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DARK PATTERNS AND THEIR USE IN E-COMMERCE

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ABSTRACT

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Growing competition in the field of e-commerce has led retailers to adopt different strategies to engage users and guide them through the digital buying process. Some retailers use digital nudges that aim to guide user through the shopping process. Some e-commerce sites have resorted to the use of dark patterns – user interface elements that manipulate the user into making a choice they might not have made, had they had the chance to choose freely.

This thesis has three research questions: 1.) What are dark patterns? 2.) Why do dark patterns work? 3.) Why are dark patterns used in e-commerce?

This thesis defines dark patterns as "intentional, deceptive design decisions that were made to take advantage of psychology, to manipulate the user into making decisions that were unintended and unwanted; creating value for the service that employs them". There seems to be four factors that explain the effectiveness of dark patterns: technological, cognitive, social and motivational. Each of these factors is looked at in detail.

Dark patterns are widely used in e-commerce. The prevalence of dark patterns has created an industrial drift that has led to the adoption of dark patterns on a much larger scale. Dark patterns have also been used to promote customer engagement, which, in turn, has been associated with higher levels of economic success. Short deadlines and tight budgets have led designers to focus on creating a "happy path" that might not take into account the whole user experience, but instead focuses on filling shareholders' goals. Lastly, some researchers argue that the prevalence of dark patterns can be accounted to the lack of ethics education in design curriculums.

This literature review aims to shine light on dark patterns and the reasons behind their use in e-commerce. It also argues why e-commerce retailers should not use dark patterns on their site and brings forth topics for future research.

Keywords: dark patterns, e-commerce, digital nudges

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Kilpailu verkkokaupan alalla on johtanut erilaisten strategioiden käyttöönottoon asiakkaiden sitouttamiseksi. Jotkut verkkokauppatoimijat ovat siirtyneet käyttämään ”digitaalisia tönäisyjä”, jotka ohjaavat kuluttajaa ostoprosessin läpi. Toiset taas ovat alkaneet hyödyntää sivuillaan ”synkkiä suunnittelumalleja”, Synkät suunnittelumallit ovat käyttöliittymäelementtejä, jotka pyrkivät manipuloimaan käyttäjää tekemään tiettyjä valintoja, joita he eivät olisi tehneet, mikäli heillä olisi ollut mahdollisuus valita toisin.
Tässä tutkielmassa on kolme tutkimuskysymystä: 1.) Mitä ovat synkät suunnittelumallit? 2.) Miksi synkät suunnittelumallit toimivat? 3.) Miksi synkkiä suunnittelumalleja käytetään verkkokaupoissa?

Tämä tutkielma määrittelee synkät suunnittelumallit ”tarkoituksellisina, harhaanjohtavina suunnitteluratkaisuina, jotka hyödyntävät tietämystä psykologiasta. Käyttäjää manipuloidaan tekemään päätöksiä, jotka ovat tahattomia ja tahtomattomia, luoden arvoa yritykselle, joka käyttää näitä synkkiä suunnittelumalleja”.

Synkkien suunnittelumallien toimivuuden taustalla on neljä tekijää: teknologiset, kognitiiviset, sosiaaliset ja motivationaaliset tekijät. Jokaista näistä tekijöistä tarkastellaan yksityiskohtaisesti.

Synkkiä suunnittelumalleja käytetään yleisesti verkkokaupassa. Synkkien suunnittelumallien yleistyminen on johtanut niiden käyttöönottoon laajemmalla mittakaavalla. Synkkiä suunnittelumalleja käytetään sitouttamaan asiakkaita, ja tämän sitoutumisen on tunnistettu olevan yhteydessä liikevoittoon. Tiukka aikataulu ja budjetti ovat johtaneet siihen, että sivustoja suunnitellessa ei keskitytä kokonaisvaltaiseen käyttäjäkokemukseen, vaan pyritään tuottamaan arvoa osakkeenomistajille. Viimeiseksi, jotkut tutkijat argumentoivat, että synkkien suunnittelumallien yleisyys johtuu eettisen painotuksen vähäisyydestä suunnittelijoiden tutkinto-ohjelmissa.

Tämä kirjallisuuskatsaus pyrkii valaisemaan synkkien suunnittelumallien käsitettä ja selittämään syitä niiden käytön taustalla. Se pyrkii myös argumentoimaan miksi synkkien suunnittelumallien käyttö ei ole hyväksi, ja tuo esiin uusia tutkimusaiheita tulevaisuudelle.

Asiasanat: synkät suunnittelumallit, verkkokauppa, digitaaliset tönäisyt

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1 INTRODUCTION

The field of e-commerce has grown substantially over the past few decades. People are making purchases online more frequently than ever. In Finland, two thirds of adults have purchased something online within the past year (Tilastokeskus 2019). The yearly reported growth of e-commerce, measured in euros, was 12% in 2019 (Kaupan liitto 2020).

As the amount of online purchases has grown, so has the number of e-commerce stores. Due to this competition, retailers have started to pay more attention to developing a website that holds its customers' attention and nudges them toward completing their purchase process.

These nudges used by e-commerce retailers are elements of the user-interface that are designed to influence users' behavior. Despite the assumptions of rational economic theory, humans are not only influenced by their rational decision-making, but also by the environment in which they make these decisions (Djurica and Figl 2017). Nudges aim to overcome specific psychological effects to guide individuals toward a pre-defined choice. They can also take advantage of the unconscious thought process behind decision-making (Mirsch, Lehrer and Jung 2017).

As online shopping has become more common, users have started to seek instant gratification when visiting an online store. If they find the store difficult to navigate, or the checkup process hard to complete, they will seek another site to complete their purchases (Haywood 2006).

To prevent customers from abandoning their carts, some e-commerce retailers have resorted to the use of dark patterns on their site. Dark patterns can be defined as explicit, deceitful design choices that manipulate the user into making choices they might not have otherwise done (Gray, Kou, Battles, Hoggatt and Toombs 2018). In the context of e-commerce, customers can be pushed toward completing their purchases by notifying them about the scarcity of the product ("10 other shoppers have this item in their baskets"), the urgency of a sale ("-30% of all items ends in 12 hours!"), or the social desirability of the product they are interested in ("Karen from Florida just bought this item!"). While sometimes the product has actually been just purchased, or a sale is just

ending, often these notifications are based on deceit and are used to manipulate the user to make a buying decision (Mathur et al. 2019).

While the influence of digital nudging in e-commerce has been a topic of interest for researchers (see, for example, Weinmann, Schneider and Brocke 2014), less attention has been given to dark patterns in e-commerce. There has been only one notable example of studying dark patterns in the context of e-commerce, a study conducted by Mathur et al. in 2019.

