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Consequences of User Manipulation through Dark Patterns

Short Paper

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Abstract

With increasing competition in the online market, companies frequently apply “dark patterns” to steer user behavior in ways that benefit the company but may harm the user. To date, consequences of dark patterns use are rather unknown. Prior research demonstrated positive effects (e.g., an increase in acceptance rates) and negative effects (e.g., negative emotions) of dark patterns use. To explain these contradictory effects, we draw in information manipulation theory. In a survey experiment we confronted participants with the dark patterns scarcity and sneaking. The results indicate that exposure to dark patterns increases perceived violations of communication maxims, which increase perceived user manipulation. This, in turn, reduces attitude toward the website and website design. Further, the results show that perceived user manipulation is significantly higher for users with low familiarity with online shopping. We plan to validate the findings in a field experiment to be conducted in the near future.

Keywords: Dark Patterns, User Manipulation, Information Manipulation Theory, Manipulative E-Commerce Strategies

Introduction

One common kind of human computer interaction is online shopping (O’Keefe et al. 2000). In online shopping the focal point of interactions between users and providers is the website (Wells et al. 2011). Accordingly, website design, including all elements of user experience on a website (Wolfenbarger and Gilli 2003), is a major field of IS-Research on human computer interaction (Deng and Poole 2010). In this rich research field, there is mounting evidence that a well-designed website is associated with positive consequences for website providers (e.g., user trust; Pengnate and Sarathy 2017; Wells et al. 2011, Cyr 2008). However, with increasing competition in the online market, companies are tempted to apply “dark patterns”, for example limited-time-messages (Mathur et al. 2019), to their websites (Di Geronimo et al. 2020; Mathur et al. 2019; Narayanan et al. 2020). The term “dark patterns” refers to manipulative user interface designs (Narayanan et al. 2020), that are used to steer user behavior in a way that is beneficial for the company but, potentially, disadvantageous for the users themselves (Kollmer and Eckhardt 2022; Mathur et al. 2019). To date, research mainly focused on defining, classifying and evaluating dark patterns from an ethical and legal perspective (Mathur et al. 2019; Gray et al. 2018). However, recent empirical research on the consequences of dark patterns for user behavior is somewhat inconclusive (Kollmer and Eckhardt 2022). For instance, the study of Luguri and Strahilevitz (2021) has shown a short-term

effectiveness of some dark patterns of 39%. In a similar vein, the high frequency of use of dark patterns, with 40% of websites using them (European Commission 2023), indicates that the use might be associated with positive effects for the company. In contrast, other recent studies indicated that using dark patterns can backfire (Luguri and Strahilevitz 2021, Voigt et al. 2021). Against this background the aim of our study is to shed more light on the consequences of dark patterns on user behavior in online shopping. Specifically, we investigate the influence of manipulative designs (i.e., dark patterns) on user behavior. For this purpose, we aim to introduce Information Manipulation Theory (McCornack 1992) to this research stream and to add empirical evidence to our theorizing.

Theoretical Background and Hypotheses Development

Dark patterns

In online shopping, user interface designs are regularly chosen to steer user behavior in a way that is beneficial for the company. However, if this ignores the welfare of the user these designs can be referred to as “dark patterns” (Brignull, 2010; Mathur et al. 2019). Dark patterns often contain manipulative elements (Kollmer and Eckhardt 2022) and are used to lead users to act in a specific way and ultimately to increase revenue, user data collection or user outreach (Voigt et al. 2021; Waldman 2020). In literature, several attempts to classify dark patterns have been published (e.g., Bösch et al. 2016; Conti and Sobiesk 2010; Gray et al. 2018; Mathur et al. 2019). Among these, what is likely the most prominent is the classification delivered by Mathur et al. (2019), defining seven types of dark patterns: 1) sneaking, 2) urgency, 3) scarcity, 4) misdirection, 5) social proof, 6) obstruction, and 7) forced action. In short, sneaking involves concealing or delaying information to mislead customers or users. Urgency utilizes the scarcity bias by creating a sense of urgency and pushing customers or users to decide quickly. Dark patterns in the scarcity category also utilize the scarcity bias by using limited-time offers or high-demand messages. Misdirection exploits customer or user emotions or uses misleading visuals and language to influence their choices. Social proof techniques use social norms to guide user behavior towards a specific action and obstruction involves making certain actions difficult or complicated to deter users from taking actions that are not in the company's interests. Finally, forced action forces users to act in a specific way by, for example, coercing them to create an account before being able to continue on a website (Mathur et al. 2019).

