the benefit of the developer/publisher and the detriment of the player. In this thesis, we explore whether these dark patterns disturb the underlying objective of games, to make people have a positive experience. Do dark patterns in games affect player enjoyment? Do dark patterns influence a player's willingness to give up personal information? We tried to find this out through an online experiment. We made a game with two versions, one with and one without a dark pattern that asked users to fill in their email addresses to skip a video advertisement. We let two groups of participants each play one of the two versions of the game. After this, the players were asked to fill in a survey to determine whether the dark pattern affected player enjoyment and whether they gave up their email addresses. From the results of the experiment, no evidence was found that suggests this was the case. On average people who played the game with the dark pattern did not enjoy the game less than people who played the game without the dark pattern, and only 1 out of 22 participants who encountered the dark pattern filled in their email address. We believe that these results can partly be attributed to the limitations of this research. We only had a low amount of participants and the distribution between the groups was skewed. This may have led to unrepresentative results. We suggest repeating this experiment with a more professional game and a larger amount of participants, this setup would lead to more reliable results.

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Chapter 1 Introduction

Most games are supposed to be a positive experience for the player, whether this is by providing a fun time, serving an educational purpose or even as thought-provoking art. However, just like websites, games are occasionally plagued by something known as dark patterns, which could lead to the game being less fun and potentially even more unintended and dangerous consequences. Dark patterns are user interfaces that knowingly confuse users, make it difficult for users to express their actual preferences, or manipulate users into taking certain actions [17]. These dark patterns are often used to benefit the designers of the dark patterns and the company that use them.

There are examples of these dark patterns both in the real world and in the online space, although they seem to be more prominent in the latter. An example of dark patterns online is often found in Cookie prompts on websites. In these instances, a design strategy is used to make it much easier to agree to cookies than to disagree. This is done by hiding the disagree button or putting it behind difficult options. Now many studies about dark patterns go into dark patterns in online retailers or E-commerce. This is however not the only online space that has dark patterns.

Dark patterns also appear in games and have been researched in this context by Zagal, J., Björk, S., & Lewis, C. (2013) [36]. Their paper presents a multitude of dark patterns that are common in video games. In their paper, the researchers define dark patterns as patterns used by game designers to intentionally cause a negative experience for the player that is both without their consent and is against their best interests. An example of a dark pattern in games is called "Pre-Delivered Content". This pattern is defined as a game having certain content that is already included in the game files/executable at the time of purchasing it, but this content is only available after the user pays an extra amount of money. An example of this pattern given in [36], is the game Streetfighter x Tekken, where the player had to pay an extra fee of 20\$ to unlock characters that were already in the game files. In certain games, dark patterns are used to extract personal information such as a player's email address, age and name. In the game Coin Master on the google play store (see chapter 3.1), for instance, the player is repeatedly asked to log in to the game, purely for rewards. This game does not require your information to function, but it attempts to get your information nonetheless.

Dark patterns make use of behavioural psychology and are closely related to a tactic called nudging. Nudging is the practice of altering people's behaviour predictably without excluding any options or significantly changing the user's decision [23]. Nudging is very prevalent in our lives, both in the online space and in the real world. An example of nudging in the real world is putting fruit at eye height in supermarkets to make it more appealing to customers. In an online space, nudging may be used to remind students to enrol for their courses and exams through email.

As can be determined from these examples, nudging is used to benefit the end-users or society's welfare and well-being. This is where the main difference between dark patterns and nudging can be found. Nudges try to alter people's decisions for their benefit, whereas dark patterns try to alter people's choices for the designer's or company's benefit and often at the user's expense. To use the online example from before, nudging may be reminding people to enrol for classes or keep active, dark patterns may remind people to purchase something they were interested in or make it difficult to cancel a subscription.

1.1 Motivation

Scientific motivation

Research papers on dark patterns in video games certainly exist, but not much research has been done on the effect of dark patterns on players of these video games. Most of the existing research focuses on categorising and specifying the varying kinds of dark patterns in games [36]. However, not so much is known about how dark patterns affect the player's experience or willingness to give up personal information. This willingness to give up personal information has been researched for dark patterns in general [2], but in a gaming context, it has yet to be extensively researched. The effect of dark patterns on a player's experience, and their willingness to give up personal information are the things we mean to find out in this thesis.

Societal motivation

Dark patterns carry risks with them in many contexts [2], so it would stand to reason that they could also lead to risks in video games, especially considering that there are about 3.2 billion video game players in the world according to Statista [29]. If dark patterns do indeed pose an increased risk of players giving up personal information, it could lead to a large number of dangerous consequences.

1.2 Area

The area of this thesis is two-sided. Dark patterns can certainly be viewed as a part of the security field as they can make players give up vulnerable personal information. However, because dark patterns are designs built on knowledge of behavioural psychology, they are also part of the Human-Computer interaction field. In this research, we hope to combine these two fields into one in this thesis by both looking at a player's willingness to give up their data and the way they experience the game.

1.3 Hypothesis

The research questions we are looking at are:

1. What is the influence of dark patterns in video games on a player's enjoyment?

2. What is the influence of dark patterns in video games on a player's willingness to give up personal information?

For the first research question, we choose to split up the term enjoyment into 7 different factors, as is done in the Questionnaire of TU Eindhoven [14]. For each factor, we will specify our expectations.

Tension

This factor determines frustration and annoyance. We expect that a dark pattern will heighten frustration and annoyance with the game, thus increasing tension. The hypothesis for this factor of enjoyment is that those who play a game with a dark pattern will have a higher tension score.

Positive Experience

This factor determines general positive feelings toward the game. We expect that a dark pattern will muddle positive feelings and lead to a less enjoyable experience overall, thus lowering a player's reported positive experience. Our hypothesis for this factor is that those who play a game with a dark pattern will have a lower positive experience score.

Negative Experience

This factor determines general negative feelings toward the game. We expect that a dark pattern will induce negative feelings in players, either from previous experience or other sorts of negative associations with dark patterns. This will increase the negative experience score. Our hypothesis for this factor is that those who play a game with a dark pattern will have a higher negative experience score.

Immersion

This factor determines the feeling of immersion in a game, total attention and deep mental involvement in an activity. We expect that a dark pattern will take a player out of the game they are playing, messing up this mental involvement. Therefore, we expect that adding a dark pattern to a game will make the player experience lower amounts of immersion. Our hypothesis for this factor is that those who play a game with a dark pattern will have a lower immersion score.

Flow

This factor determines the flow of the game, and how every element of the game goes over into the next one. This may be heavily affected by a dark pattern thrown in the middle of it. We expect that a dark pattern will result in a break of flow and thus a lower experienced flow among the players. Our hypothesis for this factor is that those who play a game with a dark pattern will have a lower flow score.

Challenge

This factor determines the difficulty of the game, and how challenging a player found it. We do not expect this to be affected by the dark pattern at all, since a dark pattern does not increase or decrease a game's difficulty. We still choose to do some exploratory research on this topic due to the scarcity of knowledge on the topic.

Competence

This factor determines how competent someone felt while playing the game. We do not expect this to be affected by a dark pattern as you do not need to be more or less competent in dealing with a dark pattern in a game. We, therefore, expect there not to be a difference in competence scores among players. Similarly to the Challenge factor, we did some exploratory research on this topic because not much is known about it.

