

Louvain School of Management

The influence of *Dark Patterns* on users' attitudes and behaviours

A classification based on the FCB grid

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1 Introduction

1.1 Problem Statement

1.1.1 What is a Dark Pattern?

We currently live in an era where everything happens online. We have built hyper-connected societies in which our electronic devices are considered an extension of not only our bodies, but they're even considered being an extension of our identities. The internet has become an essential part of our life and digital marketing is constantly present nowadays.

Marketing techniques have developed even further with the internet, aiming not only to make more profit, but also to extract more data and to study internet users to get a greater segmentation of the public. The internet has developed a data market which is exploding more and more with the arrival of new applications and technologies, such as Liang et al.(2018) state. The Big Data business is growing each day bigger and generates millions. Such as Liang et al.(2018) state, big data is key to any business's productivity. Today, not only our time and money are precious but, also, companies want to get to this new gold made from our online traces.

We can see how marketing develops and grows and how digital marketing is more present than ever. Dark Patterns are designs which are based on already existing marketing techniques such as nudging and growth-hacking (Narayanan et al., 2020). Their aim is to make the user do things they never intended on doing, such as spending more money or time than expected or even sharing data they didn't want to share (Bringull, 2018). As the name says it, they work in dark ways, manipulating and even forcing the user's will, working quietly and even by deception. Their essence has been repeatedly questioned regarding ethical dimensions. These designs are currently all over the web looking to extract users' data, money, time, and even their social capital (Narayanan et al., 2020).

Many classifications and typologies have been constructed, since these designs are constantly present on the web and users are normally aware of their presence and influence (Bongard-Blanchy et al., 2021). Mathur et al. (2021) have regrouped these typologies highlighting six different attributes they can present (asymmetric, restrictive, disparate treatment, covert, deceptive and information hiding) and how they influence choice (either they work by modifying the decision space or by manipulating the information flow).

What Dark Patterns aim is to play with choice, and to drive the user towards these

design's goals, but making the user believe their choices were made on free will (CNIL, 2019). These choices represent the user's online behaviour when buying, sharing information or spending time on a specific way. A classification on how dark patterns influence users' attitudes and behaviours, and so their choice, could be built to study their effects in larger depth. These behaviours, attitudes and choices could possibly be studied following the FCB grid.

1.1.2 The FCB grid

Foote, Cone and Belding have built a grid which explains consumers' behaviours and decision making processes that are done when buying (Cheong et al., 2021): either the consumer has a low involvement or a high involvement to the purchase and the decision is made by rational mechanisms or by their feelings (Haley & Pittman, 2022).

Foote, Cone and Belding's grid presents four different degrees explaining consumer's behaviours. They claim this behaviour bases itself on thinking (cognitive dimension), feeling (attitude/emotion) and doing (behaviour) at different degrees.

This grid is used to classify different products and how their purchase is made by the consumer. It is also used to classify brands and how their image is perceived by the public. Haley & Pittman (2022) have even classified social networks using this grid.



Fig. 1: Foote, Cone & Belding consumer behaviour grid (*Haley & Pittman, 2022*)

This research aims to study the processes involved when making a choice and how the user is influenced by deceptive designs. The goal of this study is to adapt the FCB grid to classify dark patterns by measuring the influence they have on attitudes and behaviours. The objective is to classify different dark patterns by studying how these designs influence users' thinking, feelings and doing.

Some designs force users and coerce them into doing something, leaving them no choice: for example, when watching a video and an advertising interrupts the user's task flow, forcing them to visualize the ad if they want to continue with their first task. Another example, which is darker, is when a user downloads a software and, with no warning, the platform downloads other softwares into their device. There is also Forced Continuity, in which a user subscribed to a free trial of a certain platform and, after some months, they find out that their credit card has been charged with costs of said subscription (Bringull, 2018). These are typical patterns of designs that would be classified under the "doer" or "reactor" parts of the grid, since the actions of buying a product, sharing information or spending time are forced on the user and are immediately done, before even thinking or feeling. The user is then forced to perform an action, leaving them with no choice.

One example of a pattern that would go under "doer" would be Sneak into Basket, where the platform adds an extra product with no warning and the user finds out about it on the last step of the purchase. At this step, the user will weigh the advantages/disadvantages of taking it (thinking) and then build an attitude towards it (Bringull, 2018). On the other hand, Hidden Costs could belong to the "reactor" classification, in which a consumer will want to buy a specific product and the platform shows one price and, at the last step of the purchase, it is revealed that the product comes with extra costs. Revealing this at the last step will discourage the user to search something different because they will feel they have already spent a certain time and effort on searching and choosing the right product (Bringull, 2018). The user will weigh the advantages and disadvantages of taking it, but this pattern will most likely trigger feeling and emotion before thinking.

There are also some other designs that aim to trigger feelings and emotion and play with these. These are designs such as Confirmshaming, in which a platform will try to guilt the user into buying something. An example of this would be travel agencies that want to guilt the consumer into taking an insurance and so "think about their safety" when booking a trip (Bringull, 2018). There are also designs which will appeal more to our senses, such as Misdirection, in which a design will highlight one option more than the other, usually using visual techniques (Bringull, 2018).

Finally, there are patterns that play with the user’s thinking processes and aim to influence these. In this category, there are patterns such as Price Comparison Prevention, in which a platform will not allow the user to compare prices and costs of two similar products, not letting them know which one is cheaper (Bringull, 2018). Another example of this category would be Rewards and Punishments (NCC, 2018). For example, a user wants to disable personalised ads but, if they do so, the navigator won’t let them block any ads. If the user allows personalised ads then they will be able to block any ad they would like (NCC, 2018). This last pattern would leave them weighing on the best option: to have personalised ads and to know that there are companies selling and using their data, or not to have personalised ads and be penalized for it.

That the characteristic that will replace “involvement” on the grid would be “forced action”. The lower part of the grid, presenting the categories “doer” and “reactor”, is the part where the action is forced upon the user. The upper part of the grid, presenting the categories “thinker” and “feeler”, will be the one where the influence of these patterns on decision is less felt by the user but where there probably is more manipulation.

The aim of this research is to adapt this grid from a consumer-wise perspective, to a user-wise, analysing their attitudes and behaviours under dark patterns influence.

1.2 Research Question

As previously stated, many typologies have already been built to study different kind of dark patterns, regrouped in a study made by Mathur et al. (2021) in which they explain how these deceptive designs can be resumed in two groups: either there are designs which will manipulate the decision space and designs which will play with information flow.

Classification and typologies of different kind of dark patterns and their characteristic have been overly done before. Nevertheless, something very important to study and to keep in mind is how these dark patterns influence the mind and induce choices and the mechanism behind it. Waldman (2019) has already highlighted the cognitive mechanisms that go into work, but there aren’t a lot of research focused on this matter, specially with a marketing point of view. This research’s aim is to deeply study the following question: *how to adapt the FCB grid to study and classify the influence dark patterns have on users’ attitudes and behaviour?*

1.3 Hypotheses

After having detailed the problem statement as well as the research question, the hypotheses stated are:

HP1: Dark patterns will aim to make users do actions they never intended on doing by either forcing them (which will lead to a “do” classification) or by manipulating the user’s thinking processes (which will lead to a “learn” classification) and/or feelings (which will lead to a “feel” classification).

HP1.1: These deceptive designs can be classified following the patterns of do-learn-feel, do-feel-learn, learn-feel-do and feel-learn-do.

HP2: Manipulation will be felt much stronger when the design aims to influence feelings and emotion, while manipulation on rational mechanisms can be more tacit.

HP3: Dark patterns classified under “do-learn-feel” or “do-feel-learn” will tend to be perceived as being more invasive and will get more negative impressions.

1.4 Objectives

These designs are often identified as being aggressive marketing techniques (Mathur et al., 2021), presenting characteristics that can be felt as intrusive and that will generate negative effects on the users. As Luguri & Strahilevitz (2021) state “dark patterns are strikingly effective in getting consumers to do what they would not do when confronted with more neutral interfaces” (p.46). Luguri & Strahilevitz (2021) have studied these designs with a more legal perspective.

The term *persuasion* must be differed from the plain manipulation and coercion of the user. Marketing techniques are usually persuasive, wanting to seduce the public. But dark patterns are not involved in a game of seduction any longer, and techniques can get very aggressive, generating users’ backlash (Luguri & Strahilevitz, 2021).

This research’s goal is to study these online designs with a marketing point of view. A classification will be built in which it will be possible to study the wide spectrum presented by dark patterns and to study their influence on users’ thinking processes and feelings. Studies on dark patterns have been mostly focused on User Experience (UX), legal and ethical aspects.

Knowing that there are more “in-your-face”, aggressive designs such as quieter ones, the main objective is to study the vast spectrum they represent. The goal is to analyse how each of the already detected patterns works to make users perform actions they never intended on doing. By building such classification, academic work will be able to study more in depth the mechanisms behind these designs and shine a light on them.

2 Literature Review

2.1 Dark Patterns: an introduction to the concept

The concept of *Dark Patterns* was firstly introduced by the UX and cognitive semiotics specialist Harry Brinull in 2010 (Gray et al., 2018). As Luguri and Strahilevitz (2021) explain, these patterns were specifically designed to trick and confuse users of a certain platform. Their aim is to manipulate the user’s will to do certain actions which he did not intend on doing, influencing their preferences (Luguri & Strahilevitz, 2021), and making these decisions feel like they were made by free will (Day et al., 2020).

As Gray et al. (2018) describe, these patterns study and know how the human mind work. They already know how a human will react and behave given a precise situation and will aim to deceive the user on the other end. These patterns work on a cognitive level, playing with the user’s mind and not for their best interest, but rather looking to get something out of them. Many users have admitted getting a feeling of frustration when coming across them, but they continue to fall for the manipulation these designs generate, without being able to fully grasp them (Bongard-Blanchy et al., 2021). As Bongard-Blanchy et al. (2021) explain, users are aware of the degree of manipulation that they can be exposed to, but they continue to fall for them.

2.1.1 A Historical Approach

Dark Patterns are not new in marketing, but they are rather a combination of previously used techniques, ever since the early stages of publicity and advertisement. Before diving in the different categorizations these designs can fit into, a reconstruction of the bases over which they are built will be firstly made. As Narayanan et al. (2020) describe, Dark Patterns are built from previous practices which manipulate cognitive biases. Such bases are deceptive ones from retail, nudging and growth-hacking (Narayanan et al, 2020).