It seems that currently, research into dark patterns has focused on generating a taxonomy of dark patterns (Bösch, Erb, Kargl, Kopp and Pfattheicher 2016; Gray et al. 2018), or evaluating them from an ethical standpoint (Fansher, Chivukula and Gray 2018). Therefore, in this thesis, the focus is shifted to dark patterns and their use in e-commerce. E-commerce is considered from a business-to-consumer (B2C) perspective, leaving out business-to-business (B2B) and consumer-to- consumer (C2C) e-commerce.

This thesis aims to answer the following research questions:

1.) What are dark patterns?
2.) Why do dark patterns work?
3.) Why are dark patterns used in e-commerce?

This thesis is divided into five chapters. Chapter 2 aims to define dark patterns, differentiate between dark patterns and digital nudges, and describe four different ways of classifying dark patterns. It aims to answer the first research question: what are dark patterns? Chapter 3 aims to give an explanation to the second research question: why do dark patterns work? Effectiveness of dark patterns is considered using technological, cognitive, social, and motivational factors. In chapter 4, dark patterns are studied in the context of e-commerce. The prevalence of them is discussed, as are the reasons behind the third research question: why are dark patterns used in e-commerce? Lastly, this thesis follows with a conclusion and suggestions for future research.

This study was conducted as a literature review. Search statements were formed from the combinations of the following keywords: “digital nudging”, “dark pattern”, “e-commerce”, “manipulation”, “persuasive design”, “user interface design”. Source material was sourced using JYKDOK and Google Scholar.

2 WHAT ARE DARK PATTERNS?

2.1 Patterns, anti-patterns and dark patterns

The designer community has used patterns to reproduce well-known solutions for specific problems since the 1970s. They were first used in the field of architecture, from which they were quickly introduced to the field of computer science and software development, including user interface design (Bösch et al. 2016). Patterns often derive from studying an existing design solution to a problem and creating a solution that is generalized from that specific situation to solve other, similar problems in different contexts (Greenberg, Boring, Vermeulen and Dostal 2014).

Patterns evolve throughout their time. A once good solution to a problem can be downgraded to an anti-pattern as our knowledge about the problem increases. An anti-pattern is a way of solving a design problem that has been proven to be bad practice. They are still important to the designer community as they can be used to raise awareness and advocate designers to steer away from them when making design decisions (Bösch et al. 2016).

Not all anti patterns were once a good design solution gone bad: according to Greenberg et al. (2014), anti-patterns can also follow from unintentional design failures, due to lack of technical skill or knowledge of user needs (Gray, Chivukula and Lee 2020). Furthermore, depending on the designer's design intent, the very same pattern can become an anti-pattern or a dark pattern (Greenberg et al. 2014). An antipattern is a design solution that results in an unintended negative user experience. Dark pattern, on the other hand, is a thought out, well researched pattern that has negative consequences for the user, simultaneously benefiting the service that employs it.

Gray et al. (2018) defines dark patterns as explicit, deceptive design choices that were created with knowledge about psychology, that are not in the user's best interest. Mathur et al. (2019) emphasizes that the decisions the dark patterns steer, coerce, or deceive the user into making, are ones that they might not have made if they had the opportunity to choose otherwise. Bösch et al. (2016) stresses that dark patterns are misleading by choice, that they are designed to trick the users into making unwanted decisions. Dark patterns can thus be defined as intentional, deceptive design decisions

that were made to take advantage of psychology, to manipulate the user into making decisions that were unintended and unwanted; creating value for the service that employs them.

Table 1 Good patterns, anti-patterns and dark patterns

	Good pattern	**Anti-pattern**	**Dark pattern**
Design intent	Intentional	Unintentional	Intentional
Knowledge of user needs	Good	Lacking	Good
Made to benefit	Mainly the user		Mainly the business
Results in	Good user experience	Poor user experience	Poor user experience

From an individual's perspective, the effects of dark patterns can range from mild annoyance to frustration, to being misled, to being deceived. This can result in financial loss, giving up personal data, and even in compulsive and addictive behavior (Mathur et al. 2019). Majority of users are aware that dark patterns exist, and that businesses have a financial incentive to make use of these patterns. At least sometimes users notice when they face a dark pattern in a digital environment (Bösch et al. 2016). Nevertheless, dark patterns seem to work, as they are still frequently used, despite the fact that users are aware of them, and might notice them when they are encountered.

Dark patterns have a varying degree of "darkness" in their design intention and motivation. Some patterns become dark after they have been exposed to a larger audience, even if they were not designed to be manipulative for the original audience (Gray et al. 2018). For example, notifications about whether some other buyer is looking at the same item one is interested in might have been helpful in e-commerce stores that sell single, one-of-a-kind items. However, these notifications have now been adopted into all kinds of e-commerce stores, pressuring the customer to make a purchase, even if there is no real scarcity of the product.

Some patterns even test well from a usability perspective (at least when considering stakeholder goals), meaning that dark patterns do not necessarily lead to bad usability. Even though the usability of a user interface might not be compromised due to use of dark patterns, they still result in a poor user experience and negative emotions for the user. (Gray et al. 2018)

2.2 Digital nudges or dark patterns?

Persuasion techniques have been used in e-commerce since the beginning of the industry, and the sites are often designed in a way that encourages users to stay on the site for as long as possible and make the most purchase decisions possible (Haywood 2006). It is no wonder then that the line between what is considered a digital nudge and a dark pattern is often blurred.

In an anti-pattern, a user interface is unintentionally designed in a way that results in a poor user experience. Digital nudges are not only meant to benefit the business that nudges the user, but the user itself, and often result in a good user experience (Acquisti

2017). In comparison, dark patterns' design intent is an intentionally poor user experience which benefits the company employing the dark pattern.

Table 2 Anti-patterns, digital nudges and dark patterns

	Anti-pattern	**Digital nudge**	**Dark pattern**
Design intent	Unintentional	Intentional	Intentional
Made to benefit	-	Both the business and the user	Mainly the business
Amount of options available for the user	Limited	Not limited by the service	Limited

Acquisti et al. (2017) argue that in nudging, users are motivated in a way that results in predictable behavior. This is done without forbidding any options the user has, or significantly changing their economic incentives. On the other hand, dark patterns are often designed in a way that they reduce the amount of choices (explicit or implicit), or greatly alter users' financial motivations (Gray et al. 2018). As the Norwegian Forbrukerrådet (2018) puts it, dark patterns come from "deliberately misleading users through exploitative nudging".

An example of a digital nudge in the context of e-commerce could be recommending products for the user on the basis of what products other customers have purchased after purchasing the product that the user has added to their basket. This nudges the user toward adding these items to their basket but does not limit the user's choice.

A dark pattern in the context of e-commerce could be forbidding the user from entering an e-commerce site without registering first or adding products into the user's basket along with items that they themselves have added. The first example limits the user's choices, and the second example significantly changes their economic incentive.
Most of the dark patterns that are discussed in the following sections fall somewhere in between a nudge or a dark pattern. This area could be described as a "gray area" - these kinds of patterns are harder to spot, their "darkness" depends on the context in which they are used. One could argue that the "darkness" of the pattern also depends on a variety of factors, such as if the pattern is based on deceitfulness, or if it takes advantage of psychological factors that are hard to counteract (for example, social pressure).

