# Can Dark Patterns Be Used For Good?

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***Abstract*— Dark patterns are often considered "evil" or bad design by many researchers. However, this paper demonstrates that it is possible to use dark patterns for good through designing a personal financial management app utilizing some common dark patterns to help users minimize online impulsive purchases.**

***Keywords—dark patterns, persuasive design, bright patters, online impulsive purchases, personal finance management***

## I. Introduction

Dark Patterns are a fairly recent phenomenon in the field of Human-Computer Interaction whereby design patterns and psychology are utilized in ways that deceive the user. These patterns are often said to be "evil" or bad design by many researchers since they are often employed in unethical ways on user interfaces. However, are there ways these patterns can be used to benefit the users rather than harm them? To explore this question, this paper takes and employs some of the patterns that fall under the category of dark patterns, to design a personal financial management application named SpendLight that helps users reduce their impulsive purchases in online environments.

## II. Dark Patterns

Coined by Harry Brignull in 2010, dark patterns are deceptive elements that are purposefully designed to lead people to take actions that they otherwise wouldn't [1]. These methods are frequently employed in web-based products such as social networking platforms, video games, shopping websites, etc. According to a systematic review done on dark patterns, there are currently 22 different types of dark patterns that have been identified [1]. These include:

*Deceptive Copywriting:* Using language in a form or web element to trick the user by taking advantage of their shallow attention.

*Sneak into Basket:* Adding an unexpected item to the user's shopping card on an e-commerce website.

*Roach Motel:* Making it extremely difficult for the user to leave a situation, such as canceling a subscription or deactivating an account, through a complicated and time-consuming process.

*Privacy Zuckering:* Collecting more data from the user than they are aware of or have consented to, named after the well-known data privacy issue on Facebook.

*Price Comparison Prevention:* Making it hard for the user to compare prices of different offers, often by making it appear cheaper to buy more when it is actually more expensive.

*Hidden Costs:* Only revealing additional costs of an item after the user is far into the purchasing process.

*Bait and Switch:* Tricking the user into thinking they will do one thing, but actually doing something different.

*Confirmshaming:* Using language that makes the user feel bad about their choice.

*Disguised Ads:* Making advertisements look like interface elements, such as buttons or forms, when they are actually just ads.

*Misdirection:* Diverting the user's attention to one thing in order to distract them from something else, such as an additional cost or important information the stakeholder doesn't want the user to know about.

*Forced Continuity:* Coercing the user to continue an action, such as paying for a subscription.

*Social Pyramid:* Deceiving the user into spamming their friends with usually the intention of making the friends join a social network site

*Monetization:* Making the user complete certain actions in order to gain something.

*Toying with Emotions:* Using elements that influence the user's emotions in order to manipulate them about important information.

*False Urgency:* Creating a false sense of scarcity in order to make the user buy faster, often used by e-commerce websites.

*Fake Notification:* Using notifications deceptively to make the user check their notifications more often, often used by social networking sites.

*Segmented Email List:* Requiring the user to unsubscribe from multiple email groups in order to stop receiving emails.

*Share the Article:* Hindering the action of continuing to read something by having to share it on social networking sites.

*Pseudo Currency:* Using premium currency in video games that is not immediately recognizable as real money, often leading to the user spending more than they realize.

*Nagging:* Repeatedly asking the user the same thing in order to eventually get them to agree.

*Infinite Scroll:* Making the user addicted to content by not providing an end to the scrolling.

*Bad Defaults:* Purposefully setting default settings to be bad and taking advantage of the effort required to change them.

## III. Are Dark Patterns "Evil"?

Classically, dark patterns have always been heavily criticized by the UX community as they are widely regarded as "evil" or "bad" design. And while it is true that these patterns are typically used in unethical ways on many user interfaces to manipulate users, it does not mean that these patterns are fundamentally good or bad. A good analogy to

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explain this is the words we use - shouting “Fire!” can save lives if there actually is a fire or cause unnecessary panic if done with negative intentions. Patterns are like words, they are neither good or bad, but the way they're used can be to create good user experience or bad user experience. What it comes down to in the end is the intent. In other words, as Chris Noddle, author of the book *Evil by Design* puts it, “Morality depends on the designer’s intention.” [17]. He claims that it is okay to trick users with persuasive design if it benefits them or if they have given their implicit permission, comparing it to a magic show where users give implied consent to be deceived [17]. Rather than “evil”, dark patterns can be considered more of a “white lie”. Hence, it is possible to use them for “good” by implementing them in ways that advance users’ goals. This is where the motivation for this report comes from - it is to prove that dark patterns are not evil by themselves, and these patterns can be used to help users by removing their darkness. Essentially, by transforming dark patterns into bright versions of themselves, they can be used for good.

## IV. Online Impulsive Purchases

Today, online shopping has revolutionized the way people shop, making it easier than ever to buy the things we want with just a few clicks. However, this convenience can also lead to impulsive purchases – buying things without careful consideration or planning [2]. Compared with offline shopping, Online shopping, aided by information technology, provides more favorable and facilitating conditions for impulsive buying in terms of the shopping environment, such as a streamlined product-searching process and ease of purchase (e.g., one-click ordering) [2]. Essentially, the impulse is more about encouraging customers to make purchases through human-computer interactions during the purchasing process.

