Evil design in the Dark Patterns tunnel: where we came from and where we are (heading) now

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ABSTRACT

In this paper we highlight certain notions on Dark Patterns from a *user's perspective*. Dark Patterns are elements in interfaces designed to misdirect, confuse, and lure users into unintended, involuntary actions. They are omnipresent in web and game-interfaces and highly effective. There is agreement that awareness and better understanding is needed. We present some current Dark Patterns research projects carried out by the Human-Centered Computing group at Utrecht University, dedicating attention to a set of insights and findings we think should be shared. These stem from research on contextual issue of device choice and experiencing Dark Patterns, the "Dark Pattern Darkness Score" (DPDS), the "System darkness scale" (SDS), and the use of Muscle Memory as a Dark Pattern. The latter we propose as an addition to existing Dark Patters taxonomies.

Author Keywords

Dark Patterns; deceptive design; deceptive patterns

INTRODUCTION

It is of all times to trick consumers into unintended purchases, the principle of manipulation is being applied to situations in the real world. In physical stores we see high-pressure sales tactics, misleading product information, or hidden fees. It happens that products or services are being advertised at low prices to attract customers, to upsell or substitute to a more expensive option. In the digital realm when an interface is maliciously crafted with a solid understanding of human psychology to deceive users into performing actions they did not intend to do, we are talking about *Dark Patterns* [2]. Dark Patterns are user interface elements that can influence a person's behavior against their intentions or best interests. They are mostly seen in ecommerce, but also in e.g., gaming, and general services.

An extreme example was once present on the website of a famous budget airline; while booking a journey, the website attempted to lure the user into buying Travel Insurance. In case one *did not want* this insurance, one had to find the option *"Travel without insurance"* in the country pulldown list (under "T"). An even more extreme example is a strand of hair being Photoshopped in an image on a mobile app. Seeing this on a mobile device leads users to think it is real, and when one tries to swipe the hair off the surface, the user is clicking on a link and enters a web store involuntarily.

Dark Patterns are much debated within the academic HCI-community and governments and regulatory bodies started acting against them. Only recently [6] (June 2023) the Federal Trade Commission sued Amazon for enrolling customers in its Prime program without their consent and making it difficult for them to cancel their subscription.

The remainder of this paper concerns the second part of the title of the paper which has 3 parts: *where we came from, where we are now,* and *where are we heading.* Regarding "where we came from" we give a brief historical perspective on the matter, including a definition and an influential taxonomy. Regarding "where we are now" some projects and findings from our department are discussed. These projects are characterized by a strong user-centered approach. Concerning "where are we heading" we conclude with some specific notions from our own research, which in our opinion should find their way into theory and practice.

WHERE WE CAME FROM

Brignull initially [2] defined dark patterns as: "*a user interface that has been carefully crafted to trick users into doing things, such as buying overpriced insurance with their purchase or signing up for recurring bills.*"

The definition is still valid, and variations on it exist. but the term "dark patterns" is becoming outdated since many voices echoed that the phrase "dark patterns" is harmful. The problem with using the term "dark" is that signifies something "bad". Brignull since then has rebranded his site to "www.deceptive.design" to use a more inclusive term, and his last book the term became "deceptive patterns" [1].

Brignull [2] initially formulated 12 different Dark Patterns to describing deceptive strategies. After this the taxonomy by Gray et. Al [8] accommodated these 12 types under five primary Dark Patterns categories and added some extra Dark Pattern types (to a total of 17), see next section.

WHERE WE ARE NOW

We firstly present the taxonomy by [8] which has become a de facto standard and starting point in many studies:

A. Nagging

    1. Nagging: interruption of unrelated task

B. Obstruction- Make a process more complicated than it must be.

    2. Roach motel: Situation easy to get into but difficult to get out of.

    3. Price Comparison Prevention: Makes comparing prices difficult.

    4. Intermediate Currency: Disconnects users from the real value of money.

C. Sneaking - Intentionally "hide, disguise, or delay" information of interest to the user.

    5. Forced Continuity: Automatically charge users after service expires.

    6. Hidden Costs: Shows price but adds costs.

    7. Sneak into Basket: Adds additional items to cart without consent.

    8. Bait and Switch: Action has different outcome than expected.

D. Interface interference - Privileging actions over others, to confuse / limit discoverability of actions.

    9. Hidden Information: Relevant options or actions not immediately accessible.

    10. Preselection: Option selected by default prior to user interaction.

    11. Toying with emotion: Uses language, emotion, style evoking certain emotions.

    12. False Hierarchy: Gives visual precedence to one option over others.

    13. Disguised Ads: Ads that blend with the medium of information.

    14. Trick Questions: Question that appears to be one thing but is another.

E. Forced action - When users must perform a specific action to access specific functionality.

    15. Social Pyramid: Strategy requires users to recruit other users to use a service.

    16. Privacy Zuckering: Trick user so he shares more personal data than intended.

    17. Gamification: Service only earned through repeated use of service

This taxonomy **is** based on the strategic motivator behind it and by doing this, the categorization of Dark Patterns was made sharper, more general, and more suitable for comparison. Ever since awareness and concern among consumers, regulators, and the tech industry is still growing, it receives more and more media coverage, and advocacy groups are growing in number [5].