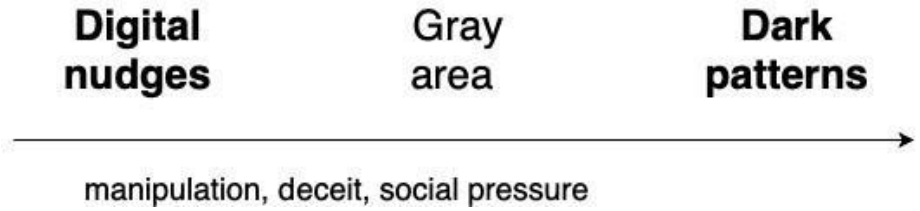

Figure 1 Digital nudges, dark patterns and the "gray area" in between

2.3 Classifying dark patterns

Dark patterns are a common occurrence on different digital platforms, including social media, e-commerce, apps, and mobile games (Mathur et al. 2019). Some dark patterns

are used in specific contexts, such as in e-commerce, while others are more generic (Gray et al. 2018). Prior work on dark patterns has largely focused on creating a taxonomy of the types of dark patterns, based on which contexts they appear in, or what kind of content they include (e.g. Brignull 2010; Bösch et al. 2016; Gray et al. 2018; Mathur et al. 2019). In this chapter, these classifications are looked at more in depth, and then compared to each other. It is important to remember that the world of dark patterns is constantly evolving; as technology advances, new ways to create a persuasive design are created. This, in turn, inevitably leads to creation of new dark patterns to take advantage of the user.

2.3.1 Brignull – the first attempt at classifying dark patterns

Brignull coined the term "dark patterns" in 2010, and in UX Brighton 2010 conference, brought forward the first taxonomy for dark patterns in UX. He categorized dark patterns into 11 types: "Trick questions", "Sneak into basket", "Roach motel", "Privacy Zuckering", "Price comparison prevention", "Forced information disclosure", "Misdirection", "Hidden costs", "Bait and switch", "Confirmshaming", "Disguised ads", "Forced continuity", and "Friend spam" (Brignull, 2010). He later combined "Forced information disclosure" into "Privacy Zuckering" and named two more categories: "Misdirection" and "Confirmshaming" (Brignull, n.d.). In this thesis, these types of dark patterns are categorized into three thematic categories: those that are generic, those that are related to e-commerce, and those that are related to privacy.

General dark patterns
"Trick question" refers to tricking the user into giving an answer that they didn't intend when responding to a question. This is often done with the use of "opt in" and "opt out" checkboxes, or by confusing copywriting.

"Misdirection" distracts the user's attention from one option by presenting a more (visually) prominent option.

"Bait and switch" make use of common conventions of user interfaces to deceive the user into choosing an option that results in an unexpected end result. For example, Microsoft tricked its users into upgrading their computers to Windows 10 by auto-installing the upgrade when users tried to close the update's pop-up window.

"Confirmshaming" refers to guilting the user into choosing an option they might not choose otherwise, if they were not shamed into compliance.

"Disguised ads" are adverts that are disguised as other types of user interface content, such as pictures, buttons or navigation, to trick the users into clicking them to create advertisement revenue.

E-commerce related dark patterns
In "Sneak into basket", an additional item is added to the user's shopping basket without their consent. This practice has become illegal in several EU countries due to the Consumer Rights directive.

"Roach motel" describes a revenue model that is often used in subscription services. The design of a user interface makes it easy for the user to purchase a service, but hard to cancel it. Often, the service can be purchased online, but it can be cancelled only by a phone call or by mail.

"Price comparison prevention" restricts price comparison with other items, thus limiting the user's ability to make an informed purchasing decision.

In "Hidden costs", the user is presented with unexpected charges in the last stages of the checkout process, when they have already made the purchase decision based on the information they had before the appearance of hidden costs.

"Forced continuity" takes advantage of user's carelessness and starts automatically charging their credit card when a free trial comes to an end.

Privacy-related dark patterns

"Privacy Zuckering" is a dark pattern that deceives the users into publicly sharing more personal data about themselves than they intended to.

"Friend spam" encourages a user to give a permission for the user's social media or email, marketing this request as something that benefits the user. Instead, this is when the service starts spamming the user's contacts, promoting the business to them. LinkedIn faced a $13 million-dollar lawsuit in 2015 for the use of this dark pattern.

2.3.2 Bösch et al. – focus on privacy dark patterns

Bösch et al. (2016) aimed to create their own way of categorizing and describing dark patterns related to privacy, using Hoepman's (2014) eight privacy design strategies: minimize, hide, separate, aggregate, inform, control, enforce, and demonstrate. They argue that privacy dark strategies are designed as opposites to good privacy design strategies; thus, coming up with the following eight privacy dark strategies: maximize, publish, centralize, preserve, obscure, deny, violate, and fake.

Bösch et al. (2016) formed their taxonomy of dark patterns based on patterns that have privacy dark strategy related attributes. They introduced the following list of privacy related dark patterns: "Privacy Zuckering", "Bad defaults", "Forced registration", "Hidden legalese stipulations", "Immortal accounts", "Address book leeching" and "Shadow user profiles". As Bösch et al. (2016) based their classification on the work of Brignull, they kept two of the original categories: "Privacy Zuckering", and "Address book leeching", which equates to Brignull's "Friend spam". The new privacy related dark patterns introduced by Bösch et al. (2016) are explained below.

"Bad defaults" refers to user interface design practice in which default options in forms are chosen in a way that they ease or encourage users into sharing personal information. "Forced registration" is a pattern that was derived from Brignull's first version of categorizing dark patterns (Brignull 2010). It refers to a service withholding some of its functionalities before a user registers to the service. This is true even in cases where the service would function just fine without the user registering to it.

"Hidden legalese stipulations" are used in privacy policies and terms and conditions of a service. Service providers deliberately choose to use wording that makes understanding its privacy policy or terms and conditions difficult or even inaccessible.

When a service is unnecessarily complicating the process of deleting an account, or by not even providing an option to do so, they are using a privacy dark pattern known as "Immortal accounts".

"Shadow user profiles" are created via registered users, to create shadow personas for people who do not have a user profile in the service. They are instead mentioned in others' posts, included in content metadata, or a part of imported address books. Such shadow profiles are used in for example improving the quality of suggestion algorithms.

2.3.3 Gray et al. – comprehensive look at dark patterns

Gray et al. (2018) attempted to create a classification of dark patterns which would not be tied to specific content, contrast to Brignull (n.d.); or to specific context, contrast to Bösch et al. (2016). They generated a corpus of dark patterns, gathered from different popular online platforms. From this corpus they categorized the artifacts into different categories of dark patterns. They created five categories for their classification: "Nagging", "Obstruction", "Sneaking", "Interface interference" and "Forced action". Each of these categories contains one or more different dark patterns, as shown in the consecutive paragraphs.