Noticing the trend of impulse buying on online environments, numerous researchers have collected data on demographics of consumers who actively engage in impulse buying behavior. The findings of these studies almost always appear to support the notion that young shoppers (between the ages of 18 and 24) are the most impulsive buyers in the online retail industry [2, 3, 4]. This comes as no surprise as young shoppers typically do not receive adequate knowledge in personal finance [6]. Additionally, since this segment of consumers contribute the most to online shopping platforms, they are also the ones who suffer the most post-purchase regret afterwards [7]. Hence, there is no doubt that young shoppers need better guidance when it comes to managing their financial resources. However, although there are many existing personal finance management applications that help track spending behavior, there are none that help change that spending behavior. This is why this domain was selected for this report.

## V. Paper Summaries

### A. *Dark Patterns in the Media: A Systematic Review*

The topic of dark patterns utilized in the design of numerous web products or services is covered in this article. Dark patterns are deceptive elements that are purposefully designed to lead individuals to engage in actions that they otherwise wouldn't. Although practitioners are familiar with this idea, there has been little research done on it. Therefore, the purpose of this paper is to increase understanding of the use of dark patterns by undertaking a systematic review of the most pertinent online papers that discuss the topic of dark patterns. Since Google is the most popular search engine globally, 31 articles were chosen for this review using its search engine. Through this review, 22 types of dark patterns were identified that were mentioned in the selected articles. Following that, these dark patterns were categorized based on three factors: the pattern’s strategic goal, its popularity in the media, and how harmful it is perceived to be. The notion that dark patterns are damaging and profoundly unethical, and that designers need to make an effort to limit their usage, is one point on which all the articles reviewed could agree. Ultimately, this article contributes to a more facile uncovering of dark patterns, with the goal of minimizing the malicious techniques used by web product creators that exploit users.

*Key Contribution and Significance:*

This paper continues an ongoing discussion about dark patterns through doing a systematic review in order to gain an understanding of those techniques in an effort to minimize them. The paper does not go into great detail about the ethics of dark patterns, but it does seem to agree that there is a need for a clear distinction of the roles and ethical obligations in designing web interfaces, a delimitation that is worthwhile discussing in both the academic and practical realms in order to reduce the use of dark patterns.

For this project specifically, this article benefits in providing a concise introduction to dark patterns. Additionally, this paper is helpful in that it lists and succinctly explains every dark pattern that has been noted in more than 30 web articles. Thus, this eliminates the need to read numerous papers in order to identify all commonly used dark patterns in web products. Overall, this article saves the time it would’ve otherwise taken to find potential dark patterns that could be used in the design section of this project.

### B. *“I am Definitely Manipulated, Even When I am Aware of it. It’s Ridiculous!” - Dark Patterns from the End-User Perspective*

The prevalence of deceptive techniques in online businesses is coming under more and more scrutiny. Such online tactics aim to sway consumers' purchasing decisions, persuade them to invest a lot of time in a service, and trick them into accepting privacy-invasive features. Although experts express concern, consumers' understanding of dark patterns is still a relatively unexplored area that has only recently been the focus of studies. By examining whether dark patterns take advantage of users' (1) lack of awareness or concern, (2) inability to recognise dark patterns, or (3) inability to resist dark patterns despite awareness and ability to recognise them, this study aims to close this gap. The authors developed an online survey on LimeSurvey that was distributed via Prolific in order to answer these three research issues. Before being exposed to specific dark

pattern designs, participants were initially questioned about their overall attitude toward manipulative web designs, followed by ratings of their online behavior. Additionally, information on their gender, age, and educational background was acquired. From a sample size of 406 participants, 193 were male, 200 were female, and 13 non-disclosed. Their ages ranged from 18 to 81, and 106 of them had only completed high school, 236 of them had vocational training or a bachelor's degree, and 64 had advanced degrees. The findings indicated that while users are able to recognise dark patterns, they are only vaguely aware of the entailed harm. The findings also suggest that a stronger ability to recognize deceptive designs is positively correlated to the capacity to self-protect. Furthermore, the study demonstrated that younger adults and those with degrees above a high school diploma are more likely to notice dark patterns. Last but not least, those who recognized dark patterns more easily reported that they are less likely to be influenced by them. However, whether people are very aware of online manipulation attempts or not generally makes no difference in terms of their tendency to be influenced by such tactics. These findings were then reviewed in light of potential interventions to combat dark patterns. These interventions included:
(1) Raising awareness of the existence and the risks of dark patterns through Warnings.

(2) Facilitating their detection through training on privacy scenarios, Spot the Dark Pattern activities, and automated detection tools.

(3) Bolstering the resistance towards them through educational interventions like long-term boosts, and design interventions like reframing costs and friction design.

(4) Eliminating them from online services through transparency impact assessment, bright patterns, design guidelines, plug-ins, add-on extensions, regulations, and hefty sanctions.

In the end, this paper concludes that dark patterns are a problem with numerous variables. As a result, they necessitate collaboration between a variety of individuals to develop a wide range of interventions. Designers should therefore be at the forefront of efforts to tame the monster they helped to create.

