Understanding How Consumers Behave When Encountering Manipulative Patterns: From Awareness to Recognition and Reactions

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Abstract

Digital technologies have shifted services online, bringing unlimited opportunities to both consumers and service providers. However, consumers also encounter threats, such as manipulative patterns – design tactics that suppress user autonomy and steer users' actions in favor of service providers. Previous studies have described consumers' perceptions and reactions on manipulative patterns as well as the effects of manipulation. In this study, we take a holistic view and bring these elements together by proposing a model that explains consumer behavior when they encounter manipulative patterns in the context of e-commerce. As a theoretical background we utilize the seminal Persuasion Knowledge Model. The findings are based on a thematic analysis of semi-structured interviews supported by retrospective think-aloud (N=23). Our model describes factors affecting consumers' awareness of manipulative patterns, factors supporting the recognition of manipulative patterns, and resulting reactions. As a practical implication, the model serves as an aid in educating consumers and designing countermeasures for manipulative patterns.

CCS Concepts

• **Human-centered computing** → Human computer interaction (HCI); Empirical studies in HCI.

Keywords

Manipulative patterns, Dark patterns, E-commerce, Consumers

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1 Introduction

We are living in the digital era, where services have increasingly transitioned online, and e-commerce has become more popular than ever before. While there are several undeniable advantages to this shift, service providers also exploit malicious design patterns (i.e., manipulative patterns) for their benefit. This is evident in various contexts, from shopping websites [25] and social media [27] to games [39] and video streaming services [6]. Here manipulative patterns[1] (also referred to as dark patterns) are understood as design patterns that threaten user autonomy by directing users to take certain actions or preventing them from making certain actions, often to the disadvantage of the user and to the advantage of the company [14, 20, 28]. Examples of these patterns include, but are not limited to, highlighting one option over others despite all options being hierarchically equivalent (i.e., false hierarchy), using confusing language that misleads users (i.e., trick questions), and steering users with emotional content that leverages feelings of shame or guilt (i.e., confirmshaming) (cf., [14]).

These patterns have become increasingly common due to growth hacking, deceptive practices in retail, and research on nudges [28]. For example, Mathur et al. [25] found a significant number of manipulative patterns applied on shopping websites, with the most popular websites having the most likelihood of including manipulative elements. Several studies have described how end users perceive manipulative patterns and the consequences for individuals [2, 9, 21, 32], as well as end-user reactions to manipulative patterns [1, 13, 32] and ways to cope with manipulative patterns [21, 32, 33]. In addition, earlier research has indicated that the design and functionality of systems influence how end users recognize manipulation and evaluate the trustworthiness of technology [13, 23].

[1]We use the term manipulative patterns regardless of which term the prior literature has used, following the ACM Diversity and Inclusion Council's guideline for inclusive language. See https://www.acm.org/diversity-inclusion/words-matter.

As we have observed, manipulative patterns are common across digital platforms. They negatively affect users, who perceive, react to, and cope with these patterns in various ways. System design plays a crucial role in shaping user recognition and trust. Unfortunately, research on manipulative patterns remains fragmented [14]. Manipulative patterns can cause significant harm to consumers, such as financial loss, privacy invasion, and technology addiction [4, 20, 28], yet the lack of a unified understanding of user behavior makes it difficult to develop effective countermeasures or ethical design practices. In other words, what literature currently lacks is a comprehensive, integrated understanding of how consumers behave when encountering manipulative patterns, as well as insight into the interconnected factors that influence behavior across different stages of interaction. To address these gaps, this study aims to explore consumer responses to manipulative patterns. Our research question is therefore: How do consumers behave when they encounter manipulative patterns in the context of e-commerce?

To answer this question, we employed a qualitative approach using semi-structured interviews supported by retrospective think-aloud, with persuasion knowledge model serving as our theoretical lens. The study was conducted at the VME Interaction Design Environment of the University of Vaasa, where eye-tracking was used to monitor how participants navigate manipulative patterns. We use the seminal persuasion knowledge model of Friestad and Wright [11] as our theoretical lens. Our contribution to literature includes the proposal of a model that explains consumers' behavior related to manipulative patterns. The model illustrates the different factors that affect consumer *awareness* related to the acquisition of knowledge about manipulative patterns, the factors that affect *recognition* of manipulative patterns, and the types of consumer *reactions* when encountering manipulative patterns. Furthermore, our model illustrates relationships between these elements (i.e., awareness, recognition, and reaction), building on the persuasion knowledge model [11] and the persuasion knowledge framework suggested by Rahmani [31], that is grounded on the Friestad and Wright [11] model. The suggested model can serve as a starting point for further studies and as an aid in educating consumers and designing countermeasures for manipulative patterns.