However, to date, research on the consequences of dark patterns for user behavior is somewhat inconclusive. As mentioned before, Luguri and Strahilevitz (2021) empirically demonstrated an effectiveness of some dark patterns of 39% with regard to steering users into accepting a data protection plan, but also pointed out that the use of dark patterns leads to negative emotions among users (Luguri and Strahilevitz 2021). In a similar vein, Voigt et al. (2021) empirically illustrated that the use of dark patterns reduces brand trust and, therefore, can in fact backfire. Against this background the aim of our study is to shed more light on the consequences of dark patterns on user behavior in online shopping by introducing Information Manipulation Theory (McCornack 1992) to recent research and by adding empirical evidence to our theorizing. That is, because we assume that this theory will be fruitful for research on dark patterns.

Information Manipulation Theory

Although there are various theories in information system research that can be used to explain user behavior in digital contexts (for an overview, see e.g., Ngai et al. 2015; Zhang and Benyoucef 2016), these often neglect aspects such as manipulative elements, which are prevalent in dark patterns (Kollmer and Eckhardt 2022). Information Manipulation Theory (McCornack 1992) focuses on the manipulation of information and its negative effects. Therefore, this theory might be suitable for explaining the consequences of the use of dark patterns.

In general, Information Manipulation Theory assumes that every communication should follow four communication maxims, namely the quality, quantity, relevance, and clarity maxim (McCornack 1992). If one or more of the communication maxims are violated, this leads to the communication being perceived as being dishonest or possibly manipulative (McCornack 1992). The *quality maxim* in this context refers to the quality of the information communicated. Violations of the quality maxim include, for example, information with insufficient evidence or false information (Grice 1989; McCornack 1992). The *quantity maxim* refers to the amount of information given. Violations include both too much and too little information (Grice 1989; McCornack 1992). The *relevance maxim* is fulfilled, if all relevant information is

communicated. Omitting relevant information and presenting obviously irrelevant information are violations of the relevance maxim (Grice 1989; McCornack 1992). The *clarity maxim* refers to the way in which information is presented. If information is disguised, for example, this would be considered a violation of the clarity maxim (Grice 1989; McCornack 1992).

As already stated, the website and information on the website are the focal points of communication between the provider and the user (Wells et al. 2011). Thus, according to Information Manipulation Theory, the communication maxims should be followed in website design as well. However, since dark patterns are by definition design elements that "trick" users (Brignull 2010; Mathur et al. 2019), by manipulating certain information, it can also be assumed that the use of dark patterns represents a violation of the communication maxims. Accordingly, we assume that a user's perception of dark patterns leads to a perceived violation of the communication maxims. Thus, we derive the following hypotheses 1_{a-d}:

H1_{a-d}: The perception of dark patterns increases perceived violation of the (a) quality, (b) quantity, (c) clarity, and (d) relevance maxims.