*Key Contribution and Significance:*

As one of the few empirical research articles on dark patterns, this paper makes a contribution by furthering the understanding of users' awareness of manipulative designs online. First, it reveals that users are able to recognize dark patterns but are only vaguely aware of the harm that is implied. The study also demonstrates that individuals under the age of 40 and those with degrees beyond a high school diploma are more likely to notice irregularities. The paper's discussion offers a range of interventions (i.e., design, technical, educational, and regulatory approaches) intended to increase public knowledge of manipulative design practices, facilitate their detection, fortify public resistance to them, or eradicate them. It also explores technical solutions as well as design strategies such as frictions, bright patterns, automated dark pattern detection applications, etc. In terms of intervention scope and measure, this paper's overall goal was to provide guidance to other designers, educators, developers, and regulators in order to help them construct effective countermeasures to manipulative designs online.

Specifically for the project, the significance of this paper are the results from the empirical study the authors conducted. The findings reveal that even if people are aware of dark patterns, they are still affected by it. Another valuable idea that this article briefly talks about is the concept of 'Bright Patterns'. Bright patterns are design nudges that counteract dark patterns by enhancing the user experience and encouraging people to make choices that align with their values and preferences.

### *C. Impulse buying: A systematic literature review and future research directions*

The study on impulse buying is fragmented and still evolving as a result of its shift from a conventional retail setting to various online outlets. Although academics from a variety of research fields, including marketing, information systems, business and management, and tourism, have studied impulse buying, the research findings are inconsistent and divided, resulting in the inability to fully comprehend the factors that influence impulse behavior. Using a systematic literature review approach, this paper conducts an extensive overview of scholarly studies on the subject of impulse purchase. Following the domain-based approach, this review's objective is to comprehensively examine the literature on impulsive buying in order to identify any gaps, opportunities, and potential areas for future studies.

First, a summary of the ideas and models employed in research on impulse purchases is provided. The findings demonstrate that a significant number of the articles on impulse buying used the Stimulus-Organism-Response framework, The Big Five Model, Hofstede's cultural dimensions theory, Regulatory focus theory, Construal level theory, Latent state-trait theory, and Flow theory. The systematic review then creates a conceptual model that depicts the antecedents of impulse purchase. Inferred from the research are five major categories of impulsive buying antecedents: consumer-related factors, sociodemographic factors, marketing mix variables, store-related variables, and online peer influence. Consumer-related factors are consumers' characteristics, self-control capacity and resources available. Sociodemographic factors include consumers' demographic group and susceptibility to cultural, normative and interpersonal influences. The marketing mix factors consist of product's characteristics and promotional offers. Store-related factors are the environmental stimuli encountered by shoppers in physical and online stores. Online peer influence includes the effects online reviews and social media have on consumers. Moreover, the review discusses the domains in impulse buying research. It specifically notes that traditional brick and mortar retailing and online retailing are two big

domains of literature where impulse buying has been studied. The latter dimension can be further broken down into mobile commerce, electronic commerce, and social commerce. Finally, utilizing the TCCM paradigm, the review offers insightful directions for further study in the field of impulse purchase. These recommendations offer distinct paths for advancing ideas, contexts, traits, and methods in impulse purchase research.

*Key Contributions and Significance:*

It is clear that the main contribution of this study was the systematic review it conducted on impulse buying literature to identify gaps, opportunities, and future research directions. The motivation behind doing this review was because the authors noticed that research findings on the topic of impulse buying were inconsistent and divided, which prevented having a full understanding of the factors that affect impulse buying behavior.

For the project, the discussion of antecedents of impulse buying behavior is the key benefit that this paper offers. The consumer-related issues raised are of particular significance since they reveal what factors should be prioritized and addressed in the application.

## VI. Designing a Personal Finance Management Application Using Dark Patterns

### A. Impulsive Buying Behavior Factors

According to the *Impulse buying: A systematic literature review and future research directions* paper, the three consumer-related aspects that affect impulse buying behavior in people are consumer characteristics, self-control, and consumer resources [2]. The consumer characteristics that predict impulse buying are neuroticism, extraversion, openness to experience, and low conscientiousness. Additionally high in materialism and low in emotional intelligence traits tend to impulse buy more. For self-control, the paper states that consumers who exhibit low self-control are more likely to purchase a product on impulse when shopping. Finally, consumer resources affect impulse buying since a larger budget can trigger positive emotions in a consumer which results in impulse buying.

Out of these three consumer-related factors, self-control is the one variable that can be worked on and improved over time. In fact, there have already been a few studies done that demonstrate that self-control exercises can help consumers reduce impulsive purchases [18, 19]. Therefore, for this personal finance management application, building self-control in users will be the main goal. This will be done through increasing self-awareness in users through reflection, building persistence in users, and letting the users as well as their friends and family hold them accountable.

### B. Use of Dark Patterns

Although there are 22 dark patterns that have been identified so far, only 8 of them will be used for the application. This is not only to limit the scope of this project, but also because some dark patterns will not be applicable here. For instance, patterns such as Sneak into Basket and Price Comparison Prevention are typically used in e-commerce websites where a user has to buy something. This app does not require the user to purchase anything (rather, the opposite of it), so applying these dark patterns will not be appropriate here. Additionally, even though this paper is an attempt to highlight that dark patterns can be used for helpful purposes, it is important to note that there are some patterns such as Privacy Zuckering that just cannot be used morally since they completely violate users' consent and privacy.