Giving up personal information

Our expectations for the second research question are slightly more easy to determine. Since a dark pattern uses behavioural psychology to affect a consumer's behaviour, we do expect that players that encounter a dark pattern that is designed to make them give up personal data are more likely to give up personal information. Therefore, our hypothesis for this research question is that players that play a game with a dark pattern will more easily and frequently give up personal information.

1.4 Overview

This thesis consists of 6 different chapters, the first of which is this introduction chapter. After this introduction, we go into related works. We look at what research has been done on the topic before, reviewing relevant papers that can help us answer our questions and shape our study. We go into papers related to dark patterns and those related to the enjoyment of games. After this, we go into some real-life examples of dark patterns in games, by reviewing several games from the google play store. We identify the dark patterns apparent in these games and we categorize them. Next up we describe in detail how we performed the experiment, going into the design of the experiment, the participants and the apparatus used. This chapter is finished with a description of the procedure of the experiment. We continue by describing the achieved results, going into detail about the various factors of enjoyment, and willingness to give up information. After the results, we end this paper with the discussions and conclusions. Here we look at the results and draw conclusions from them. We also look at what went wrong or what could have gone better in this research and we give suggestions for future research.

In the end, we hope this research contributes to the scientific world by providing a repeatable experiment that can measure enjoyment and willingness to give up information between a game with a dark pattern and a game without a dark pattern.

Chapter 2

Related Work

In this chapter, we go into research that is relevant to our study and may help us in answering our research questions. We first look at papers on dark patterns, then we look at papers on enjoyment in video games.

2.1 Dark patterns

This thesis is about dark patterns, specifically those in video games. In this section, we will look at some previously discovered dark patterns that are related to our study. Since our thesis is concerned with the enjoyment of games and giving up personal information, those are the patterns that we will focus on here. We start by listing a few dark patterns in video games that mostly affect enjoyment. These dark patterns are documented in a paper by J. Zagal, Staffan Björk and Chris Lewis [36]. After this, we discuss some dark patterns related to giving up personal information. These are perhaps even more malicious than the first category since instead of just time and enjoyment, breach of privacy and data leakage is a serious risk with these dark patterns. We will also have a look into the relation between children's rights and dark patterns. Finally, we go over some of the other forms of media that contain dark patterns and see what similarities can be found between the different contexts.

2.1.1 The dark patterns in games website

The website darkpatterns.games [6] provides an extensive overview of dark patterns in games, with a large number of examples for each pattern. This website uses a lot of references and resources that are used in this thesis, such as the paper by J. Zagal, Staffan Björk and Chris Lewis [36]. This website presents its users with a list of games to avoid, and a list of games that are free of dark patterns, so they can play these games without worrying about being manipulated. However, the website does not go into the effect of dark patterns on players. The effect of dark patterns on enjoyability is only mentioned very briefly and proposes that enjoyability is not hampered by dark patterns. The website also does not mention any information on dark patterns encouraging players to give up personal information. We hope to provide insights into to effects of dark patterns on a player's experience and willingness to give up personal data.

2.1.2 Dark patterns in video-games

We will look at three categories of dark patterns in games as defined by the paper by J. Zagal, Staffan Björk and Chris Lewis [36]. Temporal dark patterns affect the time a player spends on a game. Monetary dark patterns focus on getting a player to spend more money. And finally, social dark patterns influence players by using their social bonds and connections.

Temporal dark patterns

We go over two temporal dark patterns, namely Grinding and Play by appointment. Both of these dark patterns make players spend more time on the game than they should need to, against their best interest.

Grinding Grinding in the most basic sense is doing a very repetitive thing over and over again to gain in-game benefits. This takes the skill out of a game and replaces it with time spent. This leads to advantages for players that have more time to spend in-game. Not only does this present a less enjoyable time for players who have little time to play, but it also almost requires players to spend an exorbitant amount of time in the game, where this should not be necessary. This pattern is prevalent in many online games. An example that we have found of this pattern is part of the game *Monster Hunter World* [3], where the player defeats increasingly difficult and interesting monsters. These monsters however provide in-game rewards that can be used to create better weapons and armour. This would be fine except for the fact that you often have to defeat the same monster over and over again to get enough of its rewards to do anything useful. This becomes boring fast, but it is almost necessary to upgrade your arsenal to continue the game.

Play by appointment This pattern only allows players to play the game when the game allows it, not when the player wants to play. It does this by making certain resources only available at certain times, or by putting long timers on simple tasks. Games that we have found that contain this kind of pattern are for example *Sim City Buildit* [19] and *Clash of Clans* [31]. In *Sim City Buildit* you are required to build your own city using resources. These resources are not gained by skill or any action, but solely

by waiting. When you then get these resources and attempt to build a building, you must again wait for the building to be completed. *Clash of Clans* the progress is similar, try to build and expand your clan by using resources to build and upgrade buildings in your clan. Again you must wait for resources to be generated and for buildings to be created. An example of this can be seen in figure 2.1. We think that this pattern provides an annoying and long experience where you feel like you have little control over anything as the player. Every action makes you wait and the only way to speed this up is to pay real money (discussed in Monetary Dark patterns).

Туре	Resource	Total	Time
	🔘 Gold	746.99M	Total: 31mo 2d 7h
Structures	6 Elixir	118.5M	With 3 builders: 10mo 10d 18h
	elixir	97M	Total: 5mo 12d 0h
Lab	o Dark Elixir	1.23M	
1	o Dark Elixir	4.72M	Total: 5mo 10d 0h
Heroes	6 Elixir	90M	
Pets	🕜 Dark Elixir	7.29M	Total: 7mo 0d 0h
	Gold	7.65M	NI/A
Walls	6 Mixed	1.04B	11/7

Figure 2.1: This is an image showing the waiting times in clash of clans, an example of the play by appointment pattern.

Monetary dark patterns

We go over 3 monetary dark patterns: Pay to skip, Pre-delivered content and Monetized rivals. All of these dark patterns try to extract money from players.

Pay to skip This pattern allows players to forgo gameplay or challenges by paying money. This pattern is very grating and one of the most malicious. A very prominent example is clash of clans, whereas a way to forgo the wait

imposed after building something, you can pay real money. This pattern often coincides with either play by appointment or grinding as it allows players to skip these patterns by paying money. It can be used properly when a game is very long (not necessarily because of grinding) and has some endgame content that you may want to get to. From personal experience, we have found that this is the case for *Final Fantasy 14* [8]. This game is about 100 hours of base playtime before starting the newer content. In this game, the new content is very highly rated and awarded and thus the developers gave players an option to pay money to get to these quests without having to play the base game. We still consider this to be part of a dark pattern, as you could put this in for free, but there is some nuance to the level of maliciousness in this pattern. Another example can be seen in figure 2.2. In Clash of clans [31], a player can skip the waiting times mentioned in play by appointment section, by paying premium currency.



Figure 2.2: You are able to skip the waiting time by paying with premium currency, that can only be obtained by paying money

Pre-delivered content This pattern is put in by developers to make players pay for content that is already in the game. This is different from games that let players unlock content by actually playing the game, as this is natural and positive in most cases. If the content is already in the game, and unable to be unlocked without paying for it, we define it as a Pre-delivered content pattern. Although the pattern as a whole is less prevalent in recent times, we have found an example. *Total war: Warhammer* [5] is a real-time strategy game where varying fantasy races fight wars with each other. The player picks a race and tries to conquer the world with it by developing its economy and its armies. Playable races are very important in this game and most updates and expansion packs are focused on bringing more of these into the game. When this game came out, however, money had to be paid to unlock a certain race that was already in the game when it came out. We feel that making players pay for something that is really already in the game files is a malicious and unnecessary practice.