Perceived User Manipulation

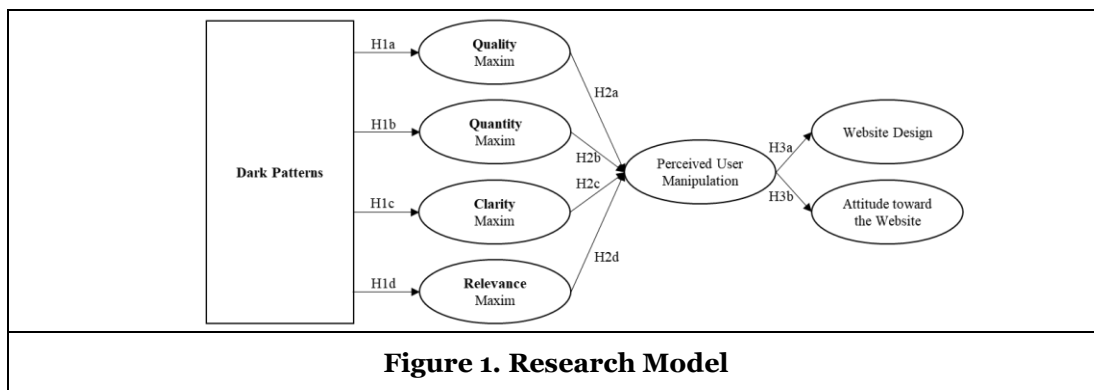
In cases of violations of the described communication maxims, users perceive the communication as dishonest, or sometimes manipulative (McCornack et al. 1992). Prior research has shown that manipulative attempts may trigger negative emotions or negatively impact attitudes of users (Campbell 1995; Luguri and Strahilevitz 2021). Since the use of manipulative elements, such as dark patterns, seems to have an effect, it stands to reason that users perceive and process the manipulation. Following Witte (2022) we define perceived user manipulation as the perception of an organization attempting to influence the user "decision making process in a hidden, targeted and often selfish manner". And hypothesize the following:

H2_{a-d}: The higher the perceived violation of the (a) quality, (b) quantity, (c) clarity, and (d) relevance maxims, the higher the perceived user manipulation.

Previous research from other areas has demonstrated that manipulative attempts negatively relate to attitude toward a manipulating party (e.g., Lunardo and Mbengue 2013). Further, in an advertisement setting, it has been empirically demonstrated, that inferences of manipulative intent negatively relate to attitude towards the advertisement and attitude towards the brand (Campbell 1995). In this regard, it has been shown that confrontation with dark patterns leads users to rate the overall user experience as negative (Voigt et al. 2021). In the context of eTail quality (Wolfenbarger and Gilli 2003), the dimension website design subsumes all aspects of the user experience, so we assume that perceived user manipulation negatively influences website design and attitudes towards the website. Drawing on these findings, we assume that perceived user manipulation impacts the attitude toward the website and the website design.

H3_{a-b}: The higher the perceived user manipulation, the lower the a) website design, and b) attitude toward the website.

The research model is presented in figure 1.



Method

To test our hypotheses, we used a 2 x 2 between subject design. To analyze the data, we applied covariance-based structural equation modeling using Amos 27. To include the treatments of the between subject design in the structural equation model, we built three dichotomous dummy variables. Each dummy variable represents one treatment and refers to the reference group (no dark pattern).

Experimental Procedure and Participants

Following Voigt et al. (2021), we conducted a scenario-based online survey using Qualtrics. Each participant was randomly assigned to one of four groups. Each group was confronted with a slightly modified online shop where participants were asked to buy a hoodie. The scenarios contained 1) no dark pattern, 2) the dark pattern scarcity, 3) the dark pattern sneaking, or 4) both dark patterns. We chose these two dark patterns because they are diverse in prevalence. While the dark pattern scarcity is frequently applied (Mathur et al. 2019) to date, the dark pattern sneaking is rather rarely used in practice (Mathur et al. 2019). In the scarcity condition, participants were notified that only three hoodies were still available and 53 other people had recently viewed the item. In the sneaking condition, a premium shipping charge was added to the participant shopping cart shortly before the order was completed. Participants in the fourth condition were exposed to both dark patterns, while the control group was exposed to a "clean" online shop without any dark pattern. The experimental manipulations are presented in figure 2.