Having said that, the dark patterns that this application will be using to influence users' impulse buying behavior for the better are Roach Motel, Confirmshaming, Social Pyramid, Bad Defaults, Toying with Emotions, Nagging, Monetization, and Pseudo Currency.

## VII. Design

### A. Initial Set-Up and Home Screen

When the user first signs up for the app, they will be shown a tutorial on how to set up their account, link their credit card, use the features of the app, set their initial goals, and select between one of the three notification/character types: Passive-Aggressive Coots the Cat, Encouraging Quin the Quokka, and Guilt-Tripping Dex the Dog [Fig. 1]. This idea was inspired by a language learning app called Duolingo where an Owl (the mascot of the app) sends passive-aggressive notifications to remind the users to learn. This dark pattern is called ***Toying with Emotion*** as the users are being influenced to do an action through the notifications by the use of language and aesthetics (cute character). In the game industry, this pattern falls under Aesthetic Manipulations category [20]. In SpendLight, instead of just one character, different characters are used to show different personalities and the notifications change depending on the chosen character's personality so users can pick what kind of motivational messages work the best for them. The users can also switch between characters any time they want by going to the settings, as well as unlock more characters once they start earning 'dabloons' as rewards when they complete their goals (this will be discussed more later).

Fig. 1. Passive-Aggressive Coots the Cat, Encouraging Quin the Quokka, and Guilt-Tripping Dex the Dog (*figure caption*)

During the setting up portion, users will also be asked if the app can track users' activity across other companies' apps and websites in order to send push notifications when the user is on shopping apps or websites (this will be discussed more later).

Once the user is done with the initial set-up, they will see the home screen that shows their selected character, the buttons that lead them to goals and reflections pages, settings icon button, the amount of dabloons they have, and statistics on their monthly balance, income, and expenses [Fig. 2]. The user can also click on the balance, income, and expenses button to see more detailed information. There is also a navigation tab at the bottom that users can use to move through the screens.

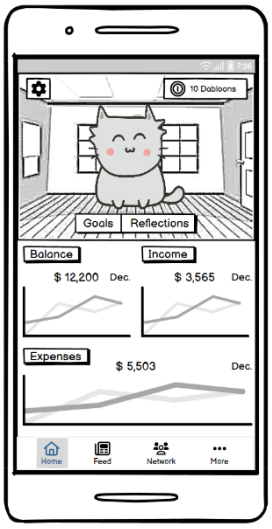


Fig. 2. Home Screen (*figure caption*)

## B. *Goals*

On this screen, users can add in their personal budget goals they have for each month [Fig. 3]. There are different categories of items that most consumers spend money on most frequently when shopping online, and users can set a budget for each of these items (Take Out, Outfits, Video Games, etc.). Progress bars are used here to visually show their progress towards each of their goals, as well as an alert icon showing up when the user is close to spending almost all of their budgeting amount.

Since a user's credit card is linked to the app, the app will automatically track users' purchases and categorize their spending into one of the options (Take Out, Outfit, etc.) so that users can see exactly where their money is going. This saves time that users would otherwise have to spend manually inputting information on the app. However, if the app is unsure about which category the purchase belongs to, then the app will ask the user.

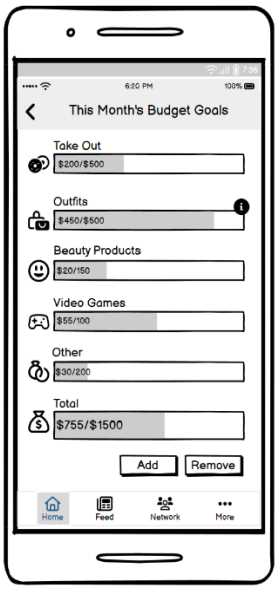


Fig. 3. Goals Screen (*figure caption*)

Additionally, when a user is close to or goes over their budgeted amount, they will receive a push notification from their selected character that will notify them and tell them to open the app so they can see where they're spending the most money [Fig. 4]. Here, the dark pattern ***Toying with Emotion*** is used again as users are being persuaded by the design of the characters, and the messages they use.

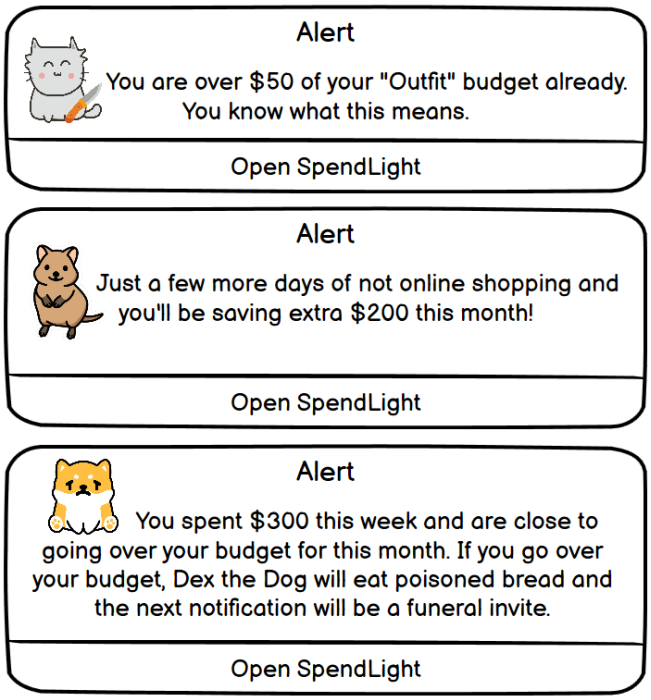


Fig. 4. Goals Notifications (*figure caption*)