Monetized rivals This pattern is more commonly known as pay-to-win, a phenomenon that makes paying real money necessary to win. Most examples of this are in games that present themselves as fair and skill-based, but under the hood, it is most certainly not and is in fact money-based. A prime example of this is *Clash Royale* [32], a mobile game where players assault other another player's castle with a collection of units. These units can be upgraded to perform better (more health points, more damage to structures or other units) by playing the game and getting lucky with the chests that you get when winning matches. That is, until certain levels, after this you would need to grind and play so much of the game that it is unrealistic to assume anyone could do this. Instead, you can pay real money to buy chests and upgrade points for characters. This gives players that have more money a massive advantage in a competitive setting.

Social capital-based dark patterns

We go over 2 social capital-based dark patterns, Social pyramid scheme and impersonation. These use the players connections and social bonds to either get them to recruit more players or to make players do things because they feel pressure from their peers.

Social pyramid schemes This pattern is very similar to the monetized rivals pattern, but it is not based on competition but on the ability to pay the game properly. A player, instead of relying on their skill or personal ability, has to invite friends and other people to progress through the game. We have found an example of this pattern in the game *Hearthstone* [9] (see figure 2.3), this is a card game where you play against other players. *Hearthstone* provides its players boosts and advantages when inviting their friends to play the game.



Figure 2.3: A picture of Hearthstone where rewards are offered for recruiting friends

Impersonation This pattern makes use of the player's naivety and desire for social validation. A game pretends to be another player (often a friend) and interacts with you for the benefit of the developers. We could not find a suitable example of this pattern ourselves.

2.1.3 Dark patterns involving personal information

In this section we will go over 5 dark patterns that try to influence consumers to give up more personal information than is necessary for the product to be functional. We go over Privacy Zuckering, Bad Defaults, Forced Registration, Hidden Legalese Stipulations and Immortal accounts. These dark patterns are not presented in the context of games because this phenomenon has been researched more in the context of social media and e-commerce. The patterns in this section were presented in a paper by Christoph Bösch, Benjamin Erb, et al. [2].

Privacy Zuckering

This pattern entails the over-complication of privacy settings, which makes users less likely to adjust them to their preferences. This often leads to poor privacy for the users, often without their intent or even knowledge. The most prominent example is Facebook [21] (hence the name) [2], which made users change multiple pages of complicated settings to get their privacy settings to align with the user's wants.

Bad Defaults

This is a very well know pattern where the default privacy settings of a service, website or application are poor for the user's privacy of data. Often this is used in combination with Privacy Zuckering in order to have the highest chance of the user just giving up and choosing the service's suggested settings. As the article states [2], this makes users share more information than they intend to or thought they would. An example of this is certain online social games, where the default settings often make it so that other players can see your country, age or even full name.

Forced Registration

The name of this pattern speaks for itself, a user is forced to register and sign up for a service. This is very often unnecessary and always leads to unneeded data ending up in the service provider's hands. Often users just make the account to get access to the service and forego the changing of their privacy settings, in which case bad defaults plays an additional role here. An example given by the article [2] is Quora.com [28], a website that users can post questions on and other users can reply to. For viewing content on this website, it is not necessary to give Quora information and yet they require you to make an account and log in.

Hidden Legalese Stipulations

This pattern attempts to trick and manipulate users by throwing in a lot of difficult legal terms in the terms and services. Now often legal terms are required to provide a decent overview but this is hard to read for an average user. Some service providers exploit this phenomenon by putting in weird and malicious stipulations which may make users provide more information without their knowledge. An example given by the article [2] is about an English company GameStation [10] who put in a clause in their terms of services as an April fools joke. The clause makes users sign over their "soul" to the company. Now obviously this is a joke, but this shows how far a company can go with their terms of services.

Immortal Accounts

This pattern is used by service providers to keep their user's accounts for as long as they want. In some cases, this is done by making the accountdeletion process incredibly difficult or even impossible. Deleting an account from Facebook [21] takes multiple steps and a long waiting period before it happens, and this is far from the only example [2]. This pattern allows companies to hold on to all your data for as long as your account persists.

2.1.4 Children and dark patterns in games

Just like adults, and maybe even more so, children play video games. This also means that children can come into contact with dark patterns that can affect their behaviour. A paper written by Simone van der Hof, Stijn van Hilten, Sanne Ouburg, Max V. Birk and Antonius J. van Rooij [11] goes more into this relation between behaviour-altering game design and its exposure to children. Although Simone van der Hof et al. do not use the term dark pattern in their paper and instead opt for negative or exploitative game design, the context is similar and both terms come down to the same thing: a design choice that influences players to make choices that are not in their best interests. The authors of the paper present 5 distinct game design choices that are negative and exploitative for children. These design choices are bad enough when applied to adults, who have their own money and fully developed minds. When they are applied to children it borders on economic exploitation, as children have rights determined by the UN children's rights council [11] that are breached by a lot of these practices. This abuse of design and behavioural psychology is exactly why the effects of dark patterns need to be researched. The designs in question are summarized below. The proceeding information about these designs is based on the paper by Simone van der Hof et al. [11].

Subscription models

This design choice asks a player to pay a certain amount of money at a specified time interval. This leads to consistent revenue for the company employing this design. Children may be more inclined to stick to their subscription because they don't want to lose the social environment a subscription-based game provides.

Free to play games

This design practice provides players a base game for free, but includes ingame purchases or other costs. When a game is presented as free to play, but includes other (sometimes required) costs, this is considered misleading commercial practice. Costs do not always have to be monetary, as some free games require one to give up personal data to play the game. Children often don't have their own expendable money, this leads them to gravitate more toward these types of games, and are thus targeted by the hidden costs of these games. An example of this design that we discovered is *Clash of Clans* [31], where the game is free to play, but players are heavily encouraged to pay for in-game currencies or items.

Microtransactions

This design is often used in conjunction with free to play games (see above) and is often used as the hidden costs for those types of games. We have found that sometimes the pay to skip pattern (see above) [36] is used to seduce players to purchase these micro transactions. Similarly, we have found that a play by appointment pattern (see above) could be used to annoy players

with long waiting times that can be skipped by using premium currency. Due to the low individual cost of most microtransactions, children may be more easily convinced to purchase something. The marketing and constant pushing of a large number of small transactions does not stop after buying one and may lead children to purchase even more.

In-game currencies

These currencies are used in the context of the game to provide players with certain advantages. Sometimes players obtain bonuses in the game, or they are able to skip certain gameplay elements. This design is used in many games to hide the actual costs of in-game items. A child especially may be more inclined to purchase an in-game item for 200 "game-bucks" than they would be to purchase something for 20 euros. An example of in-game currencies that we have found can be seen in figure 2.2 above.

Loot boxes

Loot boxes are a form of gambling in games. They are often bought with money or in-game currencies and contain randomly selected items. Because the cost of the box is unrelated to its contents and the contents are random and not shown before buying, this is considered gambling. Gambling for children is illegal and this has led loot boxes to be banned in several countries.