RETAIL DECEPTIVE PRACTICES

Deceptive practices used in retail are mostly focused on pushing the consumer to buy a product by playing with their minds. Three techniques are presented by Narayanan et al. (2020): the first one, psychological pricing will avoid presenting round numbers and prefer presenting a price in a way it will look cheaper, pushing the client to buy the item (3,99€ will look much cheaper than 4,00€, and a client will more likely buy the first option). The second technique presented it is not only manipulative but also it is not quite legal: Narayanan et al. (2020) talk about techniques like presenting the closure of a given store, when it is not actually happening. The most extreme case of deceptive retail practices are ones like bait-and-switch ones, when deals are presented but they won't happen (Narayanan et al., 2020).

NUDGING TECHNIQUES

Regarding nudging techniques, Narayanan et al. (2020) quote the concept firstly introduced by Sunstein and Thaler in the politics' domain and state: "governments, employers, and other benevolent institutions should engineer "choice architectures" in a way that uses behavioural science for the benefit of those whom they serve or employ" (p.72). As Chriss (2015) puts it forward, nudging is the science of behaviour. Such as Narayanan et al. (2020) previously stated, it is all about building the choice of our target. We know that by using a certain technique, the user on the other end will make a certain choice. The ethics regarding these techniques have been thoroughly questioned, since it can be a technique which could be used for the lesser good. Nevertheless, as Sunstein (2015) states: "It is pointless to object to nudges and choice architecture as such. Human beings cannot live in a world without them" (p. 450).

GROWTH-HACKING

The final base from which Dark Patterns are built is Growth-Hacking. This technique aims to get many customers from a low cost. Narayanan et al. (2020) explain that one of the first online platforms to use this technique was the mailing service Hotmail. The latter created an automated signature at the end of each e-mail sent by its users where it invited the receiver of the e-mail to join the service. This way, by using its users as advertisers, the platform gained a lot of popularity. This technique also has some derivatives which may border on the illegal or not ethically correct. Some platforms get access to their users' contact lists and invite them to join other platforms on the behalf of the users, when they never meant to send anything and are unaware of it, often searching to deceive the receptors and spamming them (Narayanan et al. 2020).

2.1.2 Characteristics

Online growth-hacking joined two techniques that allowed dark patterns to flourish in the online world, something that retail services couldn't achieve in the offline world (Narayanan et al., 2020). Firstly, being based on nudging techniques, growth-hacking were based on the principle of behaviour changing, knowing how to work with cognitive biases and influencing them. Secondly, great extents of design A/B testing allowed designers to analyse which web designs worked better on users to achieve the goals the developers were aiming (Narayanan et al., 2020). As Narayanan et al. (2020) state, these A/B tests are a crucial clue when building a webpage and, more often than not, these tests lead to the creation of dark patterns: designers and web developers want their users to accomplish certain actions within their webpage conception so their design will lead them to them, and A/B tests are a way to know which items/designs work best on users. Even though Zagal et al. (2013) state that "dark patterns do not happen by mistake; they must be purposefully utilized to evoke the given behaviour" (p.2), Narayanan et al. (2020) explain that, sometimes, web developers unintentionally construct them by using these A/B tests.

As previously mentioned, the person who introduced the concept of dark patterns was Harry Brin-gull through his website <https://www.deceptive.design/> (Gray et al., 2018). Brin-gull has constructed a taxonomy of dark patterns which can be found on the web.

TRICK QUESTIONS: while filling in a form you respond to a question that tricks you into giving an answer you didn't intend. When glanced upon quickly the question appears to ask one thing, but when read carefully it asks another thing entirely.

SNEAK INTO BASKET: you attempt to purchase something, but somewhere in the purchasing journey the site sneaks an additional item into your basket, often through the use of an opt-out radio button or checkbox on a prior page. **Roach motel:** you get into a situation very easily, but then you find it is hard to get out of it (e.g. a premium subscription).

PRIVACY ZUCKERING: you are tricked into publicly sharing more information about yourself than you really intended to. Named after Facebook CEO Mark Zuckerberg.

PRICE COMPARISON PREVENTION: the retailer makes it hard for you to compare the price of an item with another item, so you cannot make an informed decision. **Misdirection:** the design purposefully focuses your attention on one thing in order to distract your attention from another.

HIDDEN COSTS: you get to the last step of the checkout process, only to discover some unexpected charges have appeared, e.g. delivery charges, tax, etc.

BAIT AND SWITCH: you set out to do one thing, but a different, undesirable thing happens instead.

CONFIRMSHAMING: the act of guiltling the user into opting into something. The option to

decline is worded in such a way as to shame the user into compliance.

DISGUISED ADS: adverts that are disguised as other kinds of content or navigation, in order to get you to click on them.

FORCED CONTINUITY: when your free trial with a service comes to an end and your credit card silently starts getting charged without any warning. In some cases this is made even worse by making it difficult to cancel the membership.

FRIEND SPAM: the product asks for your email or social media permissions under the pretence it will be used for a desirable outcome (e.g. finding friends), but then spams all your contacts in a message that claims to be from you.

(Brin gull, 2018)

Some authors, such as Gray et al. (2018), tried to summarize this previous list and simplified it (Attachment 1). Others have added more to the list or they have modified some existing ones such as Conti & Sobiesk, Zagal et al., Bösch et al., entre autres (Mathur et al., 2021) (Attachment 2). These attempts to categorize dark patterns aren’t always as easy to construct as they may appear and usually result in incoherences and, as Mathur et al. (2021) state, there is clearly “a lack of conceptual consistency in prior work” (p.7).

Mathur et al. (2021) have identified how dark patterns work and created a summary of all the taxonomies they have encountered to try and give to the theoretical framework a coherent shape. Dark patterns work either by modifying the set of choices presented to the user, or by manipulating the information available (Mathur et al., 2021, p. 9). They have found that dark patterns revolve around six attributes; they can be asymmetric, covert, deceptive, hiding information, restrictive and treating their users differently.

Choice Architecture	Attribute	Description
Modifying the decision space	Asymmetric	Unequal burdens on choices available to the user
	Restrictive	Eliminate certain choices that should be available to users
	Disparate Treatment	Disadvantage and treat one group of users differently from another
	Covert	Hiding the influence mechanism from users
Manipulation the information flow	Deceptive	Induce false beliefs in users either through affirmative mis-statements, misleading statements, or omissions
	Information Hiding	Obscure or delay the presentation of necessary information to users

Fig. 2: Mathur et al.’s taxonomy (Mathur et al., 2021)

Mathur et al. (2019) have previously stated that dark patterns generated different feelings to users: a sense of urgency and scarcity on what’s being proposed, aiming to rush the

process that represents decision-making, a sense of social pressure, confusion, obstruction, misdirection and forced actions.

URGENCY AND SCARCITY

As Mathur et al. (2019) present them, some dark patterns can generate a feeling of urgency and of scarcity, which will rush the decision process of the user, making choices seem quite impulsive. The dark patterns types we can find under this category are those like countdown timers, limited messages, low-stock messages and high-demand messages. These patterns will make the user feel like they are missing out on something, rushing them to probably buy the product. These messages, especially those of high-demand, will make the product look as though it had a much higher value than it has and will therefore increase the desirability perceived.

MISDIRECTION, OBSTRUCTION AND FORCED ACTION

In this category, we find the dark patterns that either pull the user into a choice, force the user or deceptive designs that make a certain action harder. The “obstruction” characteristic was firstly introduced by Gray et al. (2018) and represents the dark patterns that make an action harder than what it should be: for example, a subscription to a certain service can be quite easy to acquire, but wanting to give the subscription up can represent a rough task (Mathur et al., 2019).

Regarding misdirection, the platform will make the user go a certain way. This can be seen in confirmshaming, for example, generating a feeling of guilt on the user. Other patterns create visual interferences on the webpage, making one item stand out more than another one.

Finally, dark patterns under the category of “forced action” were also theorized by Gray et al. (2018). These patterns are those which force the user to do a certain action to obtain what they are looking for. For example, Mathur et al. (2019) talk about forced enrolment, where the platform collects and asks for more data than it should, and that the user wouldn’t have consented to give such data away otherwise.

SOCIAL PROOF

The user will be manipulated to make a certain choice because other people are making it. Their behaviour will be influenced if they see other people making a certain choice; the user will feel a certain social pressure to conduct as the others (Mathur et al., 2019). Dark patterns found under this category can be such as active notifications, where the user is notified that “other 20+ people are looking at this product right now!”. Another design that

can be found under this typology are testimonials of uncertain origin (Mathur et al., 2019).

As explained by Narayanan et al. (2020), dark patterns’ designs have mainly three intentions: financial intentions, data extraction and capturing attention. These characteristics have been further studied by Zagal et al. (2013) in the domain of virtual games. The focus these authors have taken in their studies has been more aimed at social-capital patterns.

MONETARY DARK PATTERNS These patterns will want to make the platform gain more money from the user than what the user firstly intended to spend. Zagal et al. (2013) explain that in games, these different patterns will make the user lose track of how much money they are spending. Lewis (2014) has looked deep into these patterns in gameplay and states that they are “behavioural economic tactics employed to encourage users to think they are getting a good deal on virtual items”. Normally, the user is tricked into spending more than expected. Patterns under this category generate urgency on the user, and increase impulsive buying such as messages of high-demand and low-stock. Social proof dark patterns also contribute to spending; as Sin et al. (2022) explain, these patterns will most likely induce impulsive buying.

Lewis (2014) presents other forms that can take monetary dark patterns, especially in services that present a gamified platform. An example of this can be currency confusion, working with anchoring effect: a platform has a virtual currency which has a different value than actual currency and will confuse the user on how much they are actually spending. We can also find platforms with Monetized Rivalries, where a gamer can improve much better in a game if they pay; if the user doesn’t pay, then the game will be quite basic and improving on it will become harder and harder. Another monetary dark pattern can be those where you pay to skip (a level in a game, an advertisement,...). Finally, Zagal et al. (2013) talk about pre-delivered content, where the free version of a “free” game available is not actually complete but you need to spend money to complete it, without knowing about it beforehand.

TEMPORAL DARK PATTERNS

Temporal dark patterns also impact the user’s time and attention on a given platform. They are built in a way that they will capture an individual’s attention for longer so that they can show them more advertisements (and, therefore, get a greater income), so that the user can stay longer on a webpage and, so, buy more or give more data away. Their goal is to create a certain addiction to the service so that they keep coming back asking for more (Narayanan et al., 2020). Narayanan et al. (2020) give the example of Uber and its drivers: Uber has some gamified nudges that will keep the drivers on the road for longer, such as giving a barometer showing them how much more they can gain if they keep driving for some

hours more.