Nagging
"Nagging" refers to a user being redirected when trying to complete one or more interactions by another task that is not directly related to the one that the user is trying to complete.

Obstruction
"Obstruction" is used to make an interaction more difficult than needed, to discourage a user from choosing that option. This category of dark patterns contains Brignull's "Roach motel" and "Price comparison prevention" patterns, as well as "Immediate currency", which was identified to be a dark pattern by Gray et al. (2018). "Immediate currency" refers to the use of virtual currency instead of real money when making purchases.

Sneaking
"Sneaking" is an attempt to disguise or delay disclosing information relevant to the user. According to Gray et al. (2018), sneaking is one of the most common dark patterns referenced by practitioners, and also one noticed most often by users (Gray et al. 2020). Most of Brignull's dark patterns are of the sneaking type; this category includes "Forced continuity", "Hidden costs", "Sneak into basket", and "Bait and switch" patterns.

Interface interference
"Interface interference" refers to the manipulation of the user interface in a way that steers the user into choosing a specific action over others. "Interface interference" comes in many forms: "Hidden information", "Preselection", and "Aesthetic manipulation".

In “Hidden information”, options that are relevant to the user are deliberately made hard to access, for example, by hiding content in fine print, or by using discolored text. In “Preselection”, an option beneficial for the service is preselected for the user, despite it often being against the user’s interests.

In “Aesthetic manipulation”, the design of the user interface is created in a way that directs the user’s focus from one thing to another. This is similar to Brignull’s “Misdirection”. Gray et al. (2018) have also identified four subtypes of “Aesthetic manipulation”. Two of them are derived from Brignull’s classification: “Disguised ads” and “Trick Questions”; two of which are new: “Toying with emotion”, and “False hierarchy”. “Toying with emotion” is accomplished with the use of language, style, color or other elements, to provoke the user into choosing a specific option. “False hierarchy” gives more visual or interactive importance for other options over others, in situations in which options are considered parallel rather than hierarchical.

Forced action
When users face a situation in which they are forced to make a specific choice in order to access a specific functionality, it is known as a dark pattern called “Forced action”. One subtype of this pattern is Bösch’s “Forced registration”. Gray et al. (2018) also define three additional subtypes to this pattern, Brignull’s “Privacy Zuckering”, and two new ones: “Social pyramid”, and “Gamification”. In “Social pyramid”, users are required to recruit others before using the service. In “gamification”, certain actions are unlocked to the user after they have repeatedly used an aspect of the service. This is known as “grinding” in the platform of video and mobile games.

2.3.4 Mathur et al. – e-commerce and dark patterns

Mathur et al. (2019) reported 15 types of dark patterns in seven categories when they conducted their research on the prevalence of dark patterns on e-commerce sites. Their taxonomy is largely inspired by the work of Brignull (n.d.) and Gray et al. (2018). The broader categories they found are the following: “Sneaking”, “Urgency”, “Misdirection”, “Social proof”, “Scarcity”, “Obstruction”, and “Forced action”. It can be seen that when dark patterns are considered in the scope of e-commerce, dark patterns that take advantage of scarcity bias (“Urgency” and “Scarcity”) and social norms (“Social proof”) emerge. The seven categories and their patterns are considered in more detail in the consecutive paragraphs.

Sneaking
“Sneaking” (c.f. Gray et al. [2018]) includes three of Brignull's dark patterns: “Sneak into basket”, “Hidden costs”, and “Forced continuity” (in Mathur et al. [2019] work known as “Hidden subscription”).

Urgency
In “Urgency”, users are faced with a deadline on a sale or a deal, pushing them into making purchase decisions. Mathur et al. (2019) observed two types of “Urgency” patterns: countdown timers and limited-time messages. Researchers also found that some of the countdown timers in the data set were deceptive in their nature - after the

time ran out, the offer continued to be valid, or the offer was claimed to be expired, but was still valid.

Misdirection
"Misdirection" does not only contain Brignull's definition of this category of patterns (stylistic and visual manipulation), but also a broader view in which "Misdirection" is also caused by language and emotional manipulation. Akin to Brignull's classification, "Misdirection" contains "Confirmshaming" and "Trick questions" dark patterns. Other types of dark patterns in this category are "Visual interference" (c.f. Brignull's original "Misdirection" dark pattern, and Gray et al. [2018]), and "Pressured selling". In "Pressured selling", users are steered into purchasing products in bundles, purchasing related products to the one they bought, or purchasing a more expensive version of the product.

Social proof
In "Social proof", dark patterns exploit individual's tendency to determine correct action for them based on what others have done in their situation. This can be seen in the use of "Activity notifications" telling the user that another user has just purchased the item they were looking at, or in "Testimonials of uncertain origin", in which reviews of a product are not transparently sourced. As with the "Urgency" types of dark patterns, researchers found that some of the activity notifications used in e-commerce sites were deceptive - created either via generating random notifications or using hard-coded, previously generated notifications.

Scarcity
One of the most common types of dark patterns in the data set, "Scarcity", pushes users into purchasing a product by signaling its limited availability or high demand, increasing its perceived value and desirability. This image is constructed with "Low-stock messages" and "High demand messages". As with the "Social proof" types of dark patterns, some of these messages appeared to be deceptive in nature. Messages showed either randomly generated amounts of stock left, or implied that specific items were just sold out, even if they had been out of stock already for multiple days.

Obstruction
In the context of e-commerce, Mathur et al. (2019) observed one dark pattern - "Hard to cancel" - within Gray's "Obstruction" category. This pattern is similar to Brignull's "Roach motel"-pattern - obstruction makes signing up for newsletters, subscriptions and memberships easy, but cancelling them unnecessarily hard.

Forced action
One pattern belonging to Gray's "Forced action" category was found in the context of e-commerce: "Forced enrollment". This is identical to Bösch et al. (2016) "Forced registration". User has to sign up before being able to use all of the service's functionalities.

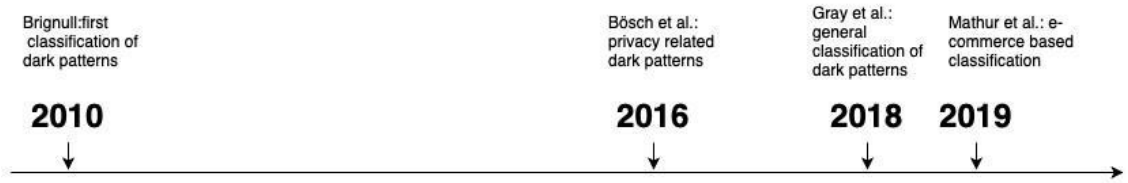

Figure 2 Timeline of dark pattern classifications

2.3.5 Comparing different dark pattern taxonomies

While in these classifications the dark patterns are discussed as separate entities, in real world user interfaces, many dark patterns appear together as a part of the user interface. In a study conducted by Gray et al. (2020), researchers noted that on average, a user interface contains 1.38 applied dark patterns.

