

Towards Quantifying Ethical User Experience: Evaluating User Perceptions of Dark Patterns in Social Media

Doris Maria Rhomberg^{1,†}, Hauke Sandhaus^{2,*,†}

¹TU Wien Informatics, Favoritenstraße 9-11, 1040 Vienna, Austria

²Cornell University, Cornell Tech, 2 West Loop Rd, 10044 New York, New York, USA

Abstract

No standardized questionnaire currently incorporates an ethical dimension for assessing User Experience (UX). We explored how the ethicality of interface design is reflected in current UX metrics and how they could be extended. To this end, we adapted the User Experience Questionnaire (UEQ) and enriched it with supplementary items specifically designed to capture user responses on social media to unethical interface designs, commonly referred to as 'dark patterns'. Through an exploratory analysis of a survey involving 120 participants who evaluated a selection of 15 social media dark patterns, we found preliminary evidence that (1) an aggregated UX score using items from the User Experience Questionnaire does not effectively indicate unethical user interface design. Instead, (2) subscale measures from the questionnaire show a relationship with unethical design. Furthermore, extending the User Experience Questionnaire seems promising, as (3) users can identify interfaces with addictive and pressuring properties, and (4) evaluations demonstrate consistency within groups of unethical design strategies.

Keywords

Dark Patterns, Ethics, Manipulation, Social Media, Measuring, User Experience

1. Introduction

User experience (UX) designers are responsible for designing all aspects of user interfaces [1]. Although UX design inherently carries qualitative value, the success of designs and design departments is typically benchmarked and evaluated through quantitative UX measurements [2]. These measurements aim to holistically assess UX and distill design into key performance indicators [3, 4]. However, there is an absence of any standardized instruments that incorporate an ethical dimension for assessing UX, underscoring a significant gap in current methodologies.

Meanwhile, there is an emerging consensus that social media companies engage in unethical design practices [5, 6, 7], driven by the goal of maximizing the collection of user data for monetization through advertising [8] and maximizing time spent on their platforms [9, 10, 6].

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*Corresponding author.

†These authors contributed equally.

✉ e1649642@student.tuwien.ac.at (D. M. Rhomberg); hgs52@cornell.edu (H. Sandhaus)

🌐 <https://haukesand.github.io/> (H. Sandhaus)

🆔 0009-0003-7542-3438 (D. M. Rhomberg); 0000-0002-4169-0197 (H. Sandhaus)

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To achieve these objectives, social media companies have incorporated dark patterns, which are "*instances where designers use their knowledge of human behavior (e.g., psychology) and the desires of end users to implement deceptive functionality that is not in the user's best interest*" [11].

This paper initiates a refocus of user experience metrics to evaluate *all* facets of users' perceptions, explicitly including those with potential for harm, as delineated by ISO 9241-210 [12].

Therefore, we made a first attempt to develop a quantitative method to assess users' ethical perception of dark patterns in social media. In pursuit of this, we adapted the UEQ and enriched it with supplementary items specifically designed to capture user reactions to unethical interface designs.

In the subsequent sections of this workshop paper, we explore existing UX metrics and examine how dark patterns are assessed in current literature. Next, we describe the process of developing an adapted UEQ incorporating an ethical dimension, informed by emerging taxonomies classifying unethical interface design strategies in social media, known as dark patterns. Following that, we present key findings from the survey and discuss their implications in the last part.

2. Literature Review

2.1. Evaluating User Experience and Ethics

The literature outlines various methods for assessing user experiences, highlighting diverse approaches to identifying software weaknesses. Methods range from *IsoMetrics*[13] and *AttrakDiff2*[14] to others, each with unique focuses. The *Microsoft Desirability Toolkit* simplifies capturing subjective aspects like "fun" and "enjoyment" through techniques like the *Faces Questionnaire* and *Product Reaction Cards*, yielding qualitative feedback[15]. In contrast, the *System Usability Scale (SUS)* offers a quantitative perspective by scoring a system's usability on a scale from 0 to 100 based on user responses to ten statements[16]. Though alternative methods exist, such as emotion recognition for evaluating dark patterns[17], surveys remain the predominant tool for gathering user experience data. This is evidenced by well-established methods like SUMI, which assesses usability through 50 statements[18], and the once-popular *AttrakDiff2*, an inspiration for the widely used User Experience Questionnaire [19, 20].