Zagal et al. (2013) present two different temporal dark patterns present in some virtual games. The first one, griding, will give the gamer repetitive tasks with the only goal of making the player stay longer to play. The second one is “Playing by Appointment” which forces the player to adapt their schedules to the game’s ones: the game will set given times for the player to come play and level-up.

PRIVACY INVADING DARK PATTERNS

Finally, this last category includes all dark patterns which attempt to invade a user’s privacy, especially those attempting to get more data than needed from them. Bösch et al. (2016) detailed these privacy dark patterns and stated that “actors intentionally manipulate people to provide their personal data for collection, storage and processing against their original intent and interest” (p.252). They have identified seven different shapes that these patterns can take:

MAXIMIZE: the platform collects much more data than needed from the user.

PUBLISH: the data provided by the user is publicly exposed.

CENTRALIZED: one central entity processes and collects all the data.

PRESERVE: interrelation between the data is not affected by processing.

OBSCURE: the user is not aware that their data is being processed.

VIOLATE: some privacy policy is violated by the platform.

FAKE: the platform presents strong privacy policy that it actually doesn’t respect.

(Bösch et al., 2016)

Some dark patterns found in this category are Privacy Zuckering, Forced Registration, Shadow User Profiles, etc. Their aim is to collect and exploit the users’ data in ways that they are either hiding their main goal to the user or want to get more information than needed. Here, the definition of consent can get blurry. Zagal et al. (2013) detailed these patterns in gameplay, focusing on the social aspect of it. These researchers state that some dark patterns impersonate the user and send messages to their contact lists with the user’s profile but without their consent.

2.2 Choice Architecture

As previously stated, dark patterns relay on choice architecture. Firstly, an analysis on how the user makes a choice and how this choice was actually predicted is going to be made: dark patterns have different goals (whether they are financial, temporal or related to private data) which are based on what the user is going to consent to (or how the user will be manipulated

and/or influenced to give their consent).

Zhao (2018) states that consumers make rational decisions looking to maximize their utility. But how is a choice made online? As Johnson et al. (2012) say, no web construction is neutral, there is always some intent behind them. The way human cognition works is by following others' expertise (CNIL, 2019): developers build a platform in a way that it will allow the user to make certain choices, seemingly on free will. As CNIL presents it (2019), choice architects want to induce a certain action on the user, they aim to influence the user's behaviour online. The choice they make relies on the way that the possible choices are presented (Johnson et al., 2012). Zhao (2018) explains that a decision also depends on the environment it is made: regarding behavioural economics, "small changes in the decision environment can exert a disproportionate influence in guiding behaviour" (p. 419).

As Thaler and Sunstein explained when presenting Nudges, choice will be influenced especially by solutions that require less effort, in a context where we have a lot of information overload (CNIL, 2019). Sunstein indicates that the fact that a choice is presented places the user as an individual-king, making them believe they are in charge of the whole situation. Nevertheless, Thaler and Sunstein state that true freedom is having the choice of not to choose (since it increases the sense of reliability and trust to the system) (CNIL, 2019).

Thaler and Sunstein believe developers should build platforms where the user is rightfully informed and guidance to a choice is done correctly (CNIL, 2019). As we have previously studied, dark patterns' architecture is done in a way where the influenced choice is done in uninformed and manipulative ways. As mentioned by Mathur et al. (2021), dark patterns work by manipulating the information presented or by manipulating the choices available.

2.3 Psychology behind Dark Patterns

How does dark patterns' architecture manipulate users into giving in, whether the dark patterns' objective is financial, temporal or privacy invading? As Narayanan et al. (2020) stated, dark patterns are built from A/B tests, where developers try to figure what works best on users to trick them into one direction or another, studying how the human mind reacted to the different stimuli presented. Most studies concerning human cognition and dark patterns have focused themselves on privacy patterns, such as Bösch et al. (2016) or Waldman (2020). These will and some other marketing structures will be used in this study to explain and summarize their mechanics.

COGNITIVE BIASES

Waldman (2020) has classified different cognitive biases that work with dark patterns.

ANCHORING: when making a decision, the user will make amalgams with things they were previously exposed to but aren't always rationally related. For example, Waldman (2020) cites an experience where participants had to give the last two digits of their social security number and then guess the prices of some wine bottles. The prices they gave were clearly influenced by the numbers they had previously given. In this category, dark patterns that will drive the user towards more expensive choices or will make the user spend more money can be placed. For example, when they give three options to the user: a cheap one, an expensive one and one in between, users will see the option in the middle as probably giving them more benefits than the cheaper one but won't cost as much as the expensive option.

Anchoring is a cognitive technique which is used in gamified platforms that offer different types of currencies (Lewis, 2014, "currency confusion"). Normally, platforms have one currency which can be gained for free (making some effort in some online tasks as inviting friends or even playing games) and another one which can be paid for. A user can buy items with these currencies and, normally, the price given in the "free" currency will look much higher than the price given in the paid currency (Lewis, 2014).

FRAMING: the decision is framed in a way that will make the user take it; it will normally be portrayed in a positive light. This is currently done with confirmshaming, for example. For example, in travel agencies, when they propose an insurance they will normally guilt the user into taking one. They will normally give two options "yes, I would like to travel safely" and/or "no, I will take the risk", stating clearly in light which is the "smartest" move.

HYPERBOLIC DISCOUNTING: it is the tendency to overestimate short-term satisfaction over long-term risks. This can be seen in privacy dark patterns where users will not mind giving out a lot of information to access a certain service without taking into account what consequences this can have (Waldman, 2020).

OVERCHOICE: when the user has too many choices from which to choose, they will normally get overwhelmed. This can lead them to take the easier road. This characteristic will be further developed following Bösch et al. (2016).

META-COGNITIVE PROCESSES: these processes can impair a decision. As Waldman (2020) exemplifies, difficulty can be seen as a motivator (since it can be interpreted as something of great importance) but it can also be seen as impossibility. If it is seen as the latter, the user will probably give-up and give their decision autonomy to the platform (Waldman, 2020).

HUMAN'S REASONING SYSTEMS

Bösch et al.(2016) have further explained the mechanisms of the cognitive system. They have presented two different systems which are involved in human reasoning:

SYSTEM 1: this system works by being very automatically, unconscious and takes no effort. For example, when the user is given the choice to read the terms and conditions of a platform they would like to join, they would rarely take the time to actually read them and most people will accept them directly because of the effort it takes.

SYSTEM 2: this system is effortful, controlled and conscious and takes longer to execute because it is more rationalised. As Bösch et al. (2016) explain, people have little motivation to do some tasks that require a lot of effort online. These are also tasks that involve a certain knowledge and, some people, do not have the capacity to understand everything that is described in documents such as terms and conditions. That is why they prefer to ignore the effort it takes and take the “easy way out”, ticking the box as if the document was read.

HUMAN'S NEED TO BELONG

Another reason why a lot of dark patterns work is the social need humans have of belonging (Bösch et al., 2016). Bösch et al. (2016) say that this is why a lot of people overshare personal data online and are careless of what is done with their data.

Taking Maslow's hierarchy of needs, it is possible to see that humans long for belonging and self-esteem. Being part of the group, doing what everybody else is and showing they are successful, are innate qualities of the human social condition. This need to belonging will encourage users to acquire more and more social capital online; showing to others that we they successful is a way a lot of people find to being well-liked and, therefore, an accepted member of the group (Bösch, 2016). This will encourage people to share more data but they ignore what the platform will make of that given data. This will also encourage people to sign-up for certain services, to have a greater sense of belonging.



Fig. 3: Maslow's hierarchy of needs. (*McLeod, 2007*)

EMOTION AND DECISION

Another factor that should not be neglected is emotion. Emotion and the senses play a great role when making a certain decision. One thing many Dark Patterns will do is that they will try to make emotion take the first place. This can be exemplified with travel agencies and insurances. By using confirmshaming techniques, travel agencies guilt clients into taking insurances, and play with the emotional side, telling them to be smart and so to “insure” their trip in case of danger. The same thing goes with dark patterns that awake feelings of urgency and scarcity which will trigger the fear of missing out on an opportunity that, apparently, is highly valued, and will rush the decision-making process.

As previously studied, some Dark Patterns involve social proof characteristics: sometimes users will look for testimonials of others in order to make a decision, and a lot of platforms let users express themselves. Users will most likely make a decision based on other's experience (as already studied with the Maslow's pyramid) and will inform themselves with the comments. These comments will most-likely be ranked, making the best ones stand out. Moreover, some of them might be deceitful (Mathur et al. 2019).

Finally, we have the altered information which will purposely be deceitful to convince the consumer, this being one of the most questionable techniques (Mathur et al., 2021), so when the user wishes to get more information, they will purposely be deceived by the fake information portrayed.

2.4 User’s Awareness

Bösch et al. (2016) supposed that there is some degree of awareness of online manipulation within the users. Bongard-Blanchy et al. (2021) have studied this question of perceived manipulation in depth and have arrived to some conclusions. They have cited Di Geronimo et al. who have previously talked about “dark patterns blindness”: normally, manipulation techniques are quite hidden but coercion is not.

Nevertheless, Bongard-Blanchy et al. (2021) have concluded that people are actually aware that platforms want to have an influence on their attitudes and behaviours. What they do not really worry about is the consequences of such influence, especially regarding privacy risks. They are more worried with financial loss. They have stated that “the level of awareness didn’t play a significant role in resisting” dark patterns (Bongard-Blanchy, 2021, p.774). Lewis (2014) says that once users understand what is going on, they will become frustrated with the situation and even resentful.

3 Methodology

3.1 Construction of the typology

3.1.1 Adaptation of the FCB grid

First of all, this will start with the construction of the dark patterns’ grid with which they will later be classified. This grid is based on the FCB decision matrix. The grid was built upon “advertising planning strategies” firstly introduced by Vaughn which showed the processes in which consumers made a purchase decision, following four different patterns (informative, affective, habitual and self-satisfaction) (Haley & Pittman, 2022). As previously explained, dark patterns could be classified following this grid, being themselves online strategies and designs which will influence and even manipulate the user towards specific actions and decisions.