The classification of dark patterns is often done by evaluating real world applications of dark patterns and classifying them either by their content (Brignull n.d., Gray et al. 2018), or by their context (Mathur et al. 2019). Another way of classifying dark patterns is assessing known design strategies and turning them onto their heads, like in the classification of privacy related dark patterns by Bösch et al. (2016).

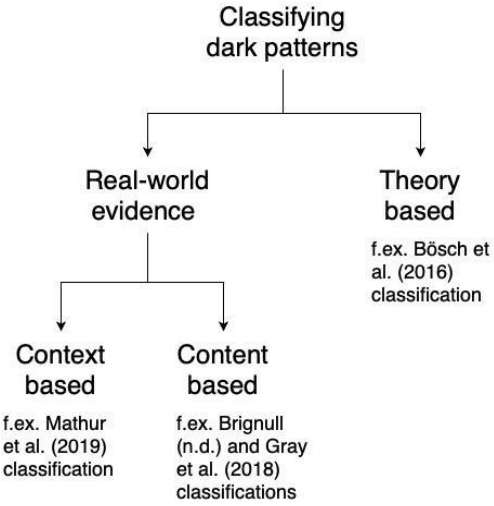

Figure 3 Ways of categorizing dark patterns

When looking at dark patterns in the context of e-commerce, one can see that urgency, scarcity and social pressure play a part in making these patterns effective. These themes have been researched widely in the field of e-commerce. Research of consumer psychology has shown for example that scarcity creates a sense of urgency and a fear of missing out. This in turn, is associated with heightened customer attention to the product that is scarce (Mehta and Zhu 2015), and more reassurance for the product when customers are undecided (Stock and Balachander 2005). These psychological factors that affect customer's decision- making process are further considered in the next section of this thesis, which aims to give various explanations as to why dark patterns work.

3 Why do dark patterns work?

Traditional economic theory suggests that people are always rational decision makers, carefully thinking through the options they have, and basing their decisions on the conclusions they've made. However, Weinnman et al. (2016) argue that people do not always act in a deliberate way, making it possible for dark patterns to work.
In the following chapters, multiple explanations are given to why and how dark patterns seem to work.

As dark patterns appear often on digital platforms, technological factors are considered first. The human psyche plays an important role in explaining why these dark patterns work, even if users are aware of them, on some level at least. From the psychological standpoint, cognitive factors are first discussed. Then the focus shifts to social factors explaining the effectiveness of dark patterns. Lastly, self- determination theory proposed by Deci and Ryan (2008) is looked at in more detail, explaining the individual differences on why some people are more vulnerable to dark patterns than others.

3.1 Technological factors

Information technology is constantly evolving, and so are the persuasive and manipulative strategies that users face on a daily basis on different digital platforms. The speed of this change often leaves the user unaware of potential threats. This phenomenon is known as information asymmetry. The service has more information on the user than the user has of service, causing a power imbalance (Acquisti et al. 2017).

3.2 Cognitive factors

3.2.1 Bias and heuristics

The amount of decisions people has to make every day has vastly grown since the internet has infiltrated our daily and work lives. As the amount of decisions that must be made each day increases, the decisions people make become hastier and more automatic in nature (Mirsch et al. 2017). Each decision is based on a user's probability judgment, which requires cognitive effort. Because humans have a limited cognitive capacity, they tend to use shortcuts, known as heuristics, in their decision making (Acquisti et al. 2017).

In availability heuristic, people estimate the probability of an event based on the salience of relevant examples. People are more likely to overestimate a shocking or a traumatic event, as it is easier to recall. Events that are not as memorable are harder to recall, resulting in people underestimating their possibility. (Acquisti et al. 2017, Mirsch et al. 2017)

In representativeness heuristic, people estimate the likelihood of an event based on how often their peers have experienced it (Acquisti et al. 2017). This can create a false feeling of safety. As people are generally unaware of how their data is treated without their consent, they are unlikely to hear about incidents of their peers' data being misused. This further reinforces the belief that they are not personally affected by the misuse of data.

Bias refers to the biased way of seeing the world, opposed to seeing the world in an objective manner. Biases are subconscious thought patterns that are either innate or learned. They affect the decision-making process in spite of the decision's complexity - they are systematic in nature (Acquisti et al. 2017). These errors in judgment are often taken advantage of when designing for user interfaces in digital platforms.

In anchoring bias, people generate reference points from related or unrelated things onto which they base their decisions (Acquisti et al. 2017). In many ecommerce stores the items with a higher price point are placed on the homepage of the site to create an anchor point onto which people compare other items' prices, making them seem more reasonably priced.

Cognitive dissonance refers to the discomfort that is caused by things that contradict a person's beliefs. People try to reduce the discomfort by distancing themselves from things that are not aligned to their own beliefs (Bösch et al. 2016).

In decoupling, users are separated from a tangible concept in exchange for a less abstract one. This results in a decrease in perceived costs of a decision (Mirsch et al. 2017). This bias is used to encourage people into purchasing things via face or fingerprint sensors, because in this method of purchasing people are less likely to fully understand the amount of money they have spent on a purchase.

Framing plays an important role in people's perception of a thing. Framing refers to a controlled presentation of a decision in a way that influences the decision- making process (Mirsch et al. 2017). A positive presentation of something emphasizes the gain, a negative one stresses the loss, heightening the effect of loss aversion (Acquisti et al. 2017). An example of framing could be a popup that asks for the permission to use cookies in a way that is framed to encourage allowing cookie usage. The options users

might be faced with could be “Yes, I want to ensure the best user experience” or “No, I hate websites that function well”, even though the cookies that ensure the functionality of a website are already loaded, and the pop up likely asks about cookies that are used for marketing purposes.

Loss aversion refers to the disposition of disliking the thought of loss more than liking the equivalent gain. Dark patterns that make use of this bias often also target hyperbolic discounting in which people prefer immediate gains over long- term risks, because they cannot fully comprehend the long-term consequences of the decision (Acquisti et al. 2017). For example, some content on webpages might be only available if the user signs up for an email newsletter. People don’t want to lose a piece of content (loss aversion), and don’t thoroughly think about the consequences of giving their email address in exchange for the additional content (hyperbolic discounting).

Optimism bias leads to people often underestimating the likelihood of a negative event happening to themselves. Overconfidence might result in overestimating one’s abilities. Don Moore, a behavioral economist in UC Berkeley, described these biases when he was interviewed for The Atlantic (Fussell 2019): “Consumers are often a little bit too reluctant to contest their own failings, limitations or errors. It is common for people to say, ‘Oh, I meant to do that’, when in fact they were manipulated”.