2.1.1. User Experience Questionnaire (UEQ)

The UEQ is designed to rapidly assess users' subjective perceptions of product features and their immediate effects, using 26 items across six scales to capture a broad view of user experience [14]. These scales assess both hedonic qualities—*Stimulation* and *Novelty*, which focus on engagement and innovation—and pragmatic qualities—*Efficiency*, *Perspiciousity*, and *Dependability*, which relate to task accomplishment. *Attractiveness* evaluates the overall product impression, synthesizing insights from both hedonic and pragmatic dimensions [21].

Users rate their agreement with paired adjectives on a scale from -3 to +3, indicating their experience. The UEQ-S, a concise version of the full questionnaire, contains eight items, four items from the hedonic scales and four from the pragmatic scales [21].

2.1.2. Business Goals and User Experience

User Experience Design is about making business objectives and user goals work together [22]. Key Performance Indicators (KPIs) or Objectives and Key Results (OKRs) measure the move to achieve those business goals, and UX measures are established, as such KPIs that can measure a user interface designs UX performance holistically [3]. As measurements can easily become targets [23, 24], it is crucial that business measurements incorporate all points of importance, *including* ethics.

2.1.3. Evaluating Ethics in Design

In the realm of technology design, ethical considerations present complex challenges [25]. The influence of dark patterns on user decision-making has been well-documented, illustrating how certain design choices can manipulate user consent, as seen in studies on cookie banner consent designs [26]. However, the assessment of tech ethics remains fragmented, with current methodologies often leading to qualitative insights.

Although instruments like the Ethical Climate Questionnaire exist to assess organizational ethics [27] and tools like the Facebook Addiction Questionnaire gauge individual platform dependency [28], these do only yield data on business organization and individual human long-term effects. More concretely, some researchers have proposed 'moral cards', designed for designers to use as a reflective tool on adhering to ethics by design [29]. In the field of artificial intelligence, considerable efforts have been made to incorporate ethics, with many ethics frameworks emerging. Although checklists, audits, and fairness metrics have been proposed to encourage AI developers towards responsibility, a review indicates that these tools investigate ethics *narrowly*, focusing on a few dimensions rather than examining all aspects holistically [30]. This underscores a significant research void: the lack of tools specifically designed to evaluate the ethical aspects of user interfaces.

Our initial endeavor seeks to bridge this gap by proposing a method that integrates ethical considerations into user experience assessments. Despite a thorough literature search using comprehensive keywords, we found no existing instruments tailored for assessing the ethicality of user interfaces. This discovery confirms the need for innovative approaches to incorporate ethical evaluation into UX design practices, marking a pivotal direction for future research.

2.2. User Perception of Dark Patterns (in Social Media)

A few researchers have studied unethical design practices in social media [5, 10, 31, 6, 9]. Mildner et al. [31] demonstrated that regular users of social networking services are capable of identifying dark patterns. This was established by presenting users with screenshots of dark patterns and non-dark patterns identified through expert analysis. Further, the study asked users to evaluate their perceptions of these patterns using specific dark pattern characteristics, asymmetric, covert, deceptive, hides information, and restrictive [32], finding a generally mild tendency in their evaluations.

In contrast, Bongard-Blanchy et al. [33] conducted a survey of whether users can recognize dark patterns in different domains. The participants were asked to elaborate in an open text

field on whether they had seen manipulative design elements presented to them for a duration from 10 to 40 seconds. One of the ten mockups served as a control condition and did not contain any dark pattern. The findings indicate that 59% of the participants successfully recognized five or more dark patterns among the nine interfaces. Furthermore, the results highlight that some dark patterns, such as high-demand / limited time message and confirmshaming, are easier to detect than others like hidden information[33].

Monge Roffarello and De Russis [6] explored dark patterns that grab users' attention and get them hooked. One of their identified dark patterns was social investment, which refers to the display of social metrics, such as the number of comments, followers, or similar indicators. In a 3-week experiment, they decreased social investment on a Facebook feed each week, and the results showed, that removing this dark pattern led to a reduction in the time spent on the page.

3. Methodology

To study how unethical interface design materializes in user experience metrics and could be quantified through them, we identified 15 social media dark patterns, reported in the literature. These were then used to stimulate an extension to the User Experience Questionnaire, translated into mockups and evaluated using an online survey.