In-game Advertisements and Product Placement

When gameplay and commercial purposes are intertwined, gamers are more likely to make transactions. This is considered misleading and unfair commercial practice. The same goes for product placement, especially when it is not communicated to the player transparently. We expect that when the player is a child they may not be able to tell advertisements from gameplay elements and may suffer more from this practice.

2.1.5 Dark patterns in other contexts

Dark patterns have been researched in many different contexts. Although we focus on dark patterns in games, it may be useful to look into the research of dark patterns in other contexts as well. In this section, we go over two papers that present their findings on dark patterns. One paper written by Arunesh Mathur et al. [18] looks at dark patterns on webshops. The other paper written by Linda Di Geronimo et al. [7] looks into dark patterns in mobile apps.

Shopping websites

Video games and shopping websites are quite different, but they do both contain dark patterns. As shown in a paper by Arunesh Mathur et al. [18], dark patterns in shopping websites are very prevalent. The authors of this paper looked at 11k shopping sites and investigated the presence of dark patterns. Out of the 11k websites investigated, 1254 websites contained a total of 1818 dark patterns. If the results of this paper are extrapolated, this means that more than 10% of shopping websites contain a dark pattern. Another interesting result suggested that the more popular the shopping website, the more likely it contained a dark pattern.

Mobile applications

Mobile applications and games are slightly more related than games and shopping websites. This is because there are a lot of games that are mobile applications. A paper written by Linda Di Geronimo et al. [7] analyzed 240 mobile apps for the presence of dark patterns. This analysis resulted in an extremely high percentage of 95% of the analyzed apps containing dark patterns. Similarly to shopping websites, the more popular the mobile app, the more dark patterns it contained. An average of up to 7 different types of dark patterns was found among the most popular of the analyzed apps. This prevalence of dark patterns in something that is related quite closely to games is concerning, especially since some of the apps analyzed in the paper were mobile games. If dark patterns are this prevalent in mobile apps, it may be interesting to find out if a similar level of prevalence is present in video games.

2.2 Video Game Enjoyment

A major part of our thesis is about the enjoyment a player gets out of a game, and the influence of dark patterns on enjoyment is one of the two main questions. But how is enjoyment in games defined? And how is it measured? These are questions that have been researched before. We will go over several papers concerned with the enjoyment of video games and we will analyse how this information can be of use to us.

2.2.1 How is enjoyment defined?

We keep talking about enjoyment in games, but what is enjoyment? Having a good definition of enjoyment might be quite useful. One definition is provided by Elisa D. Mekler, Julia Ayumi Bopp et al. who carried out a large quantitative study [20] that looks at 87 different studies on game enjoyment and its effect on player experience. The definition of enjoyment given in this paper aligns well with how we view and apply enjoyment in our thesis. The authors define enjoyment as the positive cognitive and affective appraisal of the game experience. They also find that enjoyment is associated with the need for satisfaction and the absence of guilt.

2.2.2 Evaluating player enjoyment

We focus on two papers that were of interest to us in this category, both using different methods to evaluate a player's enjoyment. One is described in a paper by Penelope Sweetster, Peta Wyeth, et al. [33] and shows us a clearcut evaluation form that can be used to properly measure a participant's enjoyment of a game. An example is given to describe the difference in enjoyment between two RTS (real-time strategy) games, but it can be used for other genres as well (though not all genres fit all sections).

Another very useful paper is written by IJsselsteijn, W. A., de Kort, Y. A. W., Poels, K. from University of Eindhoven [14]. This is a questionnaire with very clearly divided modules. One of these modules, called the core module, is a list of questions that encapsulates a player's enjoyment of the game. This enjoyment is divided into 7 clear categories, which makes this questionnaire perfect to use for our purposes. The categories are positive game experience, negative game experience, tension, flow, immersion, competence and challenge.

2.2.3 What influences enjoyment in games?

We now have a working definition of enjoyment, and a solid way to measure enjoyment. But what influences enjoyment in people as they play games? A paper written by Morris B. Holbrook, Robert W. Chestnut et al. [12] addresses this question. In their study, an experiment is performed where participants play a game in various ways. One person would have to play a game for a determined amount of time, another would have to finish the game a determined amount of times, some played it for the first time, some after playing it for a while. The participant's reactions were captured and turned into multiple conclusions. First, people who use verbal or visual cognitive styles appreciate games with a similar style (someone who thinks very visually will appreciate a very visual game more). And second, people enjoy games more as they become better at said game.

In a paper written by Marc Prensky [27], he defines twelve elements that he believes make gaming the most engaging of past times. We will give a short overview of the twelve elements as they can help us get a better idea of what makes a game enjoyable. The twelve elements that create enjoyment in games as presented by Marc Prensky:

- 1. Games are a form of fun. That gives us enjoyment and pleasure.
- 2. Games are a form of play. That gives us intense and passionate involvement.
- 3. Games have rules. That gives us structure.
- 4. Games have goals. That gives us motivation.
- 5. Games are interactive. That gives us doing.
- 6. Games are adaptive. That gives us flow.
- 7. Games have outcomes and feedback. That gives us learning.
- 8. Games have win states. That gives us ego gratification.
- 9. Games have conflict/competition/challenge/opposition. That gives us adrenaline.
- 10. Games have problem-solving. That sparks our creativity.
- 11. Games have interaction. That gives us social groups.
- 12. Games have representation and story. That gives us emotion.

Marc Prensky goes on to specify that not all games have these elements, but that when they do, they become much more enjoyable. This paper gives an overview of the elements that affect enjoyment that aligns with our perception of enjoyment.

2.2.4 Forgoing enjoyment

This thesis focuses on enjoyment in games and its importance to game experience. But what if a designer purposefully forgoes this convention that games should be enjoyable? A paper written by Douglas Wilson and Miguel Sicart [34] explores this topic. They put forth the idea that in a world of conventional and conservative game design, a game that tries to go against this can lead to a deeply personal experience. They propose that a game does not need to be enjoyable to be a worthwhile experience. It also highlights that a game that counters the conventional focus on enjoyment and instead tries to apply a more "abusive" [34] design, can lead to a more intimate relationship between gamer and designer. This paper shows that enjoyment in games is not all-important. The abusive game [34] design that Douglas Wilson and Miguel Sicart talk about does not exploit the player, which is what dark patterns attempt to do [11].

Chapter 3

Review of dark patterns in games

We have talked a lot about dark patterns; we have defined them, looked at theoretical examples, and seen how they can affect a consumer. But what do these dark patterns actually look like in a game? In this chapter, we look at ten different mobile games from the google play store. We determine whether there are dark patterns in these games and if so, which ones. These games were the top 10 most profitable games in the google playstore on 20-11-2021.

3.1 "Coin master"

Coin master [1] is a game where you move from place to place and build your village. This requires coins that you get through spinning a big wheel. This wheel has a limited amount of spins, and you get 5 every hour. This is an example of a play by appointment dark pattern [36], waiting to play again because you don't have enough money to build anything. In figure 3.1, we see two dark patterns being combined. The game asks me to pay in order to skip the wait. This combines elements of pay to skip, as we skip a game element (waiting), and play by appointment, as we have to wait for a certain time.

In figure 3.2 it can be seen that we encountered frequent pop-ups asking us to log in to Facebook [21] and connect the game with it, either for rewards or to brag on Facebook. This could be considered a form of forced registration [2], but since players are only heavily encouraged, we will not classify it as such. In the figure 3.3 *Coin master* asks us to invite friends for rewards. This is an example of the social pyramid scheme dark pattern [36].