People tend to make more mistakes after they have achieved their primary goal and move onto secondary tasks (Acquisti et al. 2017). After installing a software, users might not notice to uncheck the checkboxes that often follow after an installation is finished, that prompt the user for example, to set a certain search engine for their default search engine. This is known as post-completion errors.

In status quo bias people tend to choose the default option if it is offered to them (Acquisti et al. 2017). This choice comes from loss aversion - people want to avoid the loss that might result from not choosing the default option, and instead, don’t make a choice at all (Mirsch et al. 2017). Many assume that the default setting is chosen on the basis of what is best for the user. Most users will thus never even look, let alone change the default settings (Forbrukerrådet 2018). Many apps for example, by default, collect user data for marketing purposes, and the users have to go to the settings to turn data collection off. Apple’s new iOS 14 update will radically change this pattern, as users will have to actively opt in for ad tracking, instead of the app turning ad tracking on by default. Facebook has stated that this practice will have a negative effect on their business model of monetizing targeted ads (O’Flaherty 2020).

3.2.2 System 1 and System 2 thinking

When human cognition has been researched, it has been postulated that two different cognitive systems make up the human decision-making process (Kahneman 2015). These two different cognitive systems, System 1 and System 2, are used in different situations. Whether one makes a decision based on System 1 or System 2 thinking depends on how much motivation they have, how able they are to make that decision, how much they know about the matter, and how much time they have (Bösch et al. 2016).

People resort to System 1 decision making when they have little motivation or are unable to make a well thought decision. System 1 thinking is automatic, unconscious (Bösch et al. 2016) and continuously running (Dennis et al. 2020). When people are presented with a stimulus, System 1 automatically generates a response to it intuitively and impulsively (Dennis et al. 2020). System 1 thinking is emotionally charged: emotions easily affect the thought process (Mirsch et al. 2017). When information is processed quickly in System 1 thinking, dark patterns are more likely to be effective. People are less aware of them and are less likely to act against them (Bösch et al. 2016).

Users are accustomed to associating certain colors of UI with certain functionalities, such as green for continuing or allowing something, and gray as inactive or cancelling. Users use their System 1 to click through popups or forms and might mistakenly click the wrong option if its color differs from this automated thought process of "green means go".

System 2 thinking is characterized by controlled, conscious and effortful processing of information (Bösch et al. 2016). These are the rational decisions that economic theories assume people make when faced with different options. However, even when people make conscious decisions on important issues, they often adopt the thoughts or decisions generated by System 1 without much thought (Dennis et al. 2020).

Thereby, no decision made is fully rational, as System 1 highly affects the decisions that System 2 consciously makes, and further, every decision made is affected by the environment in which the decision maker is in. The effect of social factors that play a role in making dark patterns effective is discussed in the next section.

3.3 Social factors

3.3.1 Social norms

Social norms guide human behavior and affect decision making (Mirsch et al. 2017). They form the basis of cooperation in groups. Social norm is defined as a standard of behavior based on the shared beliefs of a group of how individuals should behave in different situations (Fehr and Fischbacher 2004). They emerge from interactions with others within a group (Mirsch et al. 2017) A group can be family, group of friends, peers, or society as a whole. Social norms differ group to group, increasing conformity within a group and heterogeneity across groups. (Fehr and Fischbacher 2004) Teenagers and young adults might for example feel social pressure to join social media platforms and post certain kinds of content there, like their peers do. By conforming to this behavior, they feel more included in their own group (teenagers, young adults) and less related to other groups (adults).

Individuals obey social norms if their personal goals are aligned with the group's social norms, or if the norms are enforced in a way that violation of them leads to a punishment (Fehr and Fischbacher 2004). This punishment might manifest in social exclusion, for example.

3.3.2 The need to belong

Humans have an innate need to belong (Bösch et al. 2016). Social exclusion has thus fundamental consequences, such as: anxiety, loneliness, anger, antisocial and self-defeating behavior (Pickett, Gardner and Knowles 2004), lower self-esteem, and even reduced well-being and belief in meaningful existence (Bösch et al. 2016). Because of such negative consequences of social exclusion, humans have subconscious tendencies to conform to group norms (Pickett et al. 2004).

3.3.3 Maximizers and satisficers

People try to make choices that satisfy their needs as well as possible. However, when they are faced with a plethora of choices, it is harder to consider all the possible alternatives. Instead, people satisfice with the best possible option in that situation. The degree to which an individual strives to satisfice or maximize their decisions differs in population. (Sparks, Ehrlinger and Eibach 2012)

When people have made a decision, they reduce the cognitive dissonance arising from not having the choice of making a decision anymore. They shift their thinking from different possible alternatives into focusing on the option they have chosen. When making decisions online, people are more likely to satisfice as they have limited cognitive resources that are used when making decisions, and almost unlimited number of choices. As satisficers, they reduce their cognitive dissonance, and are less likely to regret that decision and return to alter it (Sparks et al. 2012).

After completing a registration process to a service, users are often faced with a pop up asking whether they allow the service to use cookies. They might allow the cookies on the account of framing (the service might state that allowing cookies betters the user experience), or due to post completion errors. After they have once allowed tracking cookies (satisficed), they reduce their cognitive dissonance, and never change the cookie setting again.

3.4 Self-determination theory

According to self-determination theory, people are motivated either externally or internally (Nurmi and Salmela-Aro 2017). Internal motivators are one’s interests, passions and values. External motivators are rewards, punishments, external expectations, and social pressure. These factors drive the individual into making decisions and acting in different situations. (Deci and Ryan 2008)

Individuals differ in the way in which they believe they can make their own decisions in a given situation. When someone is autonomically oriented, they believe that they can make their own decisions, and external factors do considerably alter their decision-making process. In controlled orientation, individuals often seem to have their decisions affected by their external environment. Shame and social pressure are considered especially powerful factors to alter people’s decisions. In unconstructed orientation,

people base their decision-making process solely on external motivators - they feel no control over their own decisions. (Vasalampi 2017)

The differences in people's beliefs of how much control they have when making decisions explains why some people are more prone to manipulation and dark patterns online. If a person is easily influenced by external motivators, they are more likely to be vulnerable to dark patterns that use social proof (social pressure) or use framing and interface inference to steer the user into making certain choices and shaming them, if they don't (shame). (Vasalampi 2017)