3.1. Known Dark Patterns in Social Media as a Baseline of Unethical User Interface Design

To advance standardized tools for measuring unethical user experience, we base our work on a set of social media user interfaces identified as unethical. These interfaces were selected from a literature review of academic and governmental dark pattern taxonomies. We integrated findings from two peer-reviewed papers [5, 6] and a report by the European Data Protection Board [7], resulting in a list of 15 dark patterns mapped to six distinct strategies. For each dark pattern, we created an image or video mockup in a minimalistic social media app design. These patterns are re-creations of examples from the literature, when available. A detailed taxonomy report exceeds the scope of this paper; however, the final design stimuli are accessible on OSF ¹.

The dark patterns and their associated strategies are listed in Figure 1.

3.2. Adapting the User Experience Questionnaire

The UEQ² was adapted to include considerations of ethical and unethical design. This adaptation was conducted through iterative sessions among the authors, focusing on how users might evaluate the identified unethical design patterns using the full UEQ and what additional associations might arise.

Initially, we reviewed the 26 adjective pairs of the UEQ to determine their applicability in evaluating the 15 dark pattern instances we had identified. Subsequently, we took the complete UEQ and assessed which items might elicit strong opinions from participants—specifically,

¹<https://osf.io/nw2tj/>

²<https://www.ueq-online.org/>

Dark Pattern	Unethical Design Strategy
Nagging	Nagging
Forced Access	Forced Action
Overcomplicated Process	Obstruction
Hindering Account Deletion	Obstruction
False Hierarchy	Interface Interference
Trick Wording	Interface Interference
Toying With Emotion	Interface Interference
Expectation Mismatch	Sneaking
Sneaky Bad Defaults	Sneaking
Gamification	Social Engineering
Social Pressure	Social Engineering
Social Connector	Social Engineering
Endlessness	Social Engineering
Pull To Refresh	Social Engineering
Content Customization	Social Engineering

Figure 1: Surveyed dark patterns and corresponding strategies

I perceive this social media feature as...

		don't know / not applicable	
inefficient	○ ○ ○ ○ ○ ○ ○ ○	efficient	○
interesting	○ ○ ○ ○ ○ ○ ○ ○	not interesting	○
clear	○ ○ ○ ○ ○ ○ ○ ○	confusing	○
enjoyable	○ ○ ○ ○ ○ ○ ○ ○	annoying	○
organized	○ ○ ○ ○ ○ ○ ○ ○	cluttered	○
addictive	○ ○ ○ ○ ○ ○ ○ ○	non-addictive	○
supportive	○ ○ ○ ○ ○ ○ ○ ○	obstructive	○
pressuring	○ ○ ○ ○ ○ ○ ○ ○	suggesting	○
boring	○ ○ ○ ○ ○ ○ ○ ○	exciting	○
revealed	○ ○ ○ ○ ○ ○ ○ ○	covert	○
complicated	○ ○ ○ ○ ○ ○ ○ ○	easy	○
unpredictable	○ ○ ○ ○ ○ ○ ○ ○	predictable	○
friendly	○ ○ ○ ○ ○ ○ ○ ○	unfriendly	○
deceptive	○ ○ ○ ○ ○ ○ ○ ○	benevolent	○

Figure 2: Adapted User Experience Questionnaire

which items might be rated as either -3 or +3. These two steps resulted in two lists of UEQ items, which were then merged. In this process, we found the *Novelty* scale to be unnecessary for evaluating users' perceptions of dark patterns. Given that the resulting list was too lengthy for practical use, we favored items from the short version of the UEQ (UEQ-S) and omitted additional items from the same UEQ categories.

Upon re-evaluating our questionnaire, we identified a lack of items addressing users' perceived manipulation and the techniques implied by dark patterns. To explore these aspects without directly inquiring about manipulation and perceived ethics, we adhered to the UEQ's structure of adjective pairs. Leveraging the Product Reaction Words from the Microsoft Desirability Toolkit, we revisited the 15 dark pattern mock-ups to pinpoint descriptive gaps. Consequently, we introduced four new items with both positive and negative adjectives: *pressuring* / *suggesting*, *addictive* / *non-addictive*, *covert* / *transparent*, and *deceptive* / *benevolent*. These introduced four items are treated as distinct scales in the calculations but are collectively labeled as *Manipulation* in the box plots. Thus, our final questionnaire comprises 14 items, with 10 of them combined into 5 two-item scales and 4 newly added stand-alone item scales. Four scales—*Perspicuity*, *Efficiency*, *Dependability*, and *Stimulation*—fully represent the UEQ-S. The *Attractiveness* scale is a two-item scale utilizing adjectives from the original UEQ's Attractiveness scale.