Research by others

Much research has used the taxonomy since. [11] used a web crawler to identify dark patterns on the 11K most popular shopping websites worldwide. They discovered 1818 instances of dark patterns present on 1254 web sites (11.1%). More popular shopping websites were more likely to feature dark patterns. In a study by [10] in which was found that more than 95% of the 200 most popular apps contain at least one dark pattern from this taxonomy. Overall, 1787 dark patterns were found among all apps. The 2022 EU Commission report [12] showed that the 200 most popular apps and websites in the EU contain at least 1 dark pattern, although they more typically contain a combination of multiple dark patterns (EU Com, 2022). The EU's Consumer Protection Cooperation (CPC) Network conducted a sweep of 399 retail websites and apps for Dark Patterns and found that nearly 40% of online shopping websites rely on manipulative practices to exploit consumers' vulnerabilities or trick them.

Clearly many challenges exist, and one notion is that apart from studies where e.g., crawlers are used to obtain an idea of how widespread Dark Patterns are, or taxonomies are being theorized, more research with *real users* is needed. What about the *context* in which we experience Dark Patterns, how can we rate the *severity* of these, how can we gauge the "*darkness*" of a *whole* system or service (just as we have scales for Usability or UX), and are there still additions to the taxonomy, e.g., the use of *Muscle Memory*?

Research at Utrecht University

Several studies involving Dark Patterns have been done at the Human-Centered Computing group at the department of Science, Utrecht University in The Netherlands. They address the above-mentioned issues and other so far uncovered aspects of device use in combination with Dark Patters, but they have one aspect in common: involvement of real users.

Consumer context of use: Mobile vs. Laptop/PC

One study [4] investigated the relation between Dark Pattern recognition and platform choice. In an experiment 54 participants performed a shopping task on a website where dark pattern types were implemented, such as "Sneak into Basket", "Toying with emotions" and "Trick Questions". It showed that mobile users are twice as likely to fall for the patterns. A potential reason for this could be mobile users not taking the time to look at every single element on a webpage in detail, while desktop users may

take more time to do so. In addition, a significant correlation was found between falling for that dark pattern and the age of users. The older the user, the more chance of falling for that pattern. An explanation for this could be that older users are more careful when spending money regardless of whether they are shopping offline or online. This might lead them to be more careful and precise over the whole range of actions when shopping online. In contrast, younger users are likely to be more familiar with technology, which could result in them being less careful while shopping online.

Consumer perceptions of single Dark Patterns: DPDS

Here [9] it was investigated what user's opinions are on the level of severity of Dark Pattern types. 92 Participants were presented with 17 Dark Patterns following [8] and asked to imagine themselves being in the situation at hand. After this they had to indicate how they would feel if they found themselves in the situation. A DPDS score of 0 indicates a Dark Pattern perceived to be not severe at all and a score of 10 indicates a Dark Pattern with very high severity impact.

Table 1. Dark Pattern types with their average rating and final DPDS

Dark Pattern	Avg. Rating	DPDS
Hidden Costs	3.80	9.5
Roach Motel	3.87	9.5
Bait and Switch	3.77	9.4
Sneak into Basket	3.60	9.0
Disguised Ads	3.60	9.0
Nagging	3.53	8.8
Social Pyramid	3.48	8.7
Privacy Zuckering	3.45	8.6
Hidden Information	3.41	8.5
Trick Questions	3.38	8.5
Price Comparison Prevention	3.07	7.7
Forced Continuity	2.90	7.3
False Hierarchy	2.88	7.2
Intermediate Currency	2.80	7.0
Gamification	2.64	6.6
Preselection	2.33	5.8
Toying with Emotions	2.08	5.2

Participants perceived the patterns *Hidden Costs*, *Roach Motel, Bait & Switch,* and *Sneak into Basket* to be the most severe. What is interesting here is that at least two of the Patterns (*Hidden Costs* & *Sneak into Basket*) have a *direct relation* to monetary aspects. *Toying with Emotions* and *Preselection* showed to be the 'least severe' Dark Pattern types (DPDS lower than '6'). It is unclear why *Toying with Emotions* is not perceived to be severe, though for *Preselection* there is a relatively clear explanation: it is one of the Dark Patterns that is mostly encountered by users which might in general have led to users 'getting used' to it, resulting in less frustration with the pattern in the long term.