Figure 3.1: Combination of pay to skip and play by appointment

0
 ✓ Get 20 tree spind ✓ Get 10 tree spind
 ✓ Play with friends! ✓ Save your progress!
We won t post without your permission

Figure 3.2: Asking to connect to facebook again



Figure 3.3: Offering rewards for inviting friends, like a social pyramid scheme pattern

3.2 "Candy crush saga"

Candy crush saga [16] is a classic in mobile gaming. There is a grid filled with differently coloured candies, swap the candies on the grid to get 3 in a row of one candy and you get points. The dark pattern comes in when you lose. As can be seen in figure 3.4, you have an option to continue playing or to lose a life. Continuing to play costs real money, whereas losing a life will

eventually lead to having to wait half an hour for lives to regenerate (see figure 3.5). This is again an example combination of play by appointment and pay to skip.



Figure 3.4: Combination of pay to skip and play by appointment



Figure 3.5: Heart in the top right corner indicating a play by appointment pattern

3.3 "Garden scapes"

Garden scapes [24] is almost exactly the same as *Candy Crush*, but it has a different skin and a different context. Both the gameplay and the dark patterns are nigh identical. In figure 3.6 the same combination of pay to skip and play by appointment [36] can be seen. Lose a life (which needs time to recharge) or pay money to continue.



Figure 3.6: Combination of pay to skip and play by appointment

3.4 "Pokemon go"

Pokemon Go [22] is an augmented reality game. In the short time that we played we did not encounter the same combination of pay to skip and play by appointment pattern [36] that we did in previous games. There was a design choice when accepting the privacy policy that we would consider to be a dark pattern, as the accept button was much larger and more colourful than the button that lets players actually read the privacy policy (see 3.7).



Figure 3.7: The privacy policy button is much smaller and less prominent than the ok button

3.5 "State of survival"

State of survival [13] first shows itself as a zombie kind of tower defence/plants vs zombies kind of game but it soon lets you know that it is a camp/town builder similar to *Clash of Clans* [31]. In the same fashion, the main dark pattern that appears is having to wait for buildings to get built. In the intro/tutorial, the waits were short but like most games, this ramps up rather quickly, to the point that you have to wait hours to build or upgrade a building. As an alternative to waiting, you can pay for the building directly. So similar to *Candy Crush, Coin Master* and *Garden scapes*, the dark patterns pay to skip and play by appointment are combined [36]. An example can be seen in 3.8



Figure 3.8: State of survival example of a combination of pay to skip and play by appointment

3.6 "Homescapes"

Homescapes [25] is by the same people as Garden scapes. These two games are almost identical, in gameplay, look and dark patterns. Just like in Garden scapes [24], in Homescapes, you play a candycrush-like game [16], where you use points you get from completing levels to build your home. When you lose you get a chance to get back into the game (see figure 3.9), but when you don't have enough points you can spend real money on it. The decline button is very small. When you do decline, you lose a life. Only one life re-spawns per half hour so if you don't pay the money you eventually have to wait to play again. Another example of pay to skip combined with play by appointment [36].



Figure 3.9: Homescapes example of a combination of pay to skip and play by appointment

3.7 "Governor of poker 3"

In Governor of poker 3 [35], you play poker with people online. You can spend real money to buy chips in-game, but you can get no money from those chips. There is a spinning wheel where you can win some free chips but not that many. The ethics of a mobile gambling game aside, when you have no more chips you must pay or get extremely lucky with wheels of fortune. This is a sort of play by appointment [36] since you are not able to play until you win the wheel of fortune, which takes a long time.

3.8 "Roblox"

Roblox [4] is a game where people make their own games for people to play. As far as dark patterns go they are nearly non-existent, there is a store where you can buy cosmetics for Robux (that you buy with real money) and there is a premium membership with a couple of exclusive levels. But it does not push to buy this membership and there are more than enough games and cosmetics for free to be entertaining for a long time.

3.9 "Huuuge casino slots vegas 777"

Huuuge casino slots vegas 777 [Huuuge casino slots vegas 777] is another gambling game, you play slot machines and other gambling games in the hopes of winning in-game chips. These chips can be bought for real money but not sold for real money. Some pop-ups ask the player to log in with Facebook [21] in order to get a reward, and the decline button is very small (see figure 3.10). This could be considered a forced registration pattern [2], but since players are only heavily encouraged we will not count it as such. There is also a similar wheel of fortune that requires you to be extremely lucky (similar to Governor of poker 3 [35]).



Figure 3.10: Casino slots vegas 777 facebook registration

3.10 "Township"

Township [26] is a game where you run your own farm. You have a farm where you plant and gather crops, milk cows and build buildings. All these things take time, building a first-level bakery takes 20 minutes, or is completed instantly when you use the secondary in-game currency that you have to buy with real money. This is similar to the State of survival game, where you have to either wait for buildings to be completed or pay to progress. This is a classic example of the play by appointment pattern and the pay to skip pattern combined [36]. At the start (when timers are still low) you are sometimes forced to use your premium currency for buildings (see figure 3.11).



Figure 3.11: Township

3.11 Summary of review of dark patterns in games

In the review above, a couple of dark patterns stood out. The two most notable ones were play by appointment and pay to skip. The interesting thing is that these two patterns were very often combined. This presented itself mostly in the form of a punishment-based dark pattern, where a player has the choice between paying money or waiting. Figure 3.8 shows this combined pattern, that we will from now on call "pay or wait". A player can either use premium currency or wait a certain amount of time before their building is completed. Another common occurrence in these games was a registration pop-up. The game presented the player with a popup, asking them to register in exchange for rewards. This is a very mild example of forced registration [2], where players are heavily encouraged to give up personal information (their Facebook [21] account). Because of the commonness of these two patterns (registration pop-up and pay or wait), we ended up using a similar design for our own dark pattern (see 4).

Chapter 4

Method

In order to answer our research questions, we have designed and created an online experiment. In this experiment, participants were asked to play a game and answer questions about the game. The game had two versions, one with a dark pattern and one without. I wished to determine whether a dark pattern in a game influences how much a player enjoys the said game and whether they would give up personal information because of the dark pattern.

4.1 Design

There was one independent variable in my experiment: the version of the game the participants played (there were two options: a game with a dark pattern in it, and a game without a dark pattern in it). There were two dependent variables: (1) A players enjoyment (split into 7 categories all calculated by using the TU Eindhovens Questionnaire [14] on video game enjoyment: Tension, Positive experience, Flow, Challenge, Negative experience, Immersion, Competence) and (2) Whether or not a player filled in their email-address (each player was presented with two options, one of which was filling in their email-address in both groups). A between-group design was chosen for this experiment. This approach was chosen because of several reasons: A between-group design would require less effort from participants, and if every participant would have had to play versions of the game they would have had to spend a lot of time, which would make finding participants harder. Besides that, we also needed participants to stay naive about the purpose of the study to get their honest reactions. If participants would play both games they could spot the difference which would make their reactions less realistic. With a between-group design, every participant thinks that their version of the game is the authentic version of the game.