Finally, the new items were translated into German, as the survey was conducted in both English and German to reach a larger audience. We included a "don't know / not applicable" option and randomized the item order, arranging the pairs so that half start with the positive term and the other half with the negative term. The adapted UEQ is presented in Figure 2, reflecting the layout seen by participants.

3.3. Survey

The questionnaire for investigating the user experience of unethical user interface design was implemented in an online survey. The survey involved additional questions about social media habits and problems. This paper focuses only on the evaluation of the dark patterns in social media and excludes all non-social media users. The survey is available as an appendix on OSF³. We conducted three test runs, with the survey, before releasing it. As answering our questionnaire for 15 different dark patterns is time-consuming and overwhelming, only five randomly selected patterns were shown to each user. Users were recruited through online posts, on a survey exchange platform, and within our network.⁴

3.4. Data Analysis

We employed exploratory data analysis to determine whether and how (1) user experience questionnaires can indicate unethical design, and (2) our proposed extension is necessary for such identification. We refrained from conducting any confirmatory data analyses. First, data was formatted, cleaned and checked for any suspicious responses, such as flatlining. Using RStudio⁵, we created various data visualizations. Histograms were used to observe whether distributions appear normal. For space considerations and ease of analyzing higher order patterns, color coded box plots showing mean, median, quartiles, whiskers, and outliers were favored in the presentation of this paper. In these plots, data from the Likert scale is treated as an ordinal approximation of a continuous variable [34, 35].

We arranged the 15 dark pattern user experience visualizations on a digital whiteboard and visually clustered them to identify characteristics in the user perceptions.

Additionally, we computed averages for the new manipulation items (pressure, addiction, covert, deception) and UEQ scales (attractive, dependability, efficiency, perspicuity, stimulation), along with higher-order scores for hedonic and pragmatic qualities, as intended by the UEQ-S, and an overall UEQ-S score. A simple heuristic suggested by Schrepp et al. [21, Fig. 3] was used to interpret the quantified user experience from Likert scale data ranging from -3 to +3 as positive (≥ 1), neutral (between -1 and 1), or negative (≤ -1).

Lastly, we computed correlation matrices to assess the interrelationships among these UX measures. Given that visual clustering suggested potential relationships between patterns, we calculated correlation scores within and between the different strategies.

4. Results

A total of 126 social media users filled out the survey completely and were included in this analysis. On average, each dark pattern was evaluated by 42 social media users. The results from the explorative data analysis will focus on the most relevant findings. The data will be made available upon request.

³<https://osf.io/nw2tj/>

⁴The platform <https://www.soscisurvey.de/> was used for creating and hosting the survey. The survey was posted in Facebook groups, as well as <https://www.surveycircle.com/>

⁵<https://posit.co/download/rstudio-desktop/>

4.1. Overall User Experience of Unethical Social Media Interface Design

The overall UEQ-S score, obtained by combining the surveyed UEQ-S scales in our adapted questionnaire (dependability, efficiency, perspicuity and stimulation), ranged from a maximum of 0.58 to a minimum of -1.05 with an average of -0.16 (see Table 1). The mean scores across all scales, including the extra items from our adapted questionnaire, ranged from a maximum of 0.48 to a minimum of -0.93 with an average of -0.30. Applying the heuristics as described in subsection 3.4, *only* the dark pattern of Nagging resulted in an overall negative user experience, as defined by the UEQ. The meta-level concept of Hedonic Quality, influenced by Stimulation, and meta-level concept of Pragmatic Quality, influenced by Dependability, Efficiency, also did not yield a negative user experience, except for Nagging.