## C. *Reflections*

In order to increase users' self-awareness, this feature is added to the app to help users reflect on their past purchases. Essentially the idea here is that every time the user makes an online purchase that is over a certain amount (user will select this amount during the initial set-up), the app will ask the user to reflect on that purchase. Not only that, but the app will ask users to reflect on the purchase every 2 weeks for the next 3 months (users can customize this in settings) [Fig. 5]. This is because oftentimes when an individual first buys a product, they feel happy about it but overtime, their happiness fades if the product is not what they thought it was, they don't find the product worth it anymore, or they don't use the product as often as they thought they would. Hence, by reviewing and reflecting on a product multiple times for 3 months, the users can be more self-aware of how their attitudes towards impulsive purchases change over time.

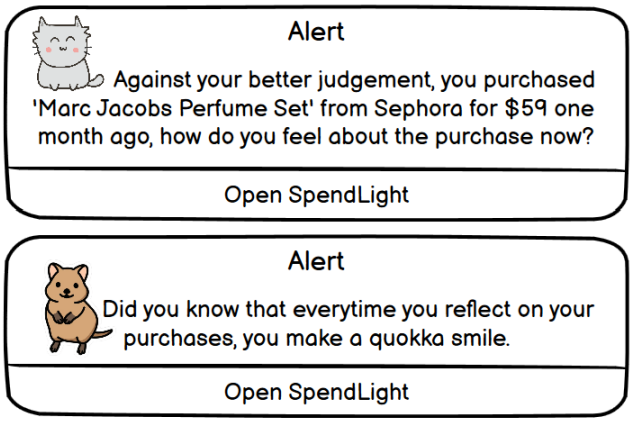


Fig. 5. Reflection Reminder Notifications (*figure caption*)

To make the reflection process quick and easy, users are asked only three questions: how they feel about the product, what they would rate it, and any comments that they have [Fig. 6].

On the actual Reflections screen, users can see the reflections they've done for all the products. Clicking on the arrow for one of the products will take them to the next screen that shows how a user's reflections for that specific product have changed over the time [Fig. 7].

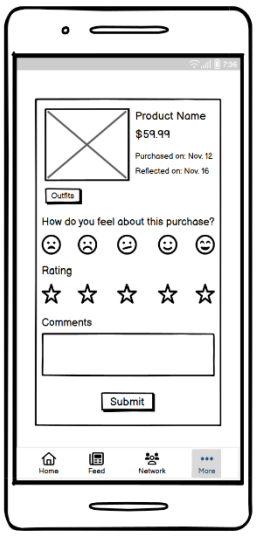


Fig. 6. Reflection Process (*figure caption*)

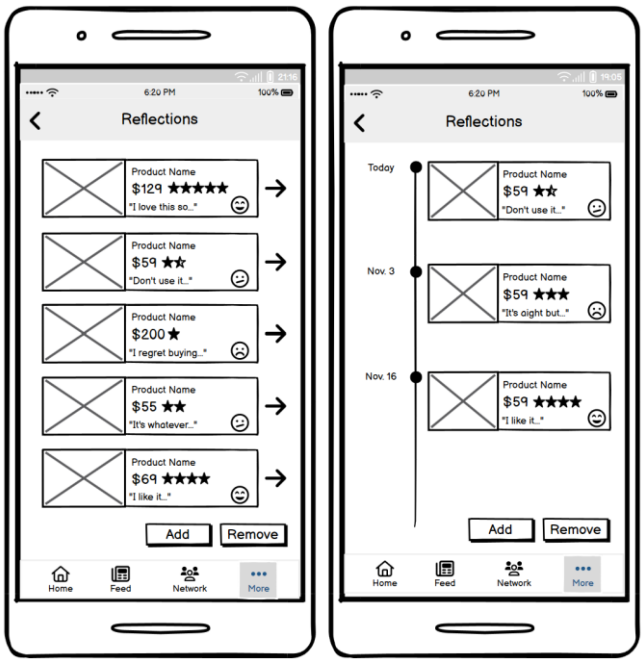


Fig. 7. Reflections Screen (*figure caption*)

## D. *Card Blocking*

One of many big reasons for online impulsive purchases is due to alcohol intoxication since users typically have little to no self-control when drunk [8]. Hence, to address this problem, this app has a feature that will allow the users to block their credit card for a certain period of time [Fig. 8]. Users can use this feature when they know they are going to go out for drinking, and hence take accountability for ensuring that they do not make any impulsive purchases.