4.2 Participants

There were a total of 38 participants, 22 of them played the game that included a dark pattern, and 16 of them played the game that did not. Who was presented with what game was completely random. Participants participated voluntarily and were given no reward for their participation. Many different approaches were used to gather these participants, asking people we knew personally, asking people in public online spaces that allow survey promotions such as discord servers related to the topic, and asking fellow students. All answers were given anonymously so we did not know who actually participated. Participants were initially naive about the purpose of the experiment, believing they were playing it to test its enjoyability. They were however notified of the study's true purpose after providing answers, with an option of backing out and having their data deleted after learning about the true purpose of the study. Previous experience with games, dark patterns or anything related to the study was not necessary, and everyone above the age of 18 was allowed to participate. In the end we had 29 male participants and 9 female participants. Out of the 38 participants, 71 % were from the Netherlands, 76% were between the ages of 18 and 24 and 50% of participants reported playing games on a weekly basis. On average participants completed the entire process in 20 and 25 minutes, but there were some participants who took much longer. Some participants took as much as 50 minutes to complete the entire process.

4.3 Apparatus

Many different elements were used for the experiment. An online survey was used to record the participants' answers to questions. The survey was made in LimeSurvey using an account provided by the university. The game (see 4.3.2) the players were presented with was based on Unity's tutorial platformer game called: Platformer microgame. Changes and additions were made by the author of this theses, using Unity 2d [15] and the programming language C#. The dark pattern (see 4.3.3) we used was in the form of a pop-up where players had two choices to continue the game, either watch an advertisement or fill in their email address. The advertisement (see 4.3.5) players were presented with was created by the author of this thesis using windows video editor with free stock footage and music. Every participant used their own computer to play the game and fill out the survey. The main elements are discussed below.

4.3.1 Survey

The survey we used was created in LimeSurvey. LimeSurvey was provided to us by the university and the survey was hosted on the science faculty's server. The survey consisted of 6 parts: The consent form, the general information section, the link to the game, the player experience section and the final debriefing. Answers were anonymous and only answers, time data and checkbox data was saved. Time and checkbox data was only saved to record at what time people accepted the consent form. If consent was not given, no data was saved.

The consent form

This was a relatively standard consent form asking for permission to use participants' data. This consent form did not include information on the true purpose of the study, which comes later in the debriefing. If this form was not answered with yes participants were not able to continue.

General information section

Here the participants had to answer questions about their background and previous experience with playing games. Questions were asked about: age, nationality, how often a week the participant plays games and many more.

Link to the game

This section had a link to the game with some basic instructions for playing it, specifications for what browsers not to use and what to do after the game was presented.

Player experience section

This section was the largest of the survey, here the TU Eindhovens Game experience questionnaire [14] was used to determine a player's experience with the game. Only the core module of this questionnaire was used. This module consisted of 33 Likert questions spread over 7 different categories.

Dark pattern section

In this section, participants were asked questions about the pop-up they encountered. They were asked what they encountered, what choices they made and why they made their choices. They were also asked questions about their previous experiences with in-game pop-ups or similar dark pattern related phenomena in games.

Debriefing

In the debriefing, participants were told about the true intention of the study and given the opportunity to still opt out of the survey and have all their data deleted.

4.3.2 Game

The physics, general looks and first-level design were based on the platformer micro game tutorial by unity. We used unity 2d [15] to make the game and C# for the coding. The game consisted of two relatively short but difficult levels in which you have to move your character through a 2-dimensional landscape, killing monsters and avoiding pitfalls along the way (see figure 4.1 for an image of the game). After the first level, a pop-up appears, pretending to be from a game-hosting website called "Gamesterdam". The pop-up asks the participants for help since they are a free site, asking participants to sign up with their email address or watch an advertisement. There were 2 versions of the game, one with the pop-up as described above, and one with a similar pop-up that allowed players to continue immediately. This second version of the pop-up still gave players the choice to fill in their email address but did not require this in order to continue with the game. After watching this advertisement or entering one's email, the game proceeds and level 2 is playable. At the end of level 2 participants are directed back to the survey.



Figure 4.1: Screenshot of the first level of the game

4.3.3 Dark pattern

The dark pattern was designed after quite some deliberation, taking into account our insights from the review of dark patterns in games. As mentioned, in this review we noticed two recurring patterns: (1) the combination of the pay to skip and play by appointment patterns [36] that we call "pay or wait" and (2) a pop-up asking the user to register in exchange for rewards. We chose to incorporate these two patterns in our own dark pattern to make it seem as realistic as possible. One decision was between a reward-based dark pattern (a dark pattern that rewards you if you give up personal information) and a punishment-based dark pattern (a dark pattern that punishes you for not giving up personal information). The "pay or wait pattern" is an example of a punishment-based dark pattern. We eventually chose the punishment based dark pattern since it was easier to implement and more prominent in popular mobile games (this form of pattern occurred in 80% of the reviewed games). The final dark pattern made users choose between two evils, giving up personal information, or being forced to watch an advertisement (see figures 4.2 and 4.3). We chose to show participants an advertisement for 30 seconds instead of just letting them wait. We did this because in most games we reviewed, players waited for something to be completed (a building to be built or a heart to respawn). In our game there was nothing to wait on, and to keep the pattern realistic we could not just let people look at a 30 second timer. Showing an advertisement seemed like a realistic option, since advertisements are often used to profit from free games. The dark pattern was placed in-between the two levels, as this gave the participants a taste of the game, making them slightly invested and increasing the chance they would engage with the dark pattern.



Figure 4.2: Screenshot of the malicous pop-up



Figure 4.3: Screenshot of the interface where one can fill in their email address

4.3.4 Control Condition

As mentioned above, we had two versions of the game. The dark pattern version, and the control version. The control version is almost identical to the dark pattern version, with the only difference being in the pop-up. The pop-up in the control version still gave you two choices similar to the dark patterns version. Players had a choice between simply continuing with the game and filling in their email addresses. Both buttons were equal in size and design and the option to simply continue was made clear (see figure 4.4).



Figure 4.4: Screenshot of the control pop-up

4.3.5 Advertisement

The advertisement used for the Dark pattern was made using windows video editor, stock footage found on pixabay and the music was found on upbeat.io. It promotes bikes in general, as we did not want to use any real brands. Below in figure 4.5, a still of the advertisement can be seen.



Figure 4.5: A collage of still images of the advertisement

4.4 Procedure

Participants would find the survey either after being asked personally or coming across it in a public space. The link contained some instructions and a link to the survey. After being shown a consent form, the survey asked for some standard background questions. The participants were then assigned a group based on a random number calculator. This group decided whether they would encounter the dark pattern or not. Participants were then presented with a link to the game and some instructions. They then played the game, consisting of two simple levels where they needed to move from left to right. Between these two levels, a pop-up showed up. As mentioned, participants of one group encountered a pop-up that gave them an option of either watching an advertisement or filling out their email addresses before continuing. The other group, encountered a pop-up that gave the option of filling in their email address or just continuing with the game. After the game participants were sent back to the survey, where they were asked to answer questions about their enjoyment and their choices regarding the pop-up. After they finished answering all questions, the participants were presented with a final disclaimer and another chance to opt-out of the study. See figure 4.6 below for a visual overview.



Figure 4.6: Graph of the procedure participants went through

Chapter 5

Results

In this chapter we go over all the results obtained by the experiment. We will give an overview of the enjoyment as measured per category and we will go over the personal information results.

5.1 Willingness to give up personal information

One out of 22 participants in the dark pattern group chose to give up personal information as opposed to watching the 30-second advertisement. This is 1 participant out of 22 participants within that group. In the second group where participants had the choice between continuing the game or giving up their personal information, no participants chose the second option. This results in a 1 out of 22 versus 0 out of 16. No statistical tests were run on this data since this result shows that the dark pattern did not have the intended effect on a players willingness to give up personal information.