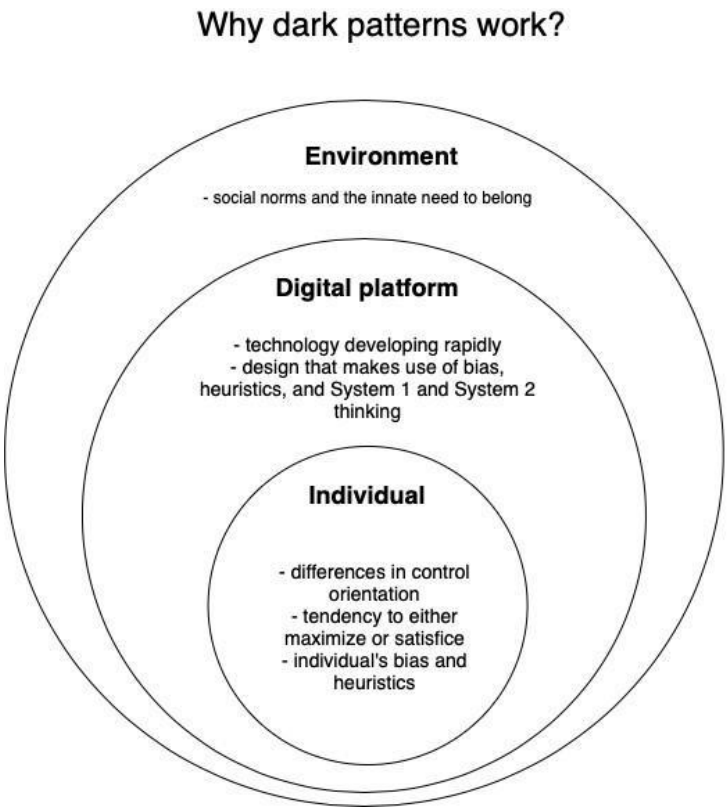

Figure 4 Working mechanisms of dark patterns divided into three layers

4 Why are dark patterns being used in e-commerce?

4.1 Brief introduction to e-commerce

E-commerce can be defined as a commercial way of making transactions online. It is rapidly growing, resulting in the amount of purchase decisions that take place online to grow rapidly as well (Xiao and Benbasat 2007). E-commerce can be divided into three categories: B2C (business to consumer, B2B (business to business), and C2C (customer to customer) e-commerce. In this thesis, the focus is on B2C e-commerce.

Constantinides (2002) has divided the consumer buying process online into six steps:
Problem identification
Information search
Alternatives evaluation
Building trust
Purchasing decision
Post-purchase behavior

The buyer decision making process is influenced by these steps, but also by marketing stimuli, personal and environmental factors, and the web experience: online controllable marketing factors. This stresses the importance of creating an online store that functions well, is easy to use, has a good usability rating and offers a positive user experience. (Constantinides 2002)

Digital marketplaces offer convenience, bigger product catalogues, and a lot of product-related information for the customer. But for these very same reasons, and because of the limited nature of human cognitive capacity, making the final purchase decision can be difficult (Xiao and Benbasat 2007). Consequently, e- commerce retailers must design their website's user interface and user experience in a way that makes the purchasing process easy for the customer and encourages them to return. For a business, it is more profitable to retain existing customers than recruit new ones (Zhang & von Dran 2001).

As the field of e-commerce is very competitive, and customers have multiple options for their choice of e-commerce store, they quickly abandon their online orders if they have a hard time completing their purchase process (Haywood 2006). Therefore, creating a well-functioning website that satisfies customers' needs and leaves them with a good user experience should be the number one priority for all e-commerce stores.

4.2 Prevalence of dark patterns in e-commerce

In a study conducted by Mathur et al. (2019), the researchers created a website crawler to go through 11 000 popular e-commerce sites to find out the prevalence of dark patterns in e-commerce. They found out that over 11% of the websites they studied had elements that could be classified as dark patterns. Furthermore, it was observed that more popular e-commerce sites were more likely to use deceptive patterns. Some e-commerce sites also used multiple instances of dark patterns across their website. (Mathur et al. 2019)

Moser, Schoenebeck and Resnick (2019) looked at the top 200 e-commerce websites in the US and evaluated the prevalence of factors that induce impulse buying. Some of these factors are non-malicious nudges toward purchases (such as a wish list), but some were more aggressive pushes toward making purchase decisions, ones that could be classified as dark patterns (such as countdown timers for sales). All of the websites in the study included at least four features that encourage impulse buying, 75% of the websites had at least 16 features that nudged customers toward impulse purchases. (Moser et al. 2019)

Based on the results of these studies, and on the amount of e-commerce related dark patterns classified by Brignull (n.d.), Gray et al. (2018) and Mathur et al. (2019), it can be concluded that dark patterns are very prevalent in e-commerce, even more so on popular e-commerce websites.

4.3 Why are dark patterns used in e-commerce?

If a positive user experience should be the number one priority for e-commerce sites to succeed, why then do retailers resort to dark patterns that can cause frustration and annoyance, and at worst the feeling of being deceived and having a poor user experience?
E-commerce retailers have a great control over their users on how they access and interact with the website. Due to the competitive nature of the e-commerce field, many e-commerce sites are designed in a way that enables the retailers to influence consumer behavior and make them stay on the site for as long as possible (Haywood 2006). High customer engagement rates have been associated with higher levels of economic success (Eisingerich and Kretschmer 2008), so as a result, retailers strive to increase the engagement on their site with the use of dark patterns.

An institutional drift has led to the adoption of dark patterns on a much larger scale (Germain 2019). Technological giants such as Facebook and Google have shaped our expectations and brought forward many dark patterns that other service providers have also taken up (Forbrukårradet 2018). Mathur et al. (2019) showed in their study that the more popular an e-commerce site was, the more likely it was to use dark patterns. These popular e-commerce sites are setting an example for smaller businesses that in turn employ dark patterns, as succeeding in a competitive market might not be as feasible otherwise.

Vendor reputation has an important effect on customers' trust (Acquisti 2017). In some cases, trust even overrides the importance of usability and user experience on online stores (Haywood 2006). If users trust the service provider, they will assume that the retailer knows what is best for them (Forbrukerrådet 2018) and might not pay attention to deceptive and misleading dark patterns that steer them toward making choices that they think are the best option for them. Trust allows e-commerce retailers to employ dark patterns without getting caught, and having their reputation affected.

One reason for the prevalence of anti-patterns and dark patterns is the speed at which e-commerce stores are created. In a rush to launch a new site, designers focus on a "happy path" - a path that fills the goals that have been set for the project. In such cases, not much attention is paid to tasks that do not comply with shareholder goals, such as deleting an account, or unsubscribing from a newsletter. (Germain 2019)

Gray et al. (2018) argue that the prevalence of dark patterns is partly due to the insufficient focus on ethics education as a part of the core curriculum for user interface and user experience design students. Despite repeated calls for more focus on the ethics of design, ethics is yet to be a formalized part of a design curriculum (Gray et al. 2018). Student designers often acknowledge user values and goals, only then to leverage them to persuade users toward stakeholder goals (Chivukula, Brier and Gray 2018). It can be argued that designers do in fact think about the ethical aspects of the design, but due to institutional or financial pressure, turn away from user-centered design when it comes to making design decisions.

4.4 Why should we "come to the light side"?

There are many arguments as to why dark patterns are used in e-commerce, but very substantial reasons exist as to why dark patterns should be avoided in user interface design. In this section of the thesis, the focus is why designers and companies should avoid the use of dark patterns and "come to the light side".