4.2. User Experience of Individual Scales and Adapted Items

In our questionnaire consisting of 5 original scales and 4 adapted pairs of items, the scales received varied evaluations—some predominantly negative, many neutral, and a few positive. Notably, our newly proposed items 'pressuring - suggesting' (Max -0.03, Min -2.25, Avg -1.08) and 'deceptive - benevolent' (Max 0.07, Min -2.09, Avg -1.03) were ranked as the most negative. Patterns such as Forced Access, Trick Wording, Toying With Emotion, Gamification, Social Pressure, and Social Connector were negatively ranked in terms of pressuring. Additionally, False Hierarchy and Nagging were evaluated as very pressuring (≤ -2).

Further, Nagging, False Hierarchy, were evaluated as very 'deceptive' and Forced Access, Expectation Result Mismatch, Trick Wording, Toying With Emotion as 'deceptive'. The 'Attractiveness' scale, which included items from the long UEQ, matched our 'deception' item in terms of negative evaluations, with Toying With Emotion being assessed as strongly negative.

Patterns Endlessness and Pull To Refresh were perceived by users as addictive. Trick Wording, Forced Access and Nagging were evaluated with negative dependability.

The scale Efficiency was neutral for all patterns, and Stimulation neutral for all, but Nagging.

Conversely, some patterns received positive evaluations. Social Pressure, Sneaky Bad Defaults, and Pull to Refresh were rated positively in terms of 'Perspicuity'. Sneaky Bad Defaults and Pull To Refresh as revealed. Moreover, Trick Wording and Sneaky Bad Defaults were perceived as non-addictive.

4.3. Relationships between Scales and Strategies

Visual clustering suggested that the user experience evaluations of patterns within the social engineering strategy were strikingly similar. This was substantiated by a correlation matrix, indicating that these patterns are indeed correlated, many of them strongly so, with an average correlation coefficient of 0.69. However, they did not show a correlation with patterns from other strategies. Similarly, the three patterns associated with the strategy of interface interference were correlated, yielding an average correlation coefficient of 0.85 (see Figure 4).

Furthermore, notable correlations were observed among various scales. The 'deception - benevolent' scale was strongly correlated with 'attractiveness' (coefficient 0.93), as also observed in subsection 4.2. Additionally, 'addiction' showed a moderate negative correlation with

'attractiveness', 'perspicuity', and the overall UEQ score.

5. Discussion

Concluding, from the explorative data analysis, we find that (1) an aggregated UX score using items from the User Experience Questionnaire does not effectively indicate unethical user interface design. Instead, (2) subscale measures from the questionnaire show relationships with unethical design strategies. However, even considering subscales, it appears to be necessary to extend User Experience Questionnaires focusing only on Pragmatic and Hedonic Qualities for an ethical dimension as (3) users negatively identify interfaces with addictive and pressuring properties. Finally, (4) evaluations demonstrate consistency within groups of unethical design strategies, indicating that these may remain stable.

5.1. Aggregated UX Score

Currently, User Experience Questionnaires are employed to evaluate designs and in industry often to measure the success of designers. However, aggregated measurements alone cannot identify deceptive design practices. The reason why aggregated UEQ scores do not consistently indicate unethical design is because dark patterns do not always represent poor design; rather, they often incorporate sophisticated design elements. These user experience qualities can outweigh other overlooked factors, such as in the evaluation of gamification, or with the pattern pull to refresh, which was evaluated as 'addictive' but also with high perspicuity. This challenge of reflecting multidimensional UX in a few key performance indicators (KPIs) is also highlighted in a brief paper by the developers of the UEQ [3]. We conclude that the current use of aggregated "catch-all" scales may, in fact, do more harm than good if they obscure harmful designs. We advise against using low-dimensional metrics as a method, especially within companies, as they do not prevent the creation of unethical designs aimed at achieving prioritized business goals. Using alternative weightings for aggregate scores, such as, considering the worst indicator, seems a plausible solution; however, not every negative evaluation is problematic as designers might employ such methods and characteristics to achieve ethically sensible goals [25, 36].

5.2. Relation Between Subscale Measures and Social Media Dark Patterns

We advocate for a nuanced approach that considers the complexity and multidimensionality of user experience, beyond simplifying it into single, aggregated metrics, including characteristics particularly indicative of unethical design.

Particularly notable is attractiveness, which, although only part of the long version of the UEQ, was identified six times as a potential indicator of dark pattern design. This suggests that individual subcategories of the UEQ can indeed reveal unethical design practices when examined separately. Furthermore, dependability appears relevant in identifying unethical design elements.