5.2 Game enjoyment

The graph below (figure 5.1) shows the differences between group 1 and group 2. A box plot has been created for each variable for both groups:



{if(is_empty(randnumber.NAOK),rand(1,100),randnumber.NAOK)}

Figure 5.1: Boxplot of variables with dark pattern group results on the left and control group on the right. The y axis represents the average score out of 5 for each of these variables.

5.3 Main analysis

In this section, we will go over the enjoyment-related results, for each category a statistical test was run. We planned on using t-tests for all the variables, but this turned out not to be possible. For a number of the variables, the assumptions required for a t-test did not hold. In these cases, we used a Mann-Whitney U test. We use the terms group 1 and group 2 in the analysis below, group 1 played the version of the game with a dark pattern, and group 2 played the control version of the game. Data are mean \pm standard deviation unless otherwise stated. There were 22 participants in group 1 and 16 participants in group 2. We made use of Laerd Statistic's tutorials [30] for help on how to perform the tests and interpret the statistics.

5.3.1 Tension

A Mann-Whitney U test was run to determine if there were differences in Tension scores between group 1 and group 2. This was done instead of an independent samples t-test because the normal distribution assumption did not hold. All assumptions for the Mann-Whitney U test hold. Distributions of the Tension scores for group 1 and group 2 were not similar, as assessed by visual inspection. Tension scores for group 1 (mean rank = 20.23) and group 2 (mean rank = 18.50) were not statistically significantly different, U = 160, z = -477, p = .651, using an exact sampling distribution for U (Dineen & Blakesley, 1973).

5.3.2 Positive experience

An independent-samples t-test was run to determine if there were differences in positive game experience of the game. There were no outliers in the data, as assessed by inspection of a box plot. Positive game enjoyment scores for each group were normally distributed, as assessed by Shapiro-Wilk's test (p > .05), and there was homogeneity of variances, as assessed by Levene's test for equality of variances (p = .845). The game was more positively experienced by participants in group 1 (3.02 ± 0.88) than participants in group 2 (2.94 ± 0.86), but this was a statistically insignificant difference of 0.08 (95% CI, -.50 to 0.66), t(36) = .281 p = .780.

5.3.3 Negative experience

An independent-samples t-test was run to determine if there were differences in negative experiences of the game. There was one outlier in the data¹, as assessed by inspection of a box plot. Positive game enjoyment scores for each group were normally distributed, as assessed by Shapiro-Wilk's test (p > .05), and there was homogeneity of variances, as assessed by Levene's test for equality of variances (p = .409). The game was less negatively experienced by participants in group 1 (2.16 ± 0.86) than participants in group 2 (2.34 ± 0.80), but this was a statistically insignificant difference of -.18 (95% CI, -.74 to 0.37), t(36) = -.672 p = .506.

5.3.4 Immersion

An independent-samples t-test was run to determine if there were differences in immersion in the game. There were no outliers in the data, as assessed by inspection of a box plot. Immersion scores for each group were not normally distributed, as assessed by Shapiro-Wilk's test (p > .05), therefore the dependent variable was transformed into the square root of its original value to pass the assumption of normality. There was homogeneity of variances, as assessed by Levene's test for equality of variances (p = .834). The game was more immersive for participants in group 1 (1.53 ± 0.29) than for participants in group 2 (1.48 ± 0.27), but this was a statistically insignificant difference of 0.044 (95% CI, -.15 to 0.23), t(36) = .467 p = .643.

¹The outlier was kept in because checks confirmed that it did not alter the conclusion of the results.

5.3.5 Flow

An independent-samples t-test was run to determine if there were differences in the experienced flow of the game. There were no outliers in the data, as assessed by inspection of a box plot. Flow scores for each group were not normally distributed, as assessed by Shapiro-Wilk's test (p > .05), therefore the dependent variable was transformed into the log10() of its original value to pass the assumption. There was homogeneity of variances, as assessed by Levene's test for equality of variances (p = .405). A higher level of flow was experienced by participants in group 1 (.41 ± 0.15) than for participants in group 2 (.35 ± 0.12), but this was statistically insignificant difference of 0.057 (95% CI, -.04 to 0.15), t(36) = 1.237 p = .224.

5.4 Exploratory analysis

We did not expect the dark pattern to affect the following variables, but since research on the effect of dark patterns on players is scarce, we decided to do an exploratory analysis.

5.4.1 Challenge

A Mann-Whitney U test was run to determine if there were differences in challenge scores between group 1 and group 2. This was done instead of an independent samples t-test because the normal distribution assumption did not hold. All assumptions for the Mann-Whitney U test hold. Distributions of the challenge scores for group 1 and group 2 were not similar, as assessed by visual inspection. Challenge scores for group 1 (mean rank = 21.55) and group 2 (mean rank = 16.69) were not statistically significantly different, U = 131, z = -1.346, p = .191, using an exact sampling distribution for U (Dineen & Blakesley, 1973).

5.4.2 Competence

An independent-samples t-test was run to determine if there were differences in experienced competence over the game. There were no outliers in the data, as assessed by inspection of a box plot. Competency scores for each group were not normally distributed, as assessed by Shapiro-Wilk's test (p > .05), therefore the dependent variable was transformed into the square root of its original value to pass the assumption. There was homogeneity of variances, as assessed by Levene's test for equality of variances (p = .689). A lower level of competence was experienced by participants in group 1 $(2.50 \pm .80)$ than for participants in group 2 (2.79 ± 0.92) , but this was a statistically insignificant difference of -.288 (95% CI, -.85 to 0.28), t(36) = -1.028 p = .311.

Chapter 6 Discussion and Conclusion

There were no statistically significant results found in this study. Differences in game enjoyment between groups were minor, and only one person out of all participants chose to give up their personal information over watching the advertisement. No significant evidence could be found that a dark pattern in a game influences a player's enjoyment or their willingness to give up personal information.

6.1 Effects of the dark pattern on enjoyment

6.1.1 Tension

As expected, Tension was higher among those in the dark pattern group. Even though the difference is not significant, there is a difference that may have been caused by the presence of the malicious pop-up. It makes some sense that being forced to wait 30 seconds before continuing the game, or having to give up personal information may make you feel frustrated and increase tension.

6.1.2 Positive Experience

Positive experience was higher among those in the dark pattern group, not significantly, but higher nonetheless. This is very strange and defies our expectations. It stands to reason that having to wait 30 seconds while watching an advertisement or having to fill in personal information may make a game less fun, but we found no evidence that points towards this conclusion. We are not quite sure why this is, but further possible explanations are given in section 7.2 Limitations.

6.1.3 Negative Experience

Negative experience was lower among those in the control group, again, not by any significant margin. This is also not according to our expectations. As stated in Positive Experience, having an advertisement in the middle of the game forcing you to either watch an Advertisement or fill in personal information sounds like something that would affect one's enjoyment negatively. Evidence of this was not found. One possibility for this may be the skewed distribution of skill levels and previous gaming experience between the groups. This reason and other possibilities are discussed in more detail in section 7.2 Limitations.