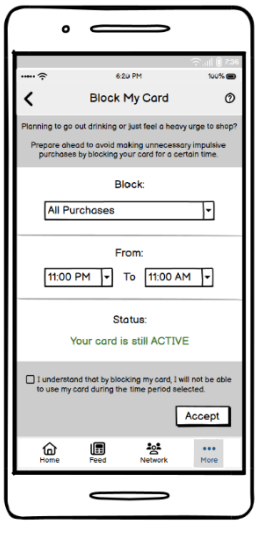


Fig. 8. Block My Card Screen (*figure caption*)

Additionally, this feature can also be used to delay purchases - when the users feel the urge to buy something but are aware enough to know that it may be impulsive, they can use the feature to block their card for a period of time in order to reflect if they really need the product or not.

In case the users decide that they need to unblock their card before their time-period is up, users will have to pass a simple Match-to-Sample task that uses visual sequences [Fig. 9]. Users can do this task by clicking on the 'Unblock Now' button from either the Block my Card screen or from the Home screen itself [Fig. 10]. In a Match-to-Sample task, a subject is given a stimulus (in this case, a visual pattern) that they must remember, also known as the 'sample'. They are then asked to identify from a set of

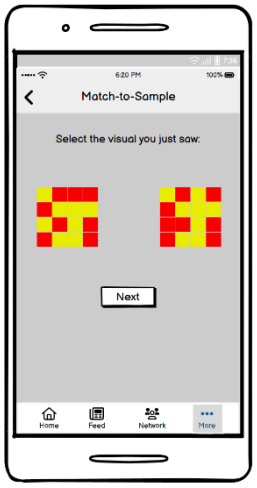


Fig. 9. Match-to-Sample Task (*figure caption*)

stimuli, known as the comparison stimuli, that "matches" the sample [21]. If users can accurately match 8 samples out of the 10 given, then the card will be unblocked, but if they receive a lower score, the card will remain blocked. The main reason this task is implemented is because typically working memory processes that are needed to encode and maintain stimulus sequences are sensitive to alcohol intoxication [9]. In other words, drunk individuals make a lot of errors when doing a task such as Match-to-Sample task that involves sequential presentation of material that can be verbally encoded [9]. Thus, it will be much harder for a drunk individual to unblock their card and make impulsive purchases. This strategy is known as the ***Roach Motel*** dark pattern, where it is extremely difficult for a user to complete an action that they want to do because it involves a complicated and time-consuming process.

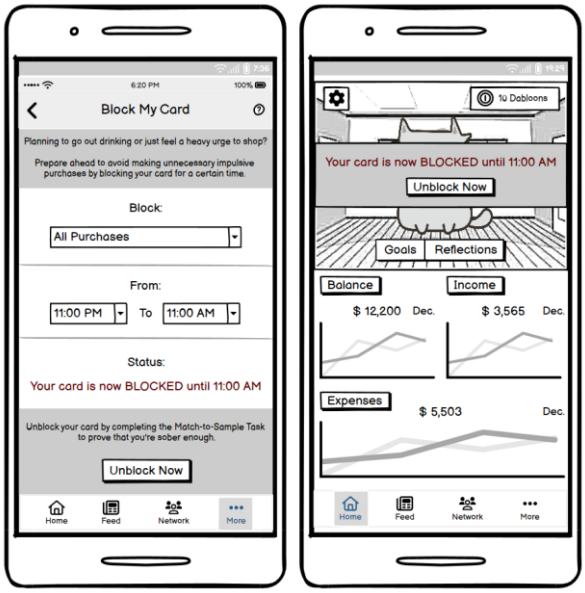


Fig. 10. Unblocking the Card (*figure caption*)

### E. *Network and Feed*

Self-regulation can be challenging when you're just starting out. Hence, the network section of the app was created to allow users to add their trusted friends and family who will help them in their journey towards self-regulation by being accountability partners [Fig. 11]. Essentially, this feature adds a social aspect to the app which lets people in the same network check each other's progress towards minimizing online impulsive purchases. Using the ***Social Pyramid*** dark patterns, how this feature works is that if an individual decides to impulsively purchase something and goes over their budget, it instantly sends a notification to the people in their network (user will unintentionally spam their friends with notifications if they decide to impulse buy) and shares the information on the Feed [Fig. 12]. Additionally, it also shares users' successes and notifies the network when a user went under their budget and saved their money. If the user has their tracking permissions on, then the app will also let their network know when the user is on a shopping website, planning to spend a lot of money on a product. Knowing that other people in their life can see their purchase can make some users think twice about purchasing. Furthermore, it lets multiple people who have the same goal of reducing their online impulsive purchases, support each other in their journeys. However, it is completely up to the users if they'd like to use this feature or not, but using the dark pattern ***Bad Defaults***, this feature is turned on by default (users will be made aware of this during the tutorial).