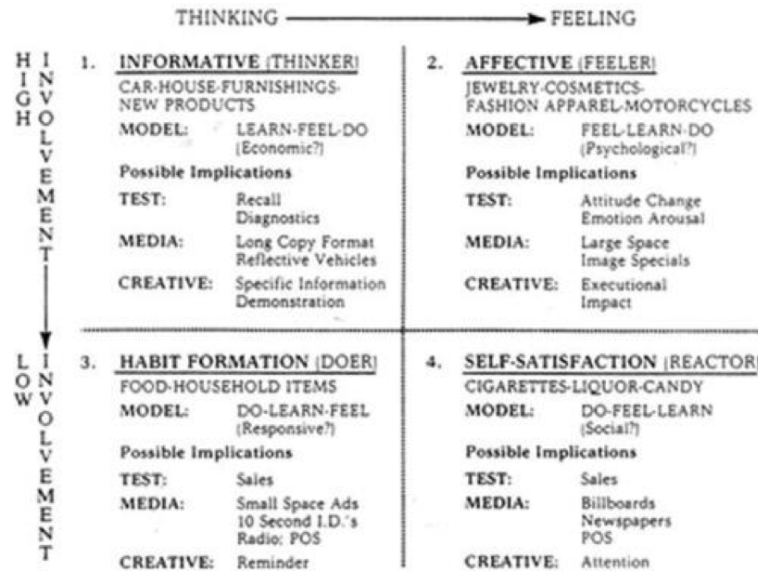


Fig. 4: The Foote, Cone and Belding grid (Haley & Pittman, 2022)

The grid is fixed by two measurements:

MEASUREMENT OF THE INVOLVEMENT OF THE CONSUMER REGARDING THE PURCHASE WHICH IS DETERMINED BY THREE FACTORS:

- 1) *"The decision is very important/unimportant"*
- 2) *"The consumer has a little/a lot to lose with their choice"*
- 3) *"A lot/little thought is involved"*

(Haley & Pittman, 2022)

WHETHER THE DECISION IS DETERMINED BY THOUGHT OR FEELING.

o If the decision is determined by thought:

- 1) *"The decision is logical"*
- 2) *"The decision bases itself on functional facts"*

(Haley Pittman, 2022)

o If the decision in determined by feeling:

- 1) *"The decision expresses the consumer's personality"*
- 2) *"It bases itself on the senses"*
- 3) *"The decision comes from a certain feeling"*

(Haley & Pittman, 2022)

Therefore, there are four different quadrants that determine how consumers decide:

QUADRANT 1 (INFORMATIVE – LEARN-FEEL-DO): the decision-making process is led by a thinking process to which a feeling and an attitude will follow before buying.

QUADRANT 2 (AFFECTIVE – FEEL-LEARN-DO): the decision-making process is led by a certain feeling or emotion and is followed by thought before buying.

QUADRANT 3 (HABIT FORMATION – DO-LEARN-FEEL): after trial of the product, the consumer informs himself about it and builds an attitude towards it.

QUADRANT 4 (SELF-SATISFACTION – DO-FEEL-LEARN): after trial of the product, there are some feelings and attitudes that are developed and, finally, thoughts about it.

(Haley & Pittman, 2022)

As Haley & Pittman (2022) explain, the lower and higher quadrants need different levels of information. They say that for quadrants 1 and 2, advertising should contain more information while the lower quadrants must encourage the experience of the product.

To adapt the grid to dark patterns, characteristics and what would go in each quadrant must be defined.

This study's aim is to analyse how aggressive dark patterns are and how they influence and manipulate users' attitudes and behaviours. Therefore, the first characteristic to study is whether the action is forced or persuaded: this axe be called forced action. This characteristic declined in three factors:

- 1) FREEDOM OF CHOICE
- 2) INTERRUPTION OF THE TASK FLOW
- 3) INVASION OF THE USER

Dark patterns can be characterized on whether they aim to influence users' rational processes and feelings. A deceptive design that would want to have an influence on the thinking process would be determined by:

- 1) LYING TO USERS AND TO WHAT THEY KNOW
- 2) CONFUSION THAT WOULD DISRUPT LOGICAL THINKING
- 3) PERSUASION OF CHOICE WEIGHING

A deceptive design that would want to have an influence on feelings and emotion would be determines by:

- 1) TRIGGERING SPECIFIC EMOTIONS SUCH AS COMPETITIVENESS, TIREDNESS, GUILT, SCARCITY, URGENCY, . . .

2) APPEALING TO THE SENSES

The quadrants will then be the same as the FCB's grid: do-learn-feel, do-feel-learn, learn-feel-do and feel-learn-do.

1) QUADRANT 1 (INFORMATIVE – LEARN-FEEL-DO): the decision-making process is led by a thinking process, which will be influenced by the dark pattern. A feeling and an attitude will follow before the user makes the action aimed by the deceptive design (buying/spending time on a specific action/sharing information).

Example: Price Comparison Prevention

A user wants to buy an apple and he accesses a supermarket's webpage. The webpage shows him two kind of apples; nevertheless, the price of one kind of apples is shown by kilograms and the price of the other ones is shown by units. This pattern won't let him compare prices to know which one is cheaper. In this situation, the user will try to guess, with the different information available, which apple is more convenient but without being able to compare prices. After the rationalization process, the user will build an attitude towards it and do the buying.

2) QUADRANT 2 (AFFECTIVE – FEEL-LEARN-DO): the decision-making process is led by a certain feeling, which will be influenced by the dark pattern. A rational process will follow before the user performs the action aimed by the deceptive design (buying/spending time on a specific action/sharing information).

Example: Confirmshaming

A user wants to travel and he books his tickets online. When booking the tickets, the airline company wants the user to get a travel insurance. To do so, they give him two options: either the user can click on "Yes, I want the insurance" or "No, I will take the risk to travel unsecured". This last phrasing will trigger a certain feeling of fear to the user, which will encourage him to take the insurance to travel safely. After this feeling of fear, the user will weigh both choices and will probably end up choosing the insurance option.

3) QUADRANT 3 (DECISIVE – DO-LEARN-FEEL): this kind of classification will make the user perform a specific action without their consent, forcing the user and even interrupting their task flow. The user will learn about this action that was made and will weigh the options to make a final decision. After the decision is made, the user will build an attitude towards it.

Example: Sneak into Basket A user wants to buy a new phone on a webpage. Right before paying for the purchase, he realizes that the price has increased. Checking the receipt, the user finds out that a phone case was added to the bill without any previous warning. This will most likely trigger some negative feelings on the side of the user, because he didn't ask for a case, but feelings and emotion aren't the main manipulated characteristic here. This design will make the user think about the pros and cons of taking the case. After reflecting on it, the user will build an attitude towards it.

4) **QUADRANT 4 (REACTIVE – DO-FEEL-LEARN)**: this kind of classification will make the user perform a specific action without their consent, forcing the user and even interrupting their task flow. This will firstly trigger some feelings on the user who will afterwards reflect upon it.

Example: Hidden Costs

A user would like to buy a flower bouquet. At the last step of the purchase, the user realizes that the price has increased and sees that the webpage has added “care” costs to the bouquet. These costs can’t be cancelled, since it is a service that comes with the bouquet but the user was never warned of this. Normally, as the user finds himself at the last steps of the purchase, he already took too much time selecting the flowers and following every step of the purchase. The user will feel as though he already made too much effort and will most likely pursue with the purchase.

The grid would then become:

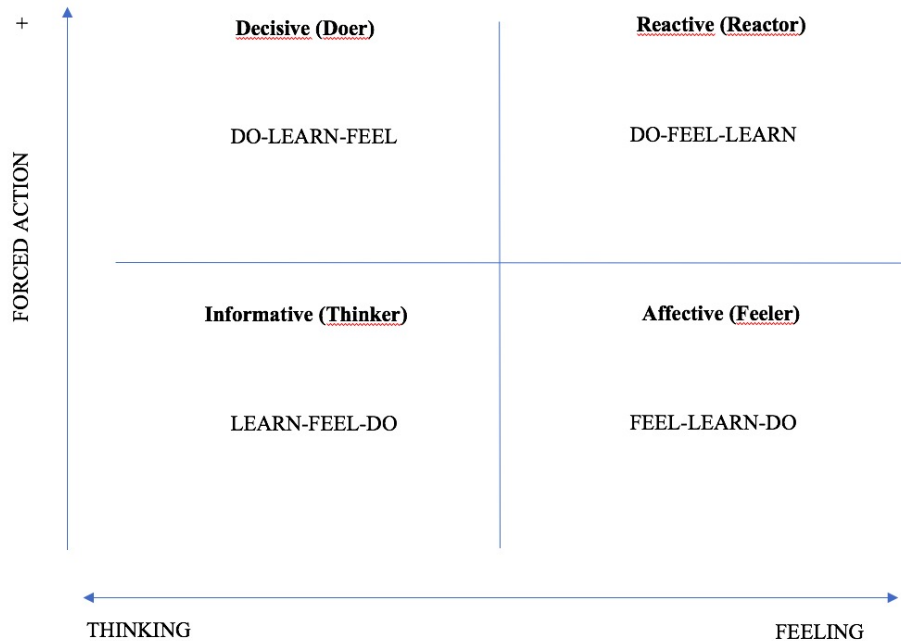


Fig. 5: Adaptation of the FCB grid

3.2 Dark Patterns’ classification following the adapted grid

The dark patterns that will be classified into these four different quadrants are:

BRINGULL (2018)	GREENBERG ET AL. (2014)	- Bait & Change
- Bait and Switch	- Attention Grabber	- Blaming the Individual
- Confirmshaming	- Bait and Switch	- Camouflaged Advertising
- Disguised Ads	- Captive Audience	- Chameleon Strategy
- Forced Continuity	- Desguised Data Collection	- Comparison Obfuscation
- Friend Spam	- Milk Factor Never Forget	- Default Sharing
- Hidden Costs	- Personal Info. Public	- Falce Continuity
- Misdirection	- Unintended Relationships	- Hard to Adjust Privacy
- Price Comp. Prevention		- Impenetrable Wall
- Privace Zuckering	BÖSCH ET AL. (2016)	- Improving Experience
- Roach Motel	- Address Book Leeching	- Just You and Us
- Sneak into Basket	- Bad Defaults	- Last Minute Consent
	- Forced Registration	- Obfuscating Settings
CONTI & SOBIESK (2010)	- Hidden Legal. Stipulation	- Repetitive Incentive
- Coercion	- Immortal Accounts	- Safety Blackmail
- Confusion	- Privacy Zuckering	- Tric Question
- Distraction	- Shadow User Profiles	- Wrong Signal
- Forced Work		
- Interruption	GRAY ET AL. (2018)	MATHUR ET AL. (2019)
- Manipulating Navigation	- Forced Action	- Forced Action
- Obfuscation	- Interface Interference	- Misdirection
- Restricting Functionality	- Nagging	- Obstruction
- Trick	- Obstruction	- Scarcity
	- Sneaking	- Sneaking
ZAGAL ET AL. (2013)		- Social Proof
- Grinding	NCC (2018)	
- Impersonation	- Default Settings	GRAY ET AL. (2020)
- Monetized Rivalries	- Ease	- Automating the User
- Pay to Skip	- Framing	- Two-Faced
- Playing by Appointment	- Rewards & Punishments	- Controlling
- Pre-Delivered Content	- Forced Action	- Entrapping
- Social Pyramid Schemes		- Nickling and Dimming
	CNIL (2020)	- Misrepresenting
	- Attention Diversion	

These dark patterns were regrouped by Mathur et al. (2021).