5.3. Identification of Addictive and Pressuring Interface Designs

The literature on dark patterns in social media particularly highlights the risk of addictiveness in interface designs. While prior research found mixed results in users' capability to identify dark patterns, our evaluation demonstrates that users are capable of identifying non-obvious design features that contribute to addiction, such as the "pull to refresh", and "endless scroll" mechanisms. This ability suggests there's potential to incorporate such a dimension into an adapted User Experience Questionnaire. Users were also identifying various dark patterns as 'deceptive'. Interestingly, these were the same patterns that were classified as unattractive, implying a relationship. This exploration shows that users can identify unethical interface designs that impact aspects of the user experience if sensible constructs are surveyed. We conclude that an extension of user experience questionnaires with an ethical dimension is feasible and overdue.

5.4. Consistency within Groups of Unethical Design Strategies

Designers are continually crafting new dark patterns, always staying a step ahead of regulations. As soon as one pattern is prohibited, another emerges in its place. It is encouraging to find that users in our survey evaluated the underlying strategies of different patterns consistently. This implies that it is possible to construct a User Experience Questionnaire capable of evaluating unethical design patterns over the long term and yielding consistent results. This consistency suggests a deeper, more stable basis for identifying unethical designs beyond the surface level of ever-evolving patterns, pointing toward the feasibility of developing tools that remain effective as the landscape of dark patterns shifts.

6. Limitations and Future Work

Our exploratory survey design and data analysis present a first step towards creating a standardized assessment tool for ethical user experience. Our extension of the UEQ is grounded in an analysis of dark patterns academics identified in social media, exemplifying unethical user interface design. Incorporating a broader taxonomy of dark patterns, including other domains, is expected to reveal additional items for the scale.

Our exploratory evaluation of the dark patterns is sensitive to the chosen heuristic cutoff. With the chosen boundary (≤ -1), 4 patterns were counted as not being evaluated negatively on any evaluative scale. A more narrowly defined neutral ≤ -0.7 would have resulted in all patterns being evaluated negatively on at least one evaluative scale. Setting these cutoffs is subjective to some degree; future benchmarking studies could inform sensible values for setting them. The survey was conducted in English and German, and therefore might have a western bias.

For this workshop paper, we did not perform tests of significance or factor analyses due to the preliminary nature of the study. Future research with a larger sample size is necessary to evaluate the validity and reliability of the newly proposed scale items.

This survey evaluated unethical design through a visual analysis on the pattern level. A limitation of the test method was that participants evaluated the designs in a non-interactive survey. If users were to click through a full user flow themselves, scales, particularly efficiency,

might be evaluated worse. We suggest follow-up studies to explore how interactive prototypes and prolonged usage influence responses to an ethically adapted user experience questionnaire. Moreover, while dark patterns represent the most extensively studied unethical interface design strategies, other ethical considerations that affect user experience and potentially lead to long-term harms should also be considered.

6.1. Conclusion

Using known dark patterns in social media as examples of unethical user interface design, and combining an exploratory UEQ extension with data analysis, we have demonstrated the potential and limitations of using user experience metrics to evaluate the ethicality of design. We hope this workshop paper serves as a first step towards the creation of a rigorous tool to quantify ethical user experiences through questionnaires.

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A. UEQ Evaluations

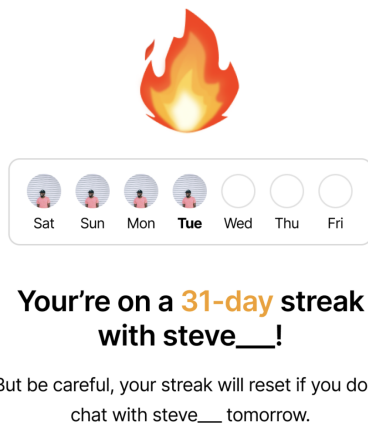
Table 1

Average scale scores and count of negative and positive evaluations across all 15 surveyed dark pattern designs. *From the full UEQ, †Our additional characteristics, ‡From the UEQ-S.