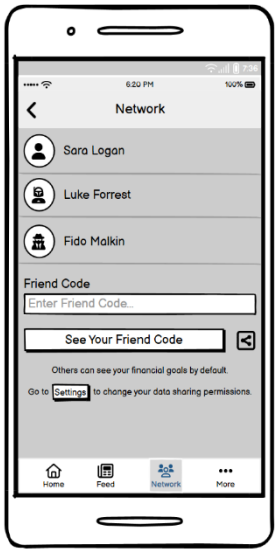


Fig. 11. Network Screen (*figure caption*)

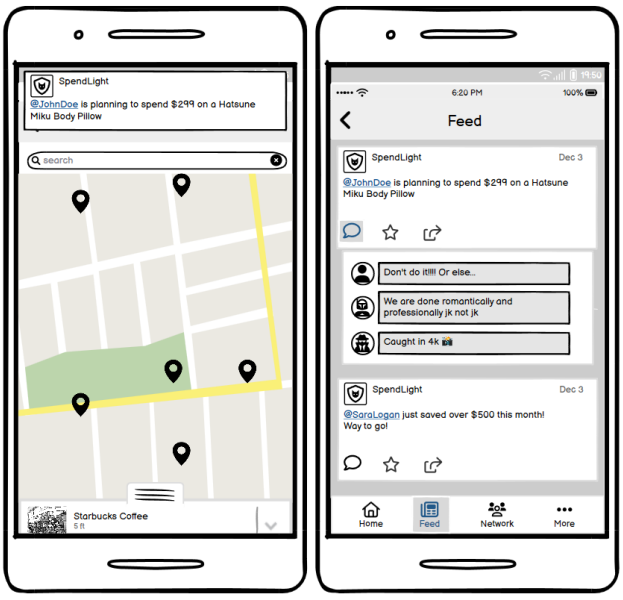


Fig. 12. Notifications to Network and Feed (*figure caption*)

### F. *Dabloons and Shop*

The dabloons and shop features in the app take advantage of the ***Monetization*** and ***Pseudo Currency*** dark patterns. By succeeding in their goals and doing reflection, users earn the pseudo currency called dabloons as reward [Fig. 13].


Fig. 13. Earning Dabloons (*figure caption*)

These dabloons can be used to unlock new characters with different personalities, outfits for the characters, as well as furniture from the Shop screen [Fig. 14]. In psychology, this strategy of rewarding the individual to increase likelihood of desired behavior is known as positive reinforcement and is quite effective [10]. This slight gamification of the app also helps with keeping the users motivated and enhances engagement [11].

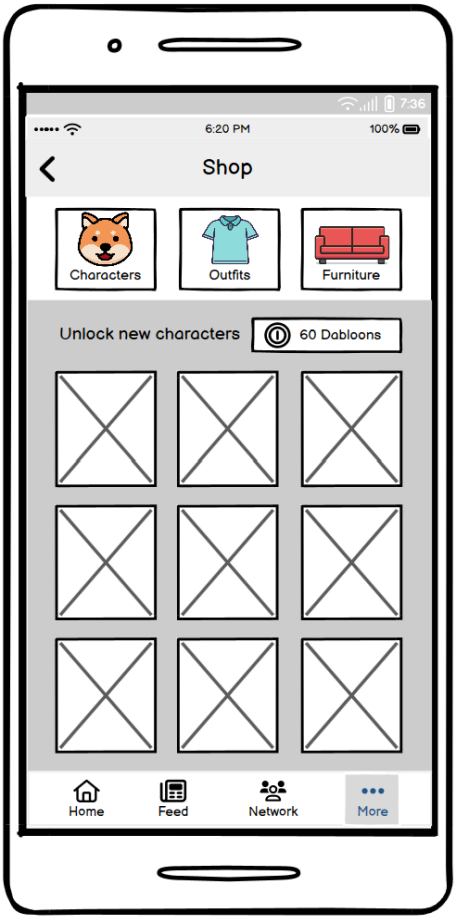


Fig. 14. Shop Screen (*figure caption*)

### G. *Push Notifications when Online Shopping*

Incorporating dark patterns such as ***Confirmshaming*** and ***Nagging***, in push notifications is one of the main strategies that influences users to increase their self-control through persistence.

If the user has allowed the app to track their activity across other apps and websites, each time a user is on a shopping app or website, the app will nag the user with push notifications if they are spending too much time on the app, purchasing an item over their budget, or buying an item that is above the amount limit they have set [Fig. 15].

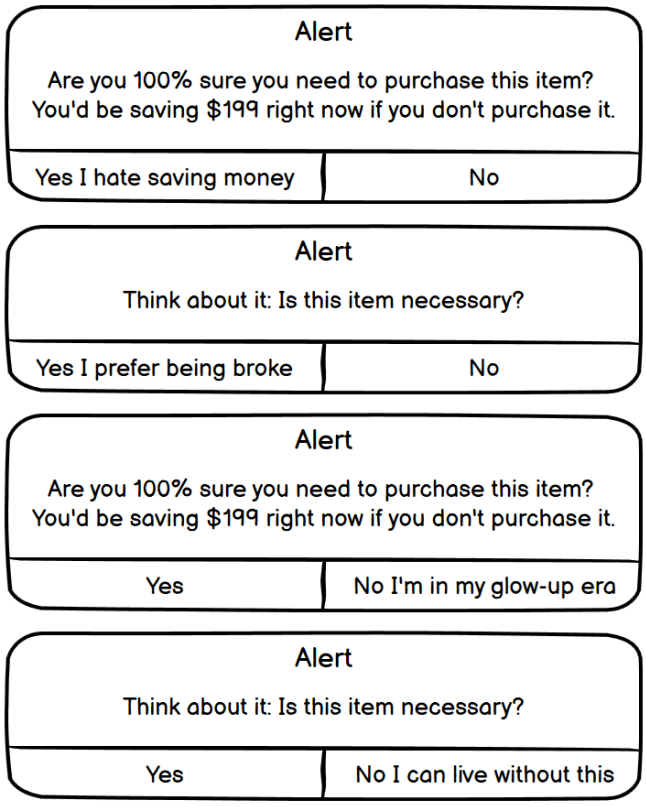


Fig. 15. Push Notifications (*figure caption*)