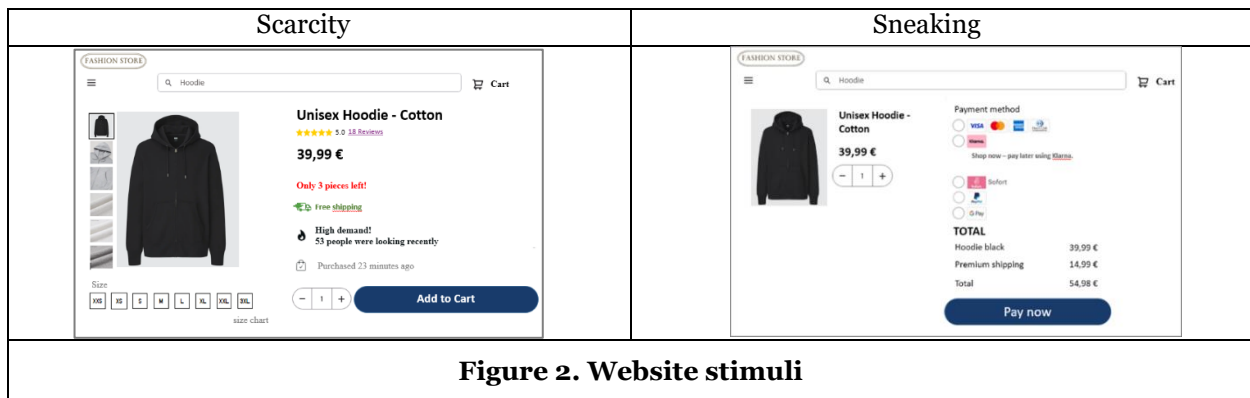


Figure 2. Website stimuli

To ensure that only people who would in principle buy a hoodie online and would also be willing to pay the price set in the fictitious online shop participated in the survey, the sample was qualified at the beginning of the survey using filter questions.

After eliminating speeders, straight-liners, and attention check failures our sample consisted of 372 participants ($M_{age} = 41.42$, $SD_{age} = 12.39$, female = 38.4%). Regarding common method bias, we incorporated a marker variable that was theoretically unrelated to all constructs of the model, namely "attitude towards the color blue" (Lindell and Whitney 2001). Upon correction of the correlation matrix, all correlations remained statistically significant, indicating that the presence of common method variance was not a concern in this study.

Measures

We used established multi-item measures for all constructs. To measure violations of the communication maxims we used 7-point semantic differentials from McCornack et al. (1992). We operationalized and measured perceived user manipulation as a three-dimensional construct consisting of the dimensions 1) restriction of autonomy, 2) bad information quality and 3) the feeling of being tricked as suggested by Witte (2022). To measure attitude towards the website we adapted a scale from Shobeiri et al. (2015). Finally, we adapted the measures of the website design dimension of Wolfingbarger and Gilly's (2003) eTail quality scale to measure website design. Due to low internal consistency, we eliminated four items within the whole operationalization process. We ensured reliability of our scales using Cronbach's Alpha. All measures for Cronbach's Alpha are above the threshold of .7 (violation of quality maxim: $\alpha = .919$; violation of quantity maxim: $\alpha = .941$, violation of clarity maxim: $\alpha = .935$, violation of relevance maxim: $\alpha = .905$, restriction of

autonomy: $\alpha = .940$, bad information quality: $\alpha = .954$, feeling of being tricked: $\alpha = .901$, perceived user manipulation (second order factor): $\alpha = .787$, attitude toward the website: $\alpha = .942$, website design: $\alpha = .871$). Further, we applied confirmatory factor analysis. Given its high complexity (Hair et al. 2014) the final measurement model shows a good fit ($\chi^2 = 1,682.247$ df = 716; $\chi^2/df = 2,350$; CFI = .937; RMSEA = .060; Hair et al. 2014). All factor loadings are significant and exceed the threshold of .7 (Hair et al. 2014). Composite reliabilities exceed the threshold of .6 (Bagozzi and Yi 1988) and average variance extracted is above .5, indicating convergent validity (Fornell and Larcker 1981; Hair et al. 2014). Discriminant validity is demonstrated, because average variance extracted from each construct exceeds squared multiple correlations with other constructs (Fornell and Larcker 1981).