3.3 Confirmation of the classification

To confirm the classification, a Google Form was created to test the public and to have a more accurate classification of the patterns on the grid, following the public's opinion and, also, to have quantitative information to measure and analyse (Attachment 3).

Firstly, the patterns were grouped into 27 different deceptive designs. This has been done to avoid repetitions in the form and, most specifically, so that the form wasn't too long. In average, the form took fifteen minutes to fill out.

These were the 27 patterns that took part of the form:

1. Bait & Switch (Bringull, 2018 ; Greenberg et al., 2014 ; CNIL, 2020)
2. Disguised Ads (Bringull, 2018 ; CNIL, 2020 ; Conti & Sobiesk, 2010 ; Gray et al., 2020)
3. Forced Continuity (Bringull, 2018)
4. Friend Spam (Bringull 2018 ; Zagal et al., 2013 ; Bösch et al., 2016)
5. Privacy Zuckering (Bringull, 2018 ; Bösch et al., 2016 ; Greenberg et al., 2014)
6. Roach Motel (Bringull, 2018 ; Greenberg et al., 2014 ; Conti & Sobiesk, 2010 ; Mathur et al., 2019 ; Gray et al., 2018 ; CNIL, 2020)
7. Sneak Into Basket (Bringull, 2018 ; Gray et al., 2018 ; Mathur et al., 2019)
8. Trick : Silent (Conti & Sobiesk, 2010)
9. Playing by Appointment (Zagal et al., 2013)
10. Never Forget (Greenberg et al., 2014)
11. Default Settings (NCC, 2018 ; CNIL, 2020 ; Bösch et al., 2016)
12. Interruption (Conti & Sobiesk, 2010 ; Gray et al., 2020)
13. Restricting Functionality (Conti & Sobiesk, 2010)
14. Grinding (Zagal et al., 2013)
15. Price Comparison Prevention (Bringull, 2018 ; CNIL, 2020)
16. Trick Question (Bringull, 2018 ; CNIL, 2020 ; Conti & Sobiesk, 2010)
17. Rewards and Punishment (NCC, 2018 ; CNIL, 2020)
18. Forced Action (Mathur et al., 2019 ; Bösch et al., 2016 ; Gray et al., 2018 ; Conti & Sobiesk, 2010 ; NCC, 2018)
19. Social Proof (Mathur et al., 2019)
20. Nickling and Dimming (Gray et al., 2020)
21. Nagging (Gray et al., 2018)
22. Chameleon Strategy (CNIL, 2020)

- 23. Improving Experience (CNIL, 2020)
- 24. Misdirection (Bringull, 2018 ; Mathur et al., 2019 ; Greenberg et al., 2014 ; CNIL, 2020 ; NCC, 2018 ; Conti & Sobiesk, 2010)
- 25. Monetized Rivaleries (Zagal et al., 2013)
- 26. Framing (NCC, 2018 ; Bringull, 2018 ; CNIL, 2020)
- 27. Scarcity (Mathur et al., 2019)

For each dark pattern, participants gave their opinion following a Linkert scale of 7 items. The Linkert scale will help to measure users' attitudes toward different dark patterns and will also help to measure their classification. It will give the possibility to quantify the study with continuous measurable data (Joshi et al., 2014).

For each dark pattern, participants were asked to point if:

- 1) They felt the design was manipulative (1: I do not agree at all, 7: I completely agree)
- 2) They felt the design gave them freedom of choice (1: I do not agree at all, 7: I completely agree)
- 3) They felt the design was invasive (1: I do not agree at all, 7: I completely agree)
- 4) They felt the design triggered out the most (1: Thinking, 7: Feeling).

From participants' answers a measured classification could be built and the confirmation of hypotheses could be made.

4 Typology

4.1 Dark Patterns' classification

After having studied dark patterns in depth, and basing the study on the Mathur et al.'s (2021) table where they studied choice architecture, a classification of the list of dark patterns was made, based on whether they forced the user's decision (Q3 and Q4) or whether they directly persuaded users' thinking and emotions (Q1 and Q2).

Table 1: Dark Pattenrs' classification following our adaptation of the FCB grid

WORK	DARK PATTERN	GRID CATEGORY			
		Informative	Affective	Decisive	Reactive
Bringull (2018)	Bait and Switch			•	
	Confirmshaming		•		
	Disguised Ads	•			
	Forced Continuity			•	
	Friend Spam	•			
	Hidden Costs				•
	Misdirection		•		
	Price Comp. Prevention	•			
	Privacy Zuckering			•	
	Roach Motel		•		
	Sneak into Basket			•	
	Trick Question	•			
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Conti & Sobiesk (2010)	Coercion			•	
	Confusion	•			
	Distraction		•		
	Forced Work				•
	Interruption				•
	Manipulating Navigation			•	
	Obfuscation		•		
	Restricting Functionality				•
	<i>Trick*</i>	•	•	•	
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Zagal et al. (2013)	Grinding				•
	Impersonation			•	
	Monetized Rivalries		•		
	Pay to Skip		•		
	Playing by Appointment			•	
	Pre-Delivered Content			•	
	Social Pyramid Schemes	•			

WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Greenberg et al. (2014)	Attention Grabber		•		
	Bait and Switch			•	
	Captive Audience				•
	Disguised Data Collection			•	
	Milk Factor			•	
	Never Forget			•	
	Personal Info. Public				•
	Unintended Relationships	•			
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Bösch et al. (2016)	Address Book Leeching	•			
	Bad Defaults				•
	Forced Registration		•		
	Hidden Legal. Stip.		•		
	Immortal Accounts			•	
	Privacy Zuckering			•	
	Shadow User Profiling			•	
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Gray et al. (2018)	Forced Action			•	
	Interface Interference		•		
	Nagging				•
	Obstruction				•
	Sneaking			•	
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
NCC (2018)	Default Settings				•
	Ease		•		
	Framing		•		
	Rewards and Punishment	•			
	Forced Action			•	

WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
CNIL (2020)	Attention Diversion		•		
	Bait and Change			•	
	Blaming the Individual		•		
	Camouflaged Advertising	•			
	Chameleon Strategy	•			
	Comparison Obfuscation	•			
	Default Sharing			•	
	False Continuity			•	
	Hard to Adjust Privacy		•		
	Impenetrable Wall				•
	Improving Experience	•			
	Just You and Us	•			
	Last Minute Consent		•		
	Obfuscating Settings		•		
	Repetitive Incentive		•		
	Safety Blackmail		•		
	Trick Question	•			
	Wrong Signal			•	
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Marthur et al. (2019)	Forced Action			•	
	Misdirection		•		
	Obstruction				•
	Scarcity		•		
	Sneaking			•	
	Social Proof	•			
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Lacey & Caudwell (2019)	Cuteness of Robots		•		
WORK	DARK PATTERN	Informative	Affective	Decisive	Reactive
Gray et al. (2020)	Automating the User			•	
	Two Faced	•			
	Controlling				•
	Entrapping				•
	Nickling and Dimming		•		
	Misrepresenting	•			

**Trick*: Conti & Sobiesk (2010) explain group three different patterns under "trick". First, there is *Silent* which presents a Do-Learn-Feel design. Secondly, there is *Lie*, which follows a Feel-Learn-Do pattern and, finally, *Spoof*, which goes under Learn-Feel-Do.

The Dark Patterns' typology could easily be built since these designs will push the user into acting by influencing either their feelings or their thinking.

4.2 Confirmation of the classification

Once the classified table was built, to confirm it, a Google Form was built in which the aim was to test users' attitudes facing these designs, as explained in the Methodology section. There were 45 participants who shared their opinion on the way they felt when encountering these patterns. The mean of every question was taken to get the following results (Attachement 4).

Sharing a form and having people respond to it helped not only to confirm the classification already built but it, but also to measure each dark pattern as well as the grid. To do so, the Linkert's scale was employed when building the form, making the quantification of users' attitudes and create these measurements possible. What was measured to build this grid was mainly *freedom of choice* and the *thinking-feeling* spectrum.