## VIII. Design Considerations

As mentioned in the article 10 Do's and Don'ts of Mobile App Design, there are many things to consider when designing a mobile app [12]. Although only low-fidelity wireframes were designed for this application in this report, there were still many recommendations from that article that I kept in mind when designing. For instance, the navigation is self-evident in the application as common navigation patterns such as the button navigation tab that most users are already familiar with are used. Additionally, the users are always aware of their current location by checking the headings on each screen as well as the icons that are highlighted on the navigation tab. The text on all screens is also legible and above 11 points so users are able to read it clearly without needing to zoom. Moreover, when designing I ensured that there was a minimal need for typing in the app since typing on mobile devices is typically a slow and error-prone process. Thus, the only time users will need to type is when they are logging in to their account and when answering one of the questions in the Reflections section. The design is also mostly minimalist and has minimal amount of clutter. The only screen that uses decorative elements is the home screen with the characters and their rooms. Further, the app does not replicate the web experience by using elements such as underlined links, instead buttons are used.

It is important to note however, that this application was designed in isolation without any kind of testing, and the scope of this report is limited. Therefore, there are many design considerations that were not addressed in the application.

## IX. Insights

### A. *Design Patterns, Dark Patterns, and Bright Patterns*

Design patterns are structural and behavioral elements that enhance the "habitability" of something, be it an object-oriented software, a website, a building, or a user interface [13]. Architect Christopher Alexander introduced the original concept of design patterns as best practices for designing buildings and communities in the 1970s [13]. In his book *A Pattern Language*, he describes 253 patterns that offer user-friendly solutions to recurring problems in urban architecture [14]. Building on Alexander's work, HCI researchers have suggested design patterns in interface design with books like *Designing Interfaces: Patterns for Effective Interaction Design* describing design patterns which can be used to design more user-friendly solutions for design problems [15].

More recently, dark patterns have caught the attention of design practitioners and researchers, which are regarded as some of the worst practices in the design industry. As mentioned previously, these patterns are usually described as being "evil" or "bad" design. However, in this project, patterns that are often described as dark patterns were used in the design of SpendLight, a personal finance management application, to help users minimize their online impulsive buying behavior. In this case, these dark patterns are being used to benefit the users. Hence, this project demonstrates that rather than dark patterns being bad patterns, it is just a label given to design patterns that have been widely used unethically in user interfaces. Essentially, the majority of the patterns that fall under the category "dark patterns", are not dark in of itself and can be used in ways to help the users rather than harm them. This is why the concept of "bright patterns" exists - they are design nudges or patterns that often fall under the category of "dark patterns" that have been reversed or implemented in ways that are helpful [16]. In a way, dark patterns and bright patterns are two sides of the same coin. At the end of the day, they are all just *persuasive* patterns.

### B. *Ethics of Using Dark Patterns for Good*

Due to their deceiving nature, dark patterns are frequently portrayed in popular and scholarly discourse as an ethical concern. Design is rarely a solitary activity, and the complex entanglement among designer responsibility, organizational demands, and neoliberal values frequently politicizes and emphasizes the profitability of design over

other social objectives, further complicating the ethics of dark design patterns [22]. There is also the problem of assigning 'dark' intentions to an interaction strategy. At what point along the trajectory does a pattern become dark, and with what degree of intentionality?

The use of dark patterns for good brings up an intriguing new question - is it ethical to use dark patterns if they are used for the benefit of the users? This question further complicates the discussion of dark patterns in the ethical landscape, and answering it necessitates further research on the subject. However, while creating the design, two factors that I did keep in mind in order to be more ethical are: 1) Being transparent about the usage of dark patterns, and 2) Allowing customization. If the user is being persuaded by an application, even for their own benefit, I believe it is crucial that they are aware of it and can give their informed consent before they use that application. The findings from [5] reveal that even if people are aware of dark patterns, they are still affected by it. Thus, this suggests that the application can be open and transparent about its use of dark patterns to be more ethical, and users would still be affected by the patterns used in the app to reduce their impulse buying behavior on online platforms. Additionally, it is also essential to give users control and allow them to customize the features. On SpendLight, users can personalize the notifications they receive, how often they receive them, which features they want turned on or off, and so on. So although the app is using dark patterns, the users can choose which patterns they encounter. There are most likely several other ethical factors that should be taken into account when designing an application like this using dark patterns, however that discussion is beyond the scope of this paper.

## X. Conclusion

Demonstrated through designing a Personal Financial Management application, this project contributes by bringing a perspective to the area of dark patterns that has been talked about, but not explored in depth. Dark patterns are frequently said to be "evil" or poor design by many researchers - and it isn't to say that their opinion is invalid since these patterns are oftentimes used maliciously by many websites - but it is important to see things from a new angle and consider that these dark patterns are not fundamentally bad themselves. They are design patterns that have been used in a bad way in many user interfaces but can also be used for good by turning these patterns into a bright version of themselves.

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