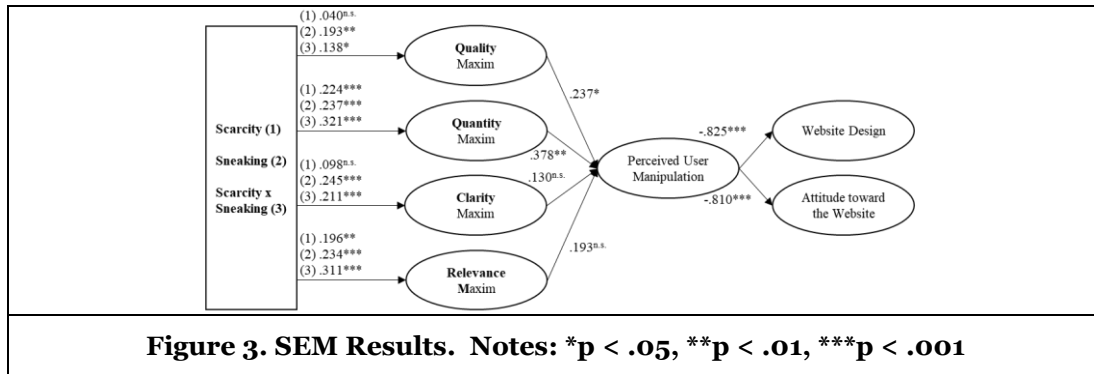
Results

Main Results

To test our hypotheses, we applied structural equation modeling using AMOS 27. The overall model shows good fit ($\chi^2 = 2,279.988$, df = 1,038; $\chi^2/df = 2.197$; CFI = .926; RMSEA = .057; Hair et al. 2014). The model reveals a significant effect of the scarcity treatment on the violation of the quantity ($\beta = .224$; $p < .001$) and relevance ($\beta = .196$; $p = .002$) maxim, but no significant effect on the quality ($\beta = .040$; $p = .532$), and clarity maxim ($\beta = .098$; $p = .119$). The sneaking treatment significantly affects the violation of all four communication maxims ($\beta = .193$; $p = .002$ for quality; $\beta = .237$; $p < .001$ for quantity; $\beta = .245$; $p < .001$ for clarity; $\beta = .234$; $p < .001$ for relevance). The same applies for the combination of scarcity and sneaking ($\beta = .138$; $p = .028$ for quality; $\beta = .321$; $p < .001$ for quantity; $\beta = .211$; $p < .001$ for clarity; $\beta = .311$; $p < .001$ for relevance). Thus, hypotheses 1_b and 1_d are supported while hypotheses 1_a and 1_c are only partially supported.

Further, while the violation of the clarity ($\beta = .130$; $p = .171$) and relevance maxim ($\beta = .193$; $p = .147$) do not significantly relate to perceived user manipulation, the violation of the quality ($\beta = .237$; $p = .014$) and the quantity maxim ($\beta = .378$; $p = .005$) significantly and positively relate to perceived user manipulation. Thus, hypotheses 2_a, and 2_b are supported, but hypotheses 2_c and 2_d are rejected.

Lastly, the results indicate a significant negative effect of perceived user manipulation on website design ($\beta = -.825$; $p < .001$) and attitude toward the website ($\beta = -.810$; $p < .001$), supporting hypotheses 3_a and 3_b.



Additional Analyses

To gain further insights into the consequences of dark patterns usage, we conducted an analysis of variances (ANOVA) using perceived user manipulation, attitude toward the website and website design as dependent variables. ANOVA demonstrates significant differences between the four groups with regard to perceived user manipulation ($F(3, 368) = 19.536$, $p < .001$), attitude towards the website ($F(3, 368) = 11.178$, $p < .001$), and website design ($F(3, 368) = 16.935$, $p < .001$). Mean differences are presented in figure 4.