Based on the answers collected on the form, this is the final classification (built with *Excel*):

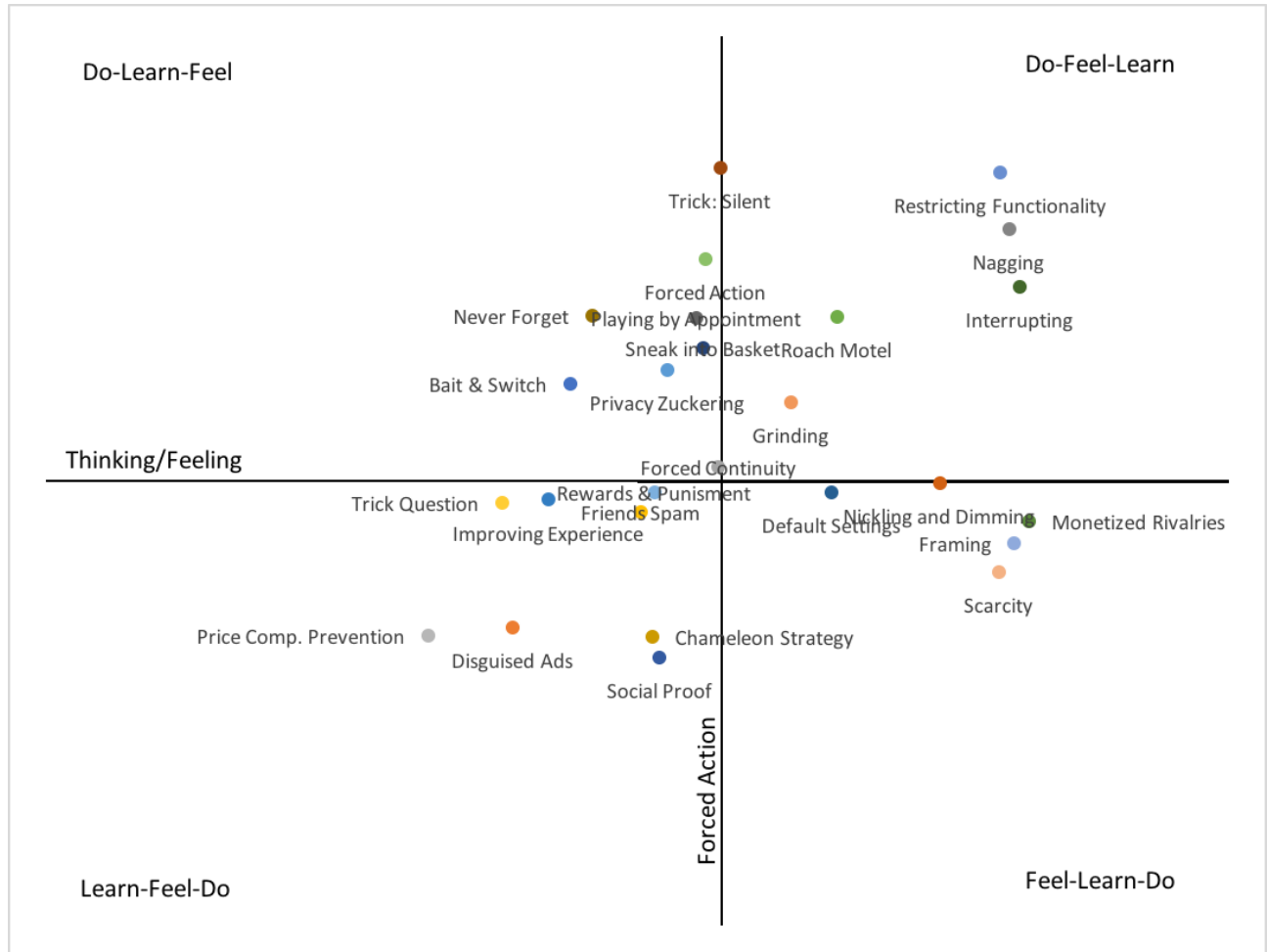


Fig. 6: Dark Patterns' Typology based on the FCB Grid

With this classified grid, it is possible to confirm the first hypothesis:

HP1: Dark patterns will aim to make users do actions they never intended on doing by either forcing them (which will lead to a “do” classification) or by manipulating the user’s thinking processes (which will lead to a “learn” classification) and/or feelings (which will lead to a “feel” classification).

HP1.1: These deceptive designs can be classified following the patterns of do-learn-feel, do-feel-learn, learn-feel-do and feel-learn-do.

It is possible to confirm that this classification of Dark Patterns works and it will be useful for future investigation on the subject.

It is also possible to confirm that the first classification constructed was perceived as such by users. Nevertheless, there were a couple of patterns which have some of the measurements in a quite neutral point. This can be exemplified with *Trick: Silent* which is right in the middle-point of the *thinking-feeling* spectrum. This dark pattern takes place when a platform downloads a software into the user's device without the user's consent. Adobe sometimes does this: when downloading Photoshop, the platform also downloaded CameraRaw, for example. This was firstly classified as *Do-Learn-Feel*, as the platform will download a software without warning, the user will realize this and will then weigh the option of keeping it or deleting it. Before the decision, the user builds a certain attitude towards it. For example, if the user is an active photographer, he might want to keep CameraRaw. However, users might get a feeling of invasion and urgency to delete it, before weighing and thinking on anything, once realizing a certain platform has downloaded a software with no previous warning.

There is also the example of *Nickling and Dimming*, which finds itself quite neutral on the scale of *forced action*. This pattern will ask for users to spend more and more money to make a progression in the game, accessing to new levels and items. This pattern was firstly classified as *Feel-Learn-Do*, but on the measured classification, it is quite clear that for a lot of users it is more of a *Do-Feel-Learn* situation. Users can feel forced to spend that much money to progress, motivated by a competitive feeling. They might as well feel as though the game is restrictive and to play, one must pay.

Forced Continuity is one pattern that is neutral on both measurements. It was classified as being *Do-Learn-Feel*. This pattern works, for example, when a user wants to try a 30 days free-trial of a paid service (such as Netflix). The platform asks for a payment method in order to access to the trial and says it won't charge you for these 30 first days. A couple of months have passed and the user finds out, by getting their bills, that there have been 2 months of subscription charged to the card without any previous warning. The platform will make the user pay. The user will then have to choose if they continue with the service or if they let it down, building an attitude towards it. Nevertheless, the user might want to cancel it immediately, because of a feeling of invasion (so the pattern would be *Do-Feel-Learn* in this case). Something to keep in mind is that the platform had warned that the trial was free only for 30 days, implying the user must pay for it afterwards. This means the user does have a choice and can cancel the subscription at any time.

On the other hand, there were patterns which were clearly identified in a given classification, such as *Nagging*. This pattern was clearly identified as being a *Do-Feel-Learn* where the action will be forced upon because the user is tired of getting constant notifications about it. *Bait and Switch* is also another pattern which has been easily classified as *Do-Learn-Feel*. Bringull (2018) presents this pattern with an example of a Windows situation which created a big backlash. Windows forced an update on users' devices by changing the meaning of the cross (x) on the tabs (which normally means to close). When the user wanted to close the tab, the update immediately started. We can also mention *Scarcity* that has been identified as *Feel-Learn-Do*. The platform will warn the user that a product they would want to buy is selling out. The user will then be on a rush to get it and, after a little thinking, they will most probably proceed to buy it. Finally, *Disguised Ads* has been classified as *Learn-Feel-Do*. When the user comes across an advertisement which they think it is something else (for example, a download button), the user might reflect about whether or not to click. After building an attitude, the user might get tricked by the platform and they will click.

4.3 Users' Attitudes

In this section, the graphs were built using *Python* and the Mean Squared Error (MSE) and Coefficient of determination (R2) were calculated using the *sklearn* package.

4.3.1 Perceived manipulation

The graph shows that the hypothesis number two cannot be quite confirmed.

HP2: Manipulation will be felt much stronger when the design aims to influence feelings and emotion, while manipulation on rational mechanism can be more tacit.

First of all, manipulation rates were all positive. No dark pattern got a mean rating lower than 4 points on the Likert scale. This means manipulation was pretty much perceived and obvious in all of the deceptive designs that were presented. Mathematically, the R2 obtained for this regression was only of 0,02 (2%). The R2 is a measurement that predicts the chances that future values have of being similar (Rowe, 2018). The score obtained for this situation is quite low, meaning there isn't a strong correlation between both of the variables studied. The MSE calculated was of 0,34 which means there weren't many errors detected.

It is still possible to witness a slight difference between patterns that influence feelings and those that influence thinking. The line is still slightly inclined positively, and patterns falling under the "feel-learn-do" and "do-feel-learn" classifications still rank slightly higher.

The pattern which ranked highest on perceived manipulation was *Restricting Functionality* which had a score of 6,8. This design was followed by *Misdirection* which had a value of 6,6. However, some "learn-feel-do" and "do-learn-feel" patterns still ranked quite high: *Trick Question* had a ranking of 6,11, *Price Comparison Prevention* had a score of 6,08 and *Disguised Ads* had a score of 6,47.

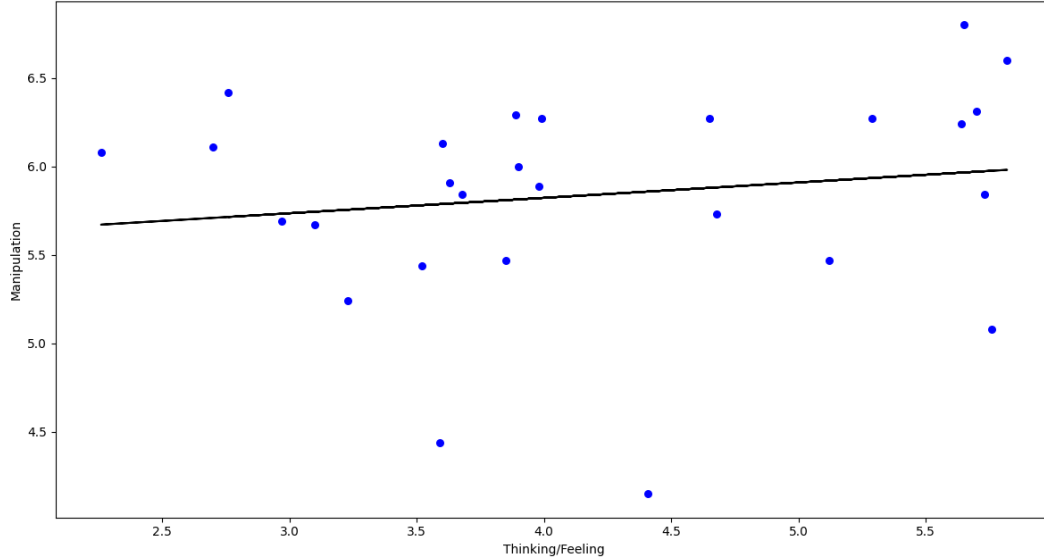


Fig. 7: Thinking/Feeling - Manipulation correlation

The pattern with the lowest perceived manipulation score was *Grinding* that had a score of 4,15 and belongs to the "do-feel-learn" category. The design that follows it is *Chameleon Strategy* which belongs to the "learn-feel-do" category and its perceived manipulation ranks 4,44.

Even though the hypothesis could not be confirmed, it is still possible to affirm that users sensed manipulation in all of the dark patterns studied and, in most cases, it wasn't really hidden away from the user.

RANKING OF DARK PATTERNS FROM BEING PERCEIVED AS THE LEAST MANIPULATIVE TO THE MOST:

Grinding	Forced Action
Chameleon Strategy	Price Comp. Prevention
Interrupting	Trick Question
Never Forget	Rewards and Punishment
Friends Spam	Scarcity
Monetized Rivalries	Default Settings
Playing by Appointment	Nickling and Dimming
Bait and Switch	Trick: Silent
Improving Experience	Sneak Into Basket
Roach Motel	Nagging
Privacy Zuckering	Disguised Ads
Framing	Misdirection
Forced Continuity	Restricting Functionality
Social Proof	

4.3.2 Perceived Invasion

It is possible to confirm the following hypothesis with this graph.