6.1.4 Immersion

Being immersed in a game is to be heavily engaged with it, paying full attention to the game and not thinking of other things while playing it. This may be difficult in a platformer such as our game, but there is still a difference between the two groups. This difference, however, is again against our expectations. Being sucked out of a game to look at an advertisement for 30 seconds, should pull one out of a game more than a pop-up that can be skipped within a second. Marc Prensky states that because games are a form of play, players get an intense and passionate involvement [27]. It would then make sense that having less play and more stalling (such as the 30-second advertisement) would lead to less intense and passionate involvement. This is not what the results showed. In fact, the people that encountered the dark pattern reported they were more immersed than those in the control group. The results were statistically insignificant so we still do not know in what way dark patterns affect immersion. Possible reasons for not finding the expected results may be the advertisement itself. It had emotional music and pretty videos of nature. These factors may have made the advertisement add to the immersion. Other possible reasons are discussed in Section 7.2 Limitations.

6.1.5 Flow

The flow of the game is the smoothness of transition between one part of the game to the next. Examples of flow in a game include placing a required jump just so that the next coin is visible, going from dying to respawning smoothly, but also going from one level to the next. In that regard, waiting 30 seconds on an advertisement should be quite bad for the flow of the game, as you are halted for a considerable time. This is not what the data shows though. With a statistically insignificant difference, the participants in the group that encountered the dark pattern reported experiencing a higher flow than those that did not. A possible reason for not finding the expected results is that those 30 seconds of advertisement may have been used as a break by the players, refreshing them and in a sense improving the feel of flow. Other possible reasons are discussed in Section 7.2 Limitations.

6.1.6 Challenge

This result is slightly less relevant than the others, simply because the popups for both groups are equally simple to navigate and do not provide any more challenges than one another. There was a difference, the dark pattern group reported a more challenging experience, but this difference was insignificant. This insignificant difference may be because the participants in this group were less experienced in video games overall.

6.1.7 Competence

This category is very similar to Challenge. Participants that encountered the dark pattern felt less competent in their gameplay abilities. The difference that was found was statistically insignificant. A possible cause for this insignificant difference may be explained by the lack of experience in this group, this will be discussed in more detail in the next section.

6.2 Effects of dark pattern on personal information

We did not expect our dark pattern to work flawlessly, but the final results here are quite surprising. Only one person gave up their personal information. This person was part of the dark pattern group, consisting of 22 participants. 1 in 22 is not a lot and statistically insignificant, but since the other group had zero participants give up personal information it is still worth looking into. This participant likely filled in their information because they were not interested in waiting for 30 seconds.

6.3 Review of dark patterns in mobile games

To make the design of our dark pattern as realistic as possible, we reviewed 10 mobile games and analyzed them for dark patterns. Similarly to what Linda Di Geronimo et al. [7] found in their review of mobile applications, almost all of these mobile games had one or more dark patterns in their design. This leads us to believe that dark patterns are an often occurring phenomenon in mobile games.

6.4 Limitations

This study had some issues that may have caused this result. Issues that, when fixed, may lead to vastly different findings. Although the betweengroup design and the general set-up of the experiment had promise, the final execution left something to be desired.

6.4.1 Game

The game made for the experiment was not perfect: there were some bugs and annoyances involved, which may hamper the participant's investment in the game. Had the game been made by a professional, without any bugs and with smooth and intuitive controls, the only thing that could hamper the enjoyment of the game would be the Dark pattern. we believe this would have led to more significant results.

6.4.2 Accessibility

Another problem with the experiment was the number of participants. We found it incredibly hard to gather a decent amount of participants. One possible reason for this is the length of the survey and the difficulty of the game. The estimated time to finish both the survey and the thesis was 20 minutes, but some participants went far above this. This may have led people to not want to invest their time in this study or drop out mid-way through. In the end, this lead to a very low amount of participants, which makes the results less reliable. A more concise survey, and a game that was easy enough to be accessible to all players, may have helped in this regard.

6.4.3 Personal preferences

As discussed earlier in chapter 2.2.3, enjoyment can be quite subjective depending on a player's personal cognitive style. In the paper by Morris B. Holbrook, Robert W. Chestnut et al. [12], it was determined that players enjoy a game more, the more they improve at said game. It also presented a difference in enjoyment between those with visual cognitive styles and those with verbal cognitive styles, depending on the game's own style. In our experiment, players only play the game for the first time and only once, so they will not be able to improve their performance much. This may lead to some discrepancies in enjoyment between those who are experienced at similarly styled games, and those who are not. In the same way, there may be a difference in perceived enjoyment between those who think in a more visual cognitive style, as opposed to a more verbal style, since our game is quite a visual game, with few verbal elements.

6.4.4 Skewed distribution

The results of the study, although statistically insignificant, were quite surprising to us. Although insignificantly, the positive factors (positive game experience, flow and immersion) of the game were higher on average for players with the dark pattern in the game. A possible explanation for this rather counter-intuitive phenomenon is the randomization of the groups. Due to the random nature of the group distribution, people that participated in the study early were coincidentally put more into group 1 (Dark pattern), whereas group 2 contained more of the later participants. This difference was important in our experiment because since we used various methods of finding participants, different participants participated at different times of the experiment's run time. The first people that were approached to participate were all close friends and family, people that know us and may have been more positive toward the game out of pride or compassion. After running out of close acquaintances, people we did not know as well were asked to participate. These people had less incentive to be positive and likely gave a more honest opinion. Of course, we do not know if this is the case as all data was anonymous, and a friend asked on day 1 could have actually participated on day 40. However, we do feel that it is a theory worth mentioning.

6.4.5 Halfway quitters

A large number of participants stopped halfway through the survey, usually either after acknowledging they finished the game or after being presented with the link to the game. The most likely explanation for this is that the survey did not properly convey that the survey continued after the game. Though it was mentioned quite a few times, the experiment was usually presented with the game on the forefront, which may have led people to believe that playing the game was their only task, and the survey just a nice jacket around it. Every participant that drops out halfway is one less participant to increase the reliability of the paper. This may have been prevented by using more clear wording when presenting the experiment to people, and having an automatic redirection back toward the survey after the game was finished.

6.4.6 Dark pattern design

For this thesis, we decided to design our own dark pattern to fit the needs of our research. Since we are not professional designers, the pattern had some limitations. The choice between watching an advertisement or filling out your email may have been jarring to some participants since this is not usually how personal data is requested. In most of the games we reviewed, personal information was asked for in the form of a Facebook sign-in button. Had we used a similar method of giving up personal information, the pattern may have seemed more realistic and would have convinced more people. This was unfortunately not possible since we did not want to use the name of an existing company in our game. A second limitation of the dark pattern was its visual design. For participants with experience with technology or similar pop-ups, it may have looked out of place or unrealistic. This may have prevented them from believing the pop-up was real and thus prevented them from giving up personal information. Another thing that could have limited the dark pattern was the trade-off between watching a short advertisement and filling in your email address. It could be that the advertisement was not enough of a punishment for participants to consider filling in their email addresses, since filling in one's email address also takes some time. These second and third limitations may have been prevented by having the dark pattern be designed by someone with more experience in the design field.

6.5 Future research

A number of limitations have been discussed, and most of these would be solved by having completely random participants fill out the survey and play a professionally made game with a professionally designed dark pattern. Participants would not know who made the game and would thus not have any incentive to be overly positive. If this set-up is used with a larger number of participants we believe the results would be much more trustworthy. Although the results of were insignificant, we believe this thesis is an important first step toward understanding the effects of dark patterns in video games.

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