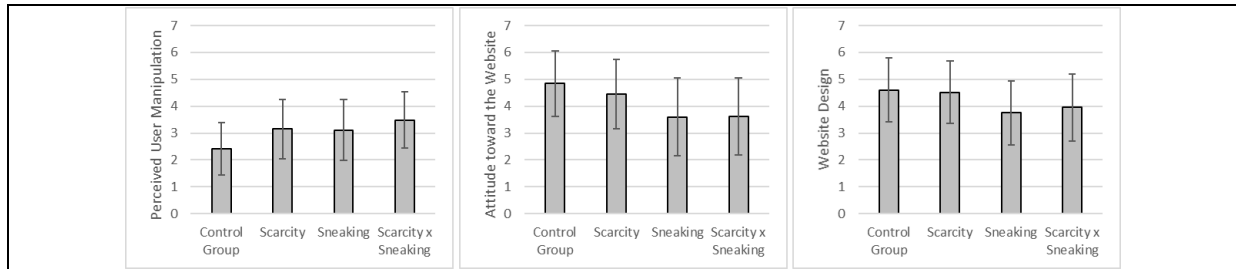


Figure 4. Mean differences between the four groups

Further, to examine pairwise differences between the specific treatments and the control group, we used Games-Howell post-hoc test (results are presented in table 1). For perceived user manipulation, pairwise comparison reveals, that compared to the control group, perceived user manipulation is significantly higher in the scarcity condition (-.734, 95%-CI[-1.103, -.366], $p < .001$), the sneaking condition (-.704, 95%-CI[-1.120, -.289], $p < .001$) and the condition combining both dark patterns (-1.074, 95%-CI[-1.471, -.677], $p < .001$). However, for attitude toward the website, there is no significant difference between the scarcity condition and the control group (.388, 95%-CI[-.058, .834], $p = .113$), while attitude toward the website is significantly lower for participants in the sneaking condition (1.242, 95%-CI[.714, 1.770], $p < .001$) and the condition combining both dark patterns (1.223, 95%-CI[.706, 1.749], $p < .001$) compared to the control group. This also applies to website design. Pairwise comparisons do not show a significant difference between the scarcity treatment and the control group (.087, 95%-CI[-.327, .503], $p = .948$), but compared to the control group, participants in the sneaking condition (.855, 95%-CI[-.394, 1.320], $p < .001$) and the condition combining both dark patterns (.649, 95%-CI[1.177, 1.122], $p = .003$) perceive the website design as being significantly worse.

Dependent Variable	Control Group	Treatment	Mean Difference (Treatment - Control)	P-value	95% Confidence interval	
					Lower bound	Upper bound
Perceived User Manipulation	Control Group	Scarcity	-.734*	<.001	-1.103	-.366
		Sneaking	-.704*	<.001	-1.120	-.289
		Scarcity x Sneaking	-1.074*	<.001	-1.471	-.677
Attitude toward the website	Control Group	Scarcity	.388	.113	-.058	.834
		Sneaking	1.242*	<.001	.714	1.770
		Scarcity x Sneaking	1.223*	<.001	.706	1.749
Website Design	Control Group	Scarcity	.087	.948	-.327	.503
		Sneaking	.855*	<.001	.394	1.320
		Scarcity x Sneaking	.649*	.003	.177	1.122

Table 1. Games Howell results

In order to include user-specific criteria in the analysis, we examined perceived user manipulation, the attitude towards the website and website design for differences between different generations, genders and different familiarities with online shopping. To examine differences between generations, we split our sample into four generations (Generation Z: born 1997-2012; Millennials: born 1981-1996; Generation X: born 1965-1980; Baby Boomers: born 1946-1964). ANOVA does not show any significant difference between the four generations with regard to perceived user manipulation ($F(4, 367) = 1.180, p = .164$), attitude toward the website ($F(4, 367) = 1.016, p = .399$) or website design ($F(4, 367) = 1.180, p = .319$). Further, independent t-tests do not show any significant differences between male and female participants ($t(370) = -.212, p = .832$ for perceived user manipulation; $t(370) = -.857, p = .392$ for attitude toward the website; $t(370) = -.271, p = .786$ for website design). However, compared to participants with high familiarity with online shopping, perceived user manipulation is significantly higher for participants with low familiarity with online shopping ($t(370) = 2.436, p = .015$). At the same time, compared to participants with high familiarity with online shopping, attitude toward the website ($t(370) = -2.013, p = .045$) and website design ($t(370) = -2.301, p = .022$) are significantly lower for participants with low familiarity with online shopping.

Discussion and Implications

The results of our study demonstrate negative consequences of the use of dark patterns. The fact that the dummy-coded treatment variables, in most cases, significantly and positively relate to the perceived violation of communication maxims, indicates, that, in line with information manipulation theory (McCornack 1992), dark patterns lead to perception of the communication as dishonest or manipulative. First, the results show that the dark pattern sneaking and the combination of both dark patterns increase violations of all four maxims, while the dark pattern scarcity alone only increases the perceived violation of the quantity and relevance maxims. This indicates that a scarcity message could be perceived as an information of high quality. Nonetheless, participants might consider the scarcity message as irrelevant, and as an abundance of information.