HP3: Dark patterns classified under “do-learn-feel” or “do-feel-learn” will tend to be perceived as being more invasive and get more negative impressions.

The R2 obtained for this situation was of 0,57 (57%). This means that there is a clear correlation between the two variables studied. The MSE value is 0,41, being close to 0, so this means that the presence of errors in the model was low.

This means that designs that fall under the categories of ”learn-feel-do” and ”feel-learn-do” aren’t perceived as being invasive to one’s privacy/economy/time. Invasion had a ranking going from 3,0 to 6,8 points on the Likert scale, in total. There have been multiple dark patterns that were classified as being invasive, but the most invasive ones were the ones that fall under the quadrants Q3 and Q4, where action is forced upon the user. One pattern that was ranked quite high and corresponded to the first quadrant (learn-feel-do) is *Disguised Ads*, which had an Invasion value of 6,0. *Grinding* is a pattern which is classified under ”do-feel-learn” but was still ranked quite low on the Invasion measure, getting a score of 3,8.

The pattern that forces the user the most is the pattern which is perceived as being the most invasive, which is *Trick: Silent*, and the pattern that gives the user most freedom of

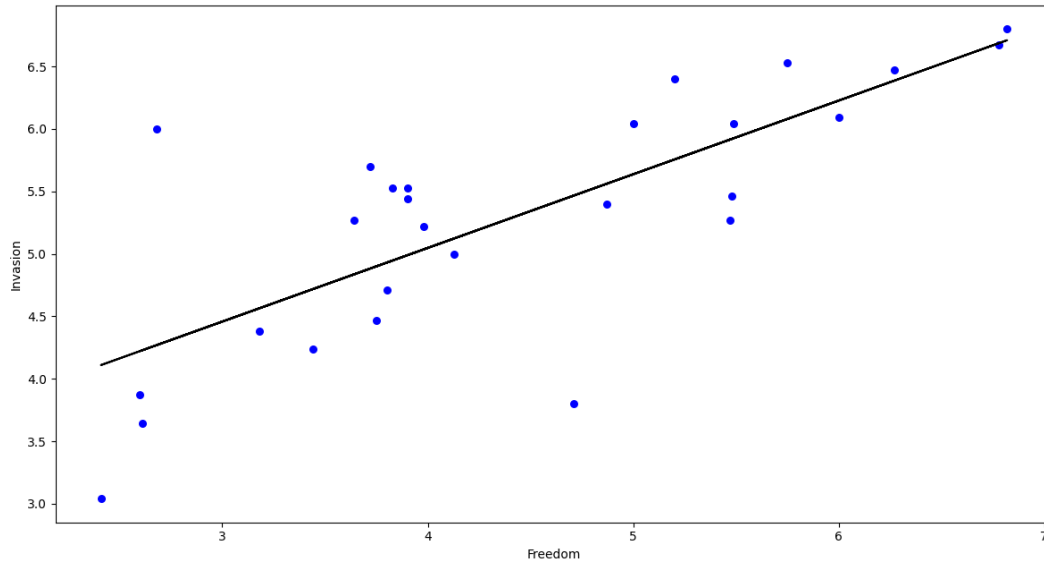


Fig. 8: Forced Action - Perceived Invasion correlation

choice (*Social Proof*) is the pattern which is perceived as being the least invasive.

When a pattern doesn't give a lot of freedom to choose, imposes itself on the user and forces the action, the user perceives it as being invasive. This will inevitably generate negative feelings towards the platform.

RANKING OF DARK PATTERNS FROM BEING PERCEIVED AS THE LEAST INVASIVE TO THE MOST:

Social Proof	Nickling and Dimming
Price Comp. Prevention	Misdirection
Grinding	Playing by Appointment
Chameleon Strategy	Bait and Switch
Framing	Default Settings
Scarcity	Roach Motel
Monetized Rivalries	Rewards and Punishment
Trick Question	Improving Experience
Forced Continuity	Friends Spam

Disguised Ads	Nagging
Privacy Zuckering	Interrupting
Never Forget	Restricting Functionality
Forced Action	Trick: Silent
Sneak into Basket	

5 Conclusion

"Persuasion is a positive feature of effective design, as long as it helps customers achieve what they want to achieve." (Craig, 2022). Dark patterns push users against their first intents and will, "against their best interest" (Craig, 2022).

As already studied, dark patterns are perceived as manipulative and invasive. These deceptive designs create negative feelings on the users when encountered. Generating negative feelings on the users and customers will generate, inevitably, a lost of trust on the side of the user towards the platform, which will result in the loss of customers and productivity (Craig, 2022).

5.1 Typology constructed

Dark Patterns could be classified and can be studied under four categories:

QUADRANT 1 - INFORMATIVE (LEARN-FEEL-DO): the patterns will manipulate and influence the users' thinking processes. The user will build an attitude upon this and, afterwards, they will perform a certain action (which will normally be the action induced by the platform).

QUADRANT 2 - AFFECTIVE (FEEL-LEARN-DO): the pattern will influence and manipulate the user's feelings, emotions and senses. The user will then reflect on this and will choose to perform a certain action (normally the one induced by the platform).

QUADRANT 3 - DECISIVE (DO-LEARN-FEEL): the platform will perform a certain action without the user's consent or will force the user to perform it. After learning about it, the user will reflect upon it and will build an attitude towards it.

QUADRANT 4 - REACTIVE (DO-FEEL-LEARN): the platform will perform a certain action without the user's consent or will force the user to perform it. The user will learn about it, they will generate an attitude towards it and will then reflect upon it.

This typology helps to identify different dark patterns and how they get to force or manipulate users to perform certain actions. It helps to identify how users behave and build an attitude towards them. It will help future research to study dark patterns characteristics more in depth and have greater insights on them.

5.2 Users' Attitudes towards Patterns encountered

Users will normally get negative impressions from these patterns. Very little of them don't have a high manipulation score (Fig.7). Most Dark Patterns that were studied got high manipulation rates, and all of them were rated over 4,0 points on the Likert scale. Perceiving such a direct manipulation will most likely decrease a user's trust towards the platform (Craig, 2022). Many of them were rated as being very invasive, specially those that force the user to do certain actions and don't let them any freedom of choice (Fig. 8). The grid will help UX designers to be wise and to choose their tools wisely. Choosing designs that generate such feelings will not bring great outcomes on the long term. The grid will also help to identify which are the most harmful patterns not only for the user but for the platform's success as well.

5.3 Limits of the study

The study presents certain limits which could be improved for better and more accurate results.

First of all, the measurements studied for users' attitudes weren't vast. We only decided to focus on manipulation perception and invasion. It would be interesting to study other aspects as important as these two. Further research could maybe study aspects such as Interruption, Frustration, Urgency, Lie, Obstruction, etc. The grid can also be a tool to investigate loyalty, fidelity and engagement. Knowing how users' attitudes are built and what impacts them is necessary to build designs that will bring positive experiences to the user and will encourage them to come back.

This study could also be enriched with a research in which participants are not aware of what they have in front of them when evaluating, so that their responses are less biased. The form presented explicitly each situation and the presentation itself of each pattern could influence the participant's point of view an attitude towards what was being shown.

To respect a certain length of the form, some dark patterns had to be regrouped. This

could leave behind some nuances in some authors' description of specific patterns they presented which could be categorized differently.

5.4 Future Research

This grid constructed could help researchers in this subject categorize better deceptive designs encountered and their effects on users' attitudes and behaviours. They can study more in depth other aspects that these designs can present. The grid can help a wide variety of studies that belong not only to the marketing domain but, also, to cognitive sciences and user experience works.

The grid can also help with studies not only regarding dark patterns but, also, concerning light patterns (Craig, 2022). In a marketing point of view, this grid can help other investigations compare these two type of designs to prove why light patterns are more beneficial to a platform that want to create engagement and loyalty with their users.

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7 Attachments

7.1 Attachment 1: Dark Patterns’ classification constructed by Gray et al. (2018)



Figure 1. Summary of dark pattern strategies derived from analysis of our corpus.

Fig. 9: Dark Patterns’ classification (Gray et al., 2018)

7.2 Attachment 2: Dark Patterns' typology by Mathur et al. (2021)

Prior Work	Dark Pattern Type	Choice Architecture					
		Modify the Decision Space				Manipulate the Info. Flow	
		Asymme.	Restri.	Dis. Treat.	Covert	Decept.	Info. Hiding
Conti & Sobiesk [9]	Sneak into Basket					●	●
	Trick Questions	●			●		
	Coercion		●				
	Confusion	●			●		
	Distraction	●			●		
	Forced Work	●	●				
	Interruption	●	●				
	Manipulating Navigation	●			●		
	Obfuscation	●			●		
	Restricting Functionality	●	●				
Zagal et al. [62]	Trick				●	●	
	Grinding		●				
	Impersonation					●	
	Monetized Rivalries			●			
	Pay to Skip			●			
	Playing by Appointment		●				
	Pre-Delivered Content			●		●	●
Greenberg et al. [22]	Social Pyramid Schemes		●				
	Attention Grabber	●			●		
	Bait and Switch					●	
	Captive Audience	●	●				
	Disguised Data Collection				●		●
	Milk Factor		●				
	Never Forget				●		
	Personal Info. Public		●				
Bösch et al. [4]	Unintended Relationships				●		
	Address Book Leeching					●	
	Bad Defaults	●					
	Forced Registration		●				
	Hidden Legal. Stip.						●
	Immortal Accounts	●	●				
	Privacy Zuckering	●	●				●
Gray et al. [21]	Shadow User Profiles		●		●		
	Forced Action		●				
	Interface Interference	●			●		●
	Nagging	●					
	Obstruction		●		●		
	Sneaking					●	●

Fig. 10: Dark Patterns' typology (*Mathur et al., 2021*)

Prior Work	Dark Pattern Type	Choice Architecture					
		Modify the Decision Space				Manipulate the Info. Flow	
		Asymme.	Restri.	Dis. Treat.	Covert	Decept.	Info. Hiding
NCC [18]	Default Settings	●					
	Ease	●					
	Framing	●			○		
	Rewards & Punishment	●	○				
	Forced Action		●				
CNIL [42]	Attention Diversion	○			○		
	Bait & Change					●	
	Blaming the Individual	●					
	Camouflaged Advertising					●	
	Chameleon Strategy	○					●
	Comparison Obfuscation		●				●
	Default Sharing	●					
	False Continuity					○	●
	Hard to Adjust Privacy	●					
	Impenetrable Wall		●				
	Improving Experience				○		○
	Just You and Us				○		○
	Last Minute Consent		○		○		
	Obfuscating Settings	●					
	Repetitive Incentive	○					○
	Safety Blackmail					●	
	Trick Question	●			●		
	Wrong Signal						●
Mathur et al. [35]	Forced Action		●				
	Misdirection	○			○	○	
	Obstruction		●				○
	Scarcity				○	○	○
	Sneaking					○	●
Lacey & Caudwell [29]	Social Proof				○	○	
	Cuteness of Robots				●		
Gray et al. [20]	Automating the User		●				
	Two-Faced	●			●		
	Controlling	○	○		○		
	Entrapping		●		●		
	Nickle and Diming	●	○			○	●
	Misrepresenting					●	●

Fig. 11: Dark Patterns' typology (*Mathur et al., 2021*)

7.3 Attachment 3: Google Form's Questions

1) Bait & Switch

A Windows update is available and you have many options: either you want to upgrade it on the time scheduled and you click « OK », or you want to upgrade now and you click on the small button next to « OK » which states « Upgrade Now ». If you close the tab with the cross on top, you will expect nothing to happen. But, in this case, closing the tab will start the update immediately, something you normally wouldn't expect happening. You can read, in small detail, that you can change/cancel the update by clicking where under the date which was set.