2 RELATED WORK AND THEORETICAL BACKGROUND

In this section, we describe previous research related to manipulative patterns and end users. Also, we introduce the persuasion knowledge model that functions as the theoretical lens for our study.

2.1 Manipulative patterns and end users

Previous research on end-user interaction with manipulative patterns can be discussed through two main topics: how end users perceive manipulative patterns and the effects of manipulative patterns on end users.

In terms of perceiving manipulative patterns, previous studies have focused on awareness levels (e.g., [2, 9, 13]), recognition abilities (e.g., [1, 2, 9, 13, 19, 21, 22], and means to identify manipulative patterns (e.g., [13, 23, 24]). Related to end-user awareness, studies by Bongard-Blanchy et al. [2] and Gray et al. [13] indicate that users are aware of design's influence on their behavior, but they are unsure if it would cause them personal harm [2]. For recognition abilities, literature indicates differences in the abilities of end users from being able to recognize manipulation [2] to not being able to recognize manipulation [9, 19]. Factors affecting the ability to recognize the manipulative patterns can be the type of manipulative pattern [1, 2, 21], the subtleness of the implementation of the manipulative pattern [13, 19, 22], and the context [21, 32]. Lu et al. [21] further emphasize that users' perception of manipulative patterns is personal and dynamically changing, which can also be seen in the results by Di Geronimo et al. [9] that hint that the patterns have become so common that end users have gotten used to them. Related to the means to identify manipulative patterns, Gray et al. [13] continued the work by Maier and Harr [24], and recognized six factors that make a digital product feel manipulative: (dis)trust in the digital product, collection of personal information, threats of big data, barriers to get security, awareness of explicit manipulation, and use of freemium products. These factors can be categorized temporally ranging from the initial judgement to feelings derived from long-term use [13]. Bhoot et al. [23] listed five elements that help end users to identify manipulative patterns: frequency of occurrence, trustworthiness, level of frustration, misleading behavior, and physical appearance of the user interface (UI). This stream of previous literature is connected to the awareness (i.e., acquisition of knowledge on manipulative patterns) and recognition parts of our model. Our study advances the previous knowledge by detailing what factors affect end user awareness, thus offering grounds to explain the results of the previous studies. In terms of recognition, we add to the studies by Gray et al. [13] and Bhoot et al. [23] by detailing the elements that support manipulation recognition on UI and interaction level.

Related to the effects of manipulative patterns on end users, previous studies have focused on the vulnerability to manipulative patterns (e.g., [1, 2]), the harms manipulative patterns cause to the end users (e.g., [6, 32]), emotions and feelings arising from interacting with manipulative patterns (e.g., [1, 13]), and strategies implemented to cope with manipulative patterns (e.g., [21, 32, 33]). Avolicino et al. [1] recognized sadness, anger, and disgust, as well as indifference as most dominant emotions when encountering manipulative patterns. Gray et al. [13] focused on the negative emotions and found out that users were mostly experiencing strong negative emotions such as being upset. Regarding coping strategies related to manipulative patterns, Sánchez Chamorro et al. [33] noticed that older adults used the following strategies: aiming to learn more about the phenomena, wanting to search support from others, and aiming to change or remove the conditions enabling the manipulation. The importance of social support was also evident in the study by Sánchez Chamorro et al. [32] that described how family supported teenagers to cope. Lu et al. [21] found that users use different coping mechanisms based on their perceptions of manipulative patterns. The reactions varied from actively seeking support to ignorance. This stream, and especially the research related to emotions and feelings, and coping strategies related to manipulation, aligns with the reaction part of our model. We advance this stream of literature by describing the different types of reactions related to manipulative patterns, as well as by describing

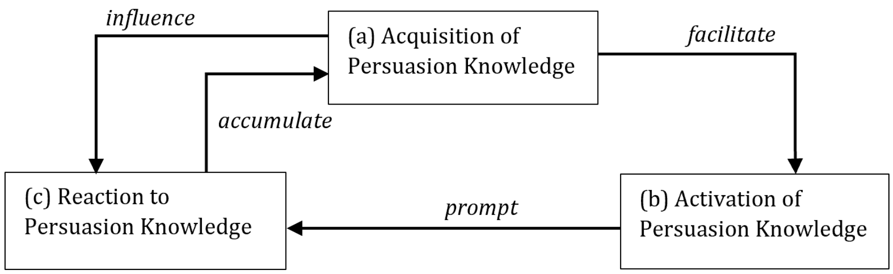

Figure 1: Conceptual framework for this study, adapted from Rahmani [31]

the relationships between the reactions and the awareness and recognition.