Second, in contrast, the dark pattern sneaking increases the perceived violation of all four communication maxims. Additionally, considering the stronger effects of sneaking, this allows the assumption, that this type of dark pattern is perceived as more negative than scarcity. As scarcity claims are frequently used and sneaking is rarely so (Mathur 2019), this might be explained by what is known as a “habituation effect”. Participants are confronted with scarcity messages frequently and might be used to them. Therefore, users might not consider this as a violation of the clarity or quality maxim. The assumption of an underlying habituation effect is supported by the finding, that perceived user manipulation is significantly higher for participants with low familiarity with online shopping. This also indicates the previously mentioned habituation effect, meaning that in case users have frequently been confronted with dark patterns, they do not consider this as that threatening or no longer manipulative. This implies that users might get used to dark patterns and that perceived manipulation is not only influenced by perceived violations of communication maxims but also by individual differences like online shopping familiarity. Such individual and dynamic factors are to the best of our knowledge absent in the information manipulation theory, presenting an opportunity for its supplementation and evolution from a (static) structural theory to a (dynamic) process theory. Nevertheless, it should also be taken into account that the dark pattern scarcity merely exploits the scarcity bias, whereas the dark pattern sneaking is associated with direct negative financial consequences for the user. This point could also account for the different effects. In any case, it is noticeable that dark patterns violate the communication maxims, but are perceived differently.

Third, we found that the violation of the quality and quantity maxim significantly relate to perceived user manipulation, while there is no significant effect of violations of the clarity and relevance maxims. This indicates, that in an e-commerce setting especially the quality and quantity of the communication is central. Additionally, perceived user manipulation significantly and negatively relates to attitude towards the website and website design. Thus, the results indicate that the use of dark patterns negatively affects key constructs in information systems research and is associated with negative consequences for organizations.

Overall, the results of the empirical analysis show that there are definitely negative consequences of using dark patterns from a corporate perspective. However, the difference in the strength of the consequence between different dark patterns is striking. Essentially, practitioners should consider using dark patterns wisely and apply dark patterns with care. As there are different consequences depending on the type of dark patterns, the use should be considered differentiated. While dark patterns, that are already prevalent (e.g., scarcity), seem to be implementable with only minimal risk of negative consequences, other dark patterns (e.g., sneaking) might harbor higher risks of potential backlash. Furthermore, a clear distinction between dark patterns used should be made before applying them. Those dark patterns that have direct financial consequences for users need to be assessed significantly more carefully than those only targeting specific biases without direct financial harm for users.

Considering the individual differences between users, special care should be taken while using dark patterns when dealing with users who are especially not familiar with online shopping. These could be potential new users who are more likely to feel manipulated when confronted with dark patterns. In order not to scare them off directly, the use of dark patterns should be wholly avoided in the best case.

Conclusion and Outlook

This short paper aimed to explain the consequences of the use of dark patterns in a theory-based manner. We contribute to the literature on dark patterns by demonstrating that the information manipulation theory

appears to be a suitable theory for explaining the consequences of the use of dark patterns. Furthermore, we showed that the use of dark patterns is accompanied by negative consequences, especially perceived user manipulation. Conditional on perceived user manipulation, the use of dark patterns was also shown to negatively impact attitude toward the website as well as website design. However, it should be noted that the data of the study are cross-sectional, so that conclusions about causality are only possible to a limited extent. Future studies should use longitudinal designs to allow conclusions about causality. Further research that takes into account additional dark patterns and branches is also needed. This would allow differentiated conclusions to be drawn about the factors that violate the communication maxim. We hope that the findings of this study will stimulate further research on dark patterns and its consequences and increase practitioner awareness of the negative consequences of using dark patterns. As a next step, we aim to validate the results of the laboratory study in a field experiment and extend the research to other dark patterns. Specifically, it would be interesting to find out whether negative consequences of known dark patterns, but also associated with direct financial consequences (e.g., obstruction) can be mitigated by the "habituation effect". We also intend to further investigate the habituation effect, specifically determining whether it is influenced by the frequency of encountering specific dark patterns, or if other factors like the provider's brand, industry, level of involvement, or personality traits play a role in explaining it.

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