Fig. 12: Bait and Switch

2) Disguised Ads

You are looking to download a software for your computer. On the webpage where you found the software, you see different « Download » indicators. If you click on the ones with the red outlines, you will be redirected to another webpage. These two spots are actually ads which will redirect you to a completely different page, making you think that if you click on them you will be able to download the software.

Fig. 13: Disguised Ads

3) Forced Continuity

You want to subscribe to a service which offers a 30-day trial in which they still ask you to register a payment method just in case. You will then think it is no big deal since for 30 days it is free. Still, after your trial month, you get charged the following months without any warning (you realize once you check your bills).

Fig. 14: Forced Continuity

4) Friends Spam

You're signing in a new network (with an e-mail address, phone number, another network profile). This new network you're signing in at has then access to your address book. In one of the steps, it proposes you to reach out to your contacts inviting them to become part of your network. The network will send an e-mail to all of your contacts using your identity without warning you of this.

Fig. 15: Friend Spam

5) Privacy Zuckering

You downloaded Facebook Messenger on your new phone and it asks you to connect your contacts on your address book to this new App. This will mean that your profile will be associated with your contacts, allowing Facebook to learn more about your social sphere and to show you and your friends better and more targeted ads, selling this information to third parties. (Other applications and platforms use this as well, not just Fb)

Fig. 16: Privacy Zuckering

6) Roach Motel

You have realized quite late that you have purchased a subscription (in this case, to the Rolling Stone Magazine). Getting out of that subscription is quite a job with a lot of steps, specially if you want a refund on the subscription value, you would have to send a letter to the address indicated within 30 days.

Fig. 17: Roach Motel

7) Sneak into Basket

When buying something (in this case, a domain name), you realize on the final steps of the purchase that the price has gone higher. When you check, you realize that the webpage has added an extra product to your chart.

Fig. 18: Sneak Into Basket

8) Trick: Silent

When downloading a software, the platform downloads and installs an extra software into your computer without you being aware of it.

Fig. 19: Trick: Silent

9) Playing by Appointment

When playing a game, the game itself schedules at what time you should play.

For example, in SimCity, things take a lot of time to build/produce. If you want to build a building, you need to produce some specific things which will take real time. In some games, if you don't arrive on time, you get penalized.

Fig. 20: Playing by Appointment

10) Never Forget

When the system/platform remembers all details of your last connection/all interaction is permanent and persistent.

ex.: a person may be unaware that he or she is again sharing his or her device's data with another person that they had previously shared with (Greenberg et al., 2014)

Fig. 21: Never Forget

11) Default Settings

Privacy and data settings are already pre-selected and looking them up to adjust them and choose the ones you want takes too much job.

Fig. 22: Default Settings

12) Interrupting

You are watching a video and an ad interrupts and delays your task flow.

Fig. 23: Interruption

13) Restricting Functionality

You don't want to connect your address book to your new messenger application but you realize the choices you have don't allow you to cancel out this option (you can accept with « OK » or click on « Learn More », but you can't cancel the option away).

Fig. 24: Restricting Functionality

14) Grinding

You are playing World of Warcraft, for example, and you have to repeat the same task over and over (ex.: killing the same opponent) using the same technique to level-up.

Fig. 25: Grinding

14) Grinding

You are playing World of Warcraft, for example, and you have to repeat the same task over and over (ex.: killing the same opponent) using the same technique to level-up.

Fig. 26: Price Comparison Prevention

15) Price Comparison Prevention

You want to order apples but you can't tell which one is cheaper since one price is shown by unit and the other one in kg.

Fig. 27: Trick Question

16) Trick Question

You bought an item at currys.co.uk and you don't want to receive more information by mail. You accidentally clicked on both boxes thinking both meant that you wouldn't receive any e-mail (or you didn't click thinking that clicking them would mean you wanted to receive more information). You realize that one box says « Please do not send me details » while the next one says « please send me details », confusing the user.

Fig. 28: Rewards and Punishment

17) Rewards and Punishments

You clicked on « turn off Ads personalisation » (that means that the platform won't show you targeted ads anymore). By doing this, they will tell you that you will no longer be able to block/mute ads (punishment). If you leave Ads Personalisation on, you will be able to block/mute ads you don't want to see (reward).

Fig. 29: Forced Action

18) Forced Action

You want to play this game but the platform won't give you access unless you sign up for the newsletter.

Fig. 30: Social Proof

20) Social Proof

You want to order something and the platform provides you with « testimonials » which are all positive.

Fig. 31: Nickling and Dimming

21) Nickling and Dimming

You want to keep playing but you need to pay for each level, and each new object. The design hides the full-payment method and asks you to keep paying for more.

Fig. 32: Nagging

22) Nagging

When a notification keeps coming up and you don't want to do that task but you don't have an option to cancel it, so you will keep getting the notification until you accept it.

Fig. 33: Chameleon Strategy

23) Chameleon Strategy

You buy an airplane ticket for your holiday and, on the airline's webpage, it offers you to rent a car right after your purchase.

Fig. 34: Improving Experience

24) Improving Experience

A platform encourages you to share more data with the excuse that they will use it to improve the user experience keeping your shared information "private".

Fig. 35: Misdirection

25) Misdirection

You are booking a flight and the webpage selects a seat (and charges you more for it without warning). You can click on the button « Continue », which is quite highlighted and lets you keep the seat. The platform doesn't warn you about this: you will be charged extra if you click on continue. However, if you click on "skip seat selection" (which is kind of "hidden") you won't get extra charges.

Fig. 36: Monetized Rivalries

26) Monetized Rivalries

You are a gamer playing a quite popular game. To improve your gameplay and have a better level than other players, you must buy objects using real-life money. You can also pay to skip levels that seem hard.

Fig. 37: Framing

27) Framing

Gmail wants you to update the application to the latest version and, to do so, they phrase the buttons « I don't want smarter email » or « yes, I want it », making you want to « improve » and get smarter email.

Fig. 38: Scarcity

28) Scarcity

You know there are only a few Xbox left and « a lot of people are checking them out » so you want to buy them as soon as possible.

Fig. 39: Likert Scales

7.4 Attachment 4: Google Form's Final Answers (Mean)

DARK PATTERN	T/F	FREEDOM	MANIP	INVASIVE
Bait & Switch	3,1	4,87	5,67	5,4
Disguised Ads	2,76	2,68	6,42	6
Forced Continuity	3,98	4,13	5,89	5
Friends Spam	3,52	3,72	5,44	5,7
Privacy Zuckering	3,68	5	5,84	6,04
Roach Motel	4,68	5,48	5,73	5,46
Sneak into Basket	3,89	5,2	6,29	6,4
Trick: Silent	3,99	6,82	6,27	6,8
Playing by Appointment	3,85	5,47	5,47	5,27
Never Forget	3,23	5,49	5,24	6,04
Default Settings	4,65	3,9	6,27	5,44
Interrupting	5,76	5,75	5,08	6,53
Restricting Functionality	5,65	6,78	6,8	6,67
Grinding	4,41	4,71	4,15	3,8
Price Comp. Prevention	2,26	2,61	6,08	3,64
Trick Question	2,7	3,8	6,11	4,71
Rewards & Punishment	3,6	3,9	6,13	5,53
Forced Action	3,9	6	6	6,09
Social Proof	3,63	2,41	5,91	3,04
Nickling and Dimming	5,29	3,98	6,27	5,22
Nagging	5,7	6,27	6,31	6,47
Chameleon Strategy	3,59	2,6	4,44	3,87
Improving Experience	2,97	3,83	5,69	5,53
Misdirection	5,82	3,64	6,6	5,27
Monetized Rivalries	5,12	3,75	5,47	4,47
Framing	5,73	3,44	5,84	4,24
Scarcity	5,64	3,18	6,24	4,38

Fig. 40: Google Form's Final Answers (Mean)

Abstract:

Dark Patterns have been identified in 2010 and they have been thoroughly studied within UX and cognitive sciences. These deceptive designs are built from marketing techniques such as retail deceptive practices, nudging techniques and growth-hacking bases. Their goal is to make users perform actions they never intended on doing. They have three main objectives: to get users to spend more time on their platforms, to get users to spend more money on their offers and to make users share more information and data about themselves that they do not need to share.

Dark Patterns will either directly force and impose these actions, or they will manipulate and influence users to perform these actions. More often than not, these patterns will make users perform actions that will go against their best interest. These deceptive designs can even generate negative feelings and emotions on users, and can even generate great backlash. These patterns can make users' trust, engagement and loyalty to the platform decline. Therefore, it is important to be aware of the dangers of employing them.

This research aims to build a typology of the patterns inspired by the Foote, Cone and Belding grid. The objective is to figure *how to adapt the FCB grid to study and classify the influence dark patterns have on users' attitudes and behaviours?* This classification will help to identify which patterns will force users perform certain actions and which will rather influence and manipulate users' thinking processes or feelings. The grid can even help to identify the effects these deceptive designs can have on attitudes and behaviours of users who come across them.

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