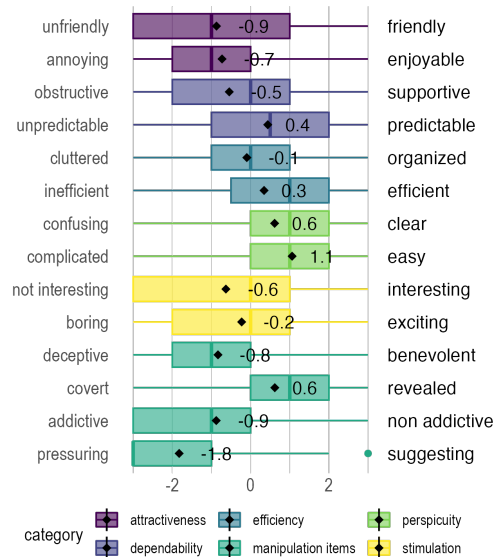
	Attractiveness*	Pressure†	Addiction†	Covert†	Deception†
Max	0.576	-0.038	1.258	1.487	0.074
Min	-2.152	-2.257	-1.474	-0.436	-2.091
Average	-0.933	-1.088	0.107	0.394	-1.032
Neg. Eval.	6	8	2	0	6
Pos. Eval.	0	0	2	2	0
	Dependability‡	Efficiency‡	Perspiciuity‡	Stimulation‡	UEQ-S Overall
Max	0.361	0.852	1.447	0.403	0.588
Min	-1.130	-0.815	-0.976	-1.557	-1.056
Average	-0.318	0.096	0.260	-0.365	-0.167
Neg. Eval.	3	0	0	1	1
Pos. Eval.	0	0	3	0	0

B. Dark Pattern Evaluations

All presented social media dark pattern mockups and plots are available at <https://osf.io/nw2tj/>.



(a) Mockup



(b) Result

Figure 3: Many dark patterns, such as gamification, were evaluated neutrally to positively in established UX measures and negatively only in newly proposed characteristics (finding 2)

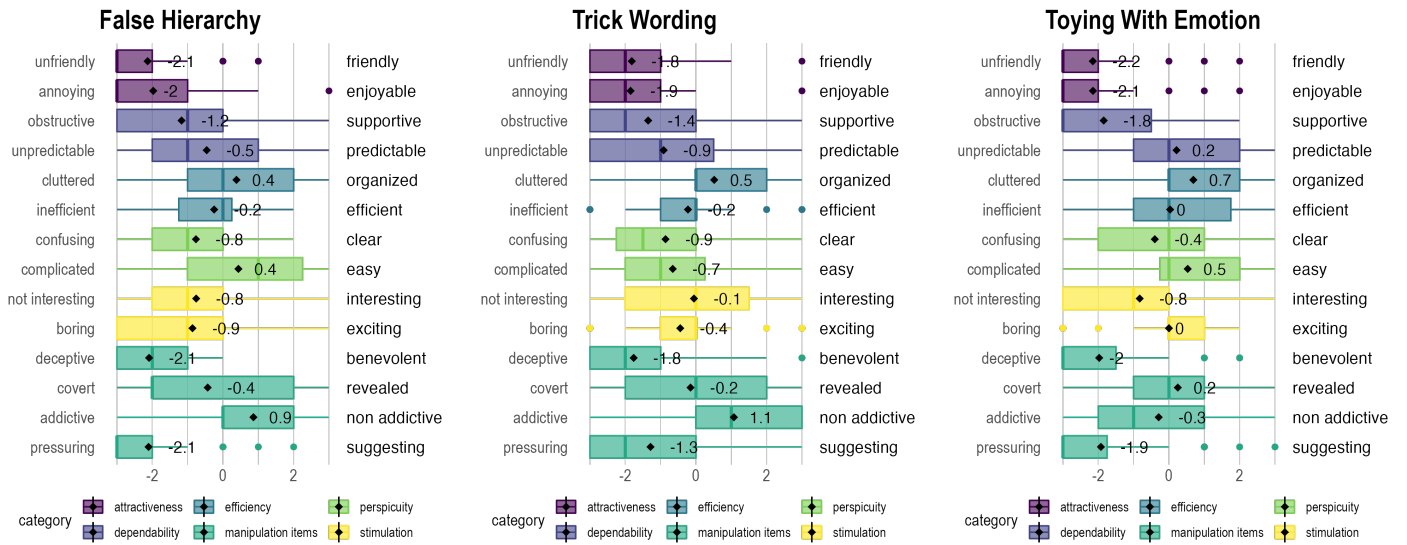


Figure 4: Dark patterns, using the unethical design strategy interface interference, were all evaluated similarly (finding 4)