If users become aware of the persuasion techniques that are used, it inevitably leads to users reassessing their attitude toward the e-commerce retailer (Djurica and Figl 2017). These manipulation attempts have direct consequences for the retailer, such as: it might lead users to trust the retailer less; or it might result in a poor user experience that discourages users from making purchases again from the retailer (Constantinides 2002). For this reason, it is important for online retailers to carefully consider the design choices they make.

While the use of dark patterns is still quite poorly regulated, legislators are starting to catch up. The European General Data Protection Regulation (GDPR) contains principles that can be used to target businesses that employ dark patterns. GDPR requires businesses to process personal data 1) transparently, 2) fairly and 3) for explicit and legitimate purposes. One of the most common ways for a website to collect personal data is through the use of cookies. GDPR requires websites to ask for explicit consent from users in order to allow data gathering. Websites have typically complied using a

"cookie banner" that asks users to either allow or disallow cookies. However, this user interface often includes dark patterns, such as visual interference (Bösch et al. 2016), and thus, consent is neither explicit nor given fairly. ([EU] 2016/679 [General Data Protection Regulation])

Senators in the US have introduced a bipartisan bill that aims to make the use of dark patterns illegal on any social media platform with more than 100 million monthly active users. Disclosures of personal data collection must be "clear, conspicuous, context-appropriate, and easily accessible" and not "deceptively obscured". The bill would also make it illegal to design a user interface directed at children under the age of 13 to cultivate compulsive usage. If the bill is passed, it would instate a DETOUR (Deceptive Experiences to Online Users Reduction) act in the US. (Tiffany 2019)

These regulations and acts are the frontrunners of legislation that aims to combat user manipulation and deceit. However, as dark patterns are sometimes hard to recognize, and their "darkness" varies greatly as noted in previous sections, holding businesses accountable for the use of dark patterns is difficult, as it is challenging to recognize which aspects of the design could be considered as dark patterns. Researchers are currently aiming to create a formalized system which determines the degree to which users are manipulated. In the future, these systems might aid legislators and different authorities to hold businesses accountable and prevent user manipulation via the darkest of patterns. (Caruso 2019)

5 Conclusion

This study aimed to shine light on dark patterns, explain what makes them effective, and discuss the prevalence of them in the context of e-commerce. The reasons behind the usage of dark patterns were discussed, as were the reasons as to why online retailers should avoid using dark patterns on their site. This thesis had the following research questions:

1.) What are dark patterns?
2.) Why do dark patterns work?
3.) Why are dark patterns used in e-commerce?

This thesis defined dark patterns as intentional, deceptive design decisions that were made to take advantage of psychology, to manipulate the user into making decisions that were unintended and unwanted; creating value for the service that employs them. Even if a definition was synthesized for dark patterns, it was concluded that it is hard to categorize user interface elements into being digital nudges or dark patterns. Most of the patterns discussed in this thesis fall somewhere between a nudge and a dark pattern - on a so-called “gray area”. This, in turn, poses a challenge for the regulation of dark patterns. If user interface elements cannot be definitively classified as dark patterns, due to the lack of set criteria for an element being a dark pattern, the use of these elements cannot be properly regulated.

This study found that there are many factors that make dark patterns effective. Firstly, the speed at which technology develops makes it hard for people to recognize dark patterns when they encounter them.

Secondly, the limited capacity of human cognition makes people vulnerable to dark patterns. Shortcuts in the decision-making process, known as heuristics, guide the decisions that are made daily. Due to these heuristics, people are unable to comprehend how prevalent dark patterns really are, and how often they are effective.

Biases are systematic errors in judgement, and they can rarely be avoided as they are subconscious. Many dark patterns take advantage of various biases to gather more personal information, make users spend more time on a website, or spend more money on an e-commerce site.

The limited cognitive capacity of humans has led to the use of two different cognitive systems when making decisions - System 1 thinking and System 2 thinking, accordingly. System 1 thinking is automatic, unconscious and constantly running. When people are faced with a stimulus, a response is automatically and intuitively created, using System 1 thinking. When information is quickly processed in System 1 thinking, people are more vulnerable to dark patterns, as their decisions are not thought through, but are instead automatic responses to a stimulus.

System 2 thinking is controlled, conscious and effortful - it is reserved for important decisions. However, even when people make conscious decisions using System 2 thinking, they often adopt the conclusions that System 1 has come to, without giving it much thought.

Thirdly, as social animals, humans are prone to the effects of social factors in their decision making. The need to belong makes people conform to social norms that guide our behavior. Our decision-making process can thus be easily swayed by dark patterns that take advantage of the role of social factors when making decisions.

Lastly, humans have individual differences in the way in which they believe they have control over their own decisions in different situations. Differences in control orientation explain why some people are more vulnerable to their decisions being affected by the external environment, and why some people might be immune to the effects of dark patterns. Differences in people's control orientation should be looked into as explaining factors when studying the effects of dark patterns in the future.

There are multiple reasons as to why dark patterns are used in e-commerce. Dark patterns in e-commerce were found to be very prevalent: 11% of e-commerce sites studied by Mathur et al. (2019) contained dark patterns. The more popular a site was, the more likely it was to contain dark patterns. Similar results were found in a study conducted by Moser et al. (2019). All of the sites studied contained impulse buying inducing patterns, and 75% of the sites studied contained at least 16 patterns. This prevalence of dark patterns is one of the reasons why dark patterns are used in e-commerce. Institutional drift has led businesses to adopt dark patterns on a much larger scale. Popular e-commerce sites that use dark patterns set an "industry standard" for the use of dark patterns.
Other possible explanations as to why dark patterns are used in e-commerce are that dark patterns are used to drive up customer engagement, which has been associated with higher levels of economic success; short deadlines and tight budgets of creating online stores compel designers into focusing only on a "happy path" that fills shareholders' goals; or the lack of focus on ethics education for user experience and user interface design students.

There are some limitations related to this study. Firstly, as the study of dark patterns in information systems science is quite a new topic, there is a limited amount of research available to study. Furthermore, as the topic of dark patterns is still new, most research is focused on generating definitions for dark patterns, or a taxonomy to classify them. Only one research article that was directly related to dark patterns in e-commerce was found.

Research on dark patterns and impulsive buying inducing patterns has only been done on sites that are popular in the US. It would be interesting to study the cultural differences between the conventions of dark patterns in the US and elsewhere, as well as people's reactions to them. Are dark patterns that take advantage of people's tendency to conform to social norms more effective in countries that are classified as collectivist, rather than individualistic in nature?

Furthermore, it would be interesting to study people's attitudes and reactions to dark patterns over a long period of time. Dark patterns can be seen as a shortcut to increase sales, but research has shown that if people become aware of the manipulation they encounter online, they start to reassess their attitude toward the retailer. This loss of trust and damage for the brand might have significant long-term implications for the success of the retailer using these dark patterns.

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