Consumer Darkness perception of a whole system: SDS

This study [3] focuses on dark patterns from a user's perspective to develop the 'System Darkness Scale' (SDS). The SDS is a set of questionnaire items which can be used to evaluate the darkness of a system and assign a score to it. Just as the SUS proved to be a quick and reliable tool to measure usability, the SDS aims to act as a validated tool to identify in how far a system or service has incorporated "dark mechanisms". The SDS shows the overall assessment of a system, offering an unpolished picture of user perceptions. The SDS can be used by researchers, professionals (e.g., designers to see their own blind spots), regulatory authorities, and policymakers to monitor online services as part of an evaluation.

Beyond conventional Dark Patterns: Muscle Memory

When a task is repeated it becomes part of procedural memory. This type of memory dedicated to movement is called "Muscle Memory", which allows one to perform actions unconsciously. Inspired by some anecdotical examples of Muscle Memory as a Dark Pattern pointed out in the design community, we decided to empirically investigate whether Muscle Memory can indeed be used as a Dark Pattern. Muscle memory was already *proposed* to be a cognitive trait exploited for a specific dark pattern, i.e., the Bait and Switch pattern [13]. Since then, it has been mentioned as a potential explanation for dark pattern use in games and social media applications. However, in none of these instances, a systematic user study was carried out, only the idea of how Muscle Memory can be exploited is sketched. Within the context of for example social media, Muscle Memory builds up if one uses social media applications frequently. Using Muscle Memory as a Dark Pattern is less defined in terms of how, when or where it manifests, it can be applied to several parts of the interface. This could be you accidentally clicking on a "Yes" button because it was swapped with a "No" button that used to be on that location. Another example is when Twitter wanted users to discover the new feature "discover", it was put in the location where "notifications" usually are, so people would naturally click on the old spot due to Muscle Memory and discover a new feature.

We designed a user study examining speed and accuracy of using a newly changed interface which showed slower reaction time and more errors. We focused on Instagram's introduction of a new feature, i.e., the "Reels" feature which replaced the most used activity: the "Create" feature. Two sets of participants contributed to this study [7]: Dutch and Greeks. As the changes in the Instagram interface were not introduced in Greece yet, we were able to test the differences in reaction time and accuracy between these two populations. We found that the Greek users needed more time and had more miss-clicks on their attempts to perform the "create" task on the interface containing the Reels feature. Moreover, Greeks reported feeling "deceived" about the change in the interface. The results lead us to

conclude that in specific interface changes muscle memory can be applied as a Dark Pattern. Moreover, we introduce a new term, "Transferable Muscle Memory", a phenomenon where users apply Muscle Memory built from one social medium to another. We examined this by testing whether Instagram users can benefit from their Muscle Memory to perform similar tasks on Pinterest. Frequent Instagram users have statistically significantly lower execution time on Pinterest tasks than the less frequent users with no related muscle memory, suggesting that "Transferable Muscle Memory" is a valid term of social media apps.

WHERE ARE WE HEADING (CONCLUSION)

Dark Patterns are here to stay. Or aren't they? As users *and* society become more aware of dark patterns and demand transparency and ethical design, companies may employ more subtle and sophisticated tactics, making it harder for users to detect deceptive practices. The crusade against Dark Patterns is an ongoing effort and progress takes time. As technology evolves, new challenges arise, but with continued vigilance, education, and a commitment to ethical design it could be possible to make strides in mitigating the impact of Dark Patterns on users. We strongly insist the academic and professional community to include Muscle Memory in their research.

We here have gone over some general theory, research from others and ourselves, and current dynamics in the research into Dark Patterns. We saw that there's a difference in experiencing/falling for Dark Patterns between mobile devices (often on the go) and Laptop/PC, and that the age of the user is also a factor. We identified which of the Dark Patterns from the influential taxonomy of [8] are perceived as "Darker". We devised a scale to gauge the "Darkness" of a whole system of services, and we precent evidence that the notion that Muscle Memory can be used as a Dark Pattern. We believe that the additions presented here fit in the larger body of knowledge regarding Dark Patterns.

In the future emerging technologies such as AR, VR, and voice assistants become more widespread, there may be new opportunities for Dark Patterns to emerge in these interfaces. A specific "fear" could be the notion of Adaptive Dark Patterns, Dark Patterns changing in response to user behavior or feedback to maintain their effectiveness.

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