2.2 Persuasion Knowledge Model

We adopted the persuasion knowledge model as the theoretical background for this study. This theory was originally developed by Friestad and Wright [11]. The theory indicates that targets (e.g., consumers) learn to recognize when agents (e.g., marketers, sellers) are trying to persuade or trick them. For example, consumers can learn to see through the tricks on e-commerce sites (i.e., incorporate persuasion coping behaviors) that try to make them buy things (i.e., apply a persuasion attempt). As such, scholars have been using persuasion knowledge model to enhance the understanding of the mechanisms underpinning consumers' responses to agents' persuasive communications [31]. Those studies have used this model to touch on various domains, such as marketing communications [7, 31], retailing [12, 31], pricing [8], and product placement [35]. In line with these studies, we adopted this theory to understand how consumers' awareness of manipulation influences how they recognize manipulative patterns, and why particular UI and interaction elements are perceived as manipulative. In that sense, the theory helps us to explain the consumers' behavior related to encountering manipulating patterns.

The persuasion knowledge model has three key constructs: persuasion knowledge, that describes how persuasive tactics and strategies are employed to influence behavior; agent knowledge, that indicates the awareness of the persuader's identity, motives, and credibility; and topic knowledge, that indicates the understanding and information the target has about the subject of interest (i.e., the product) [11]. Building upon these constructs, Rahmani [31] proposed the persuasion knowledge framework (see Figure 1).

The author posited that this framework encompasses three interconnected processes: the acquisition of persuasion knowledge, the activation of persuasion knowledge, and the reaction process of persuasion knowledge. The processes and their components are as described as follows:

(a) Acquisition of persuasion knowledge:
   - Consumers learn about persuasion through their own memories of past interactions. They also gather information from external sources like books, online reviews, and news stories.
   - The outcome of this process is the persuasion knowledge that ***facilitates*** the activation process.

(b) Activation of persuasion knowledge:
   - This process happens when a persuasive message makes the target (e.g., consumers) think about the true intentions of the agent (e.g., companies) trying to persuade them.
   - The result of this process is the recognition of the underlying motives of the agents that ***prompts*** target to engage in coping behaviors.

(c) Reaction to persuasion knowledge:
   - The reaction to persuasion knowledge happens when targets (e.g., consumers) respond to persuasion in ways that help them to reach their goals. Targets use different strategies to protect themselves, such as not trusting the company's claims about a deal.
   - The outcome of this process is that the consumers feel they have achieved their goals. After taking action (e.g., making a purchase), they evaluate their experience. The ***accumulated*** experience generated by this phase becomes an integral part of the acquisition process, helping consumers improve their strategies for future scenarios. For example, next time they might decide to ask a friend or do research before using a service on an e-commerce website.

The three interconnected processes presented above affect how consumers recognize intentions, such as manipulative patterns, and the processes are looped so that consumers' persuasion knowledge is constantly improving and evolving. This ***influences*** their reactions, which then helps them learn even more.

3 METHODS

To address our research question, we adopted a qualitative approach, because this approach helps us to understand in-depth the phenomena with multiple perspectives in real-life settings [38]. We collected our data through having end-users viewing authentic screenshots of e-commerce websites that featured different types of manipulative patterns. The study was conducted at the VME Interaction Design Environment of the University of Vaasa. The research protocol was approved by the ethical board of the University of Vaasa. Also, the practices of the Finnish Code of Conduct for Research Integrity by the Finnish National Board on Research Integrity [10], as well as the General Data Privacy Regulation were followed in both data collection and data analysis. The entire research process took eight months, with data collection occurring over two months, from November to December 2024. In the following chapters, we describe our research setting and our data collection and analysis in more detail.

3.1 Research Setting

The data collection session included a pre-survey, an eye-tracking study with selected stimuli (i.e., authentic screenshots of e-commerce websites) and semi-structured interview supported by retrospective think-aloud. The stimuli used in the study were selected through the following steps. First, we studied the concept of manipulative patterns to fully understand its meaning (see e.g., [14, 26]) and reviewed different taxonomies and ontologies (especially [14, 20]). Based on this work, we decided to focus on manipulative patterns that illustrate a strategy called *interface interference*, as they manifest during an instant interaction [13]. Interface interference means manipulating the UI to make certain actions more compelling than others, which can confuse the user or make it difficult for them to recognize relevant action possibilities [14]. We searched for authentic screenshots of interface interference that were provided in scientific articles, public reports, online sources such as Reddit (reddit.com) and X (x.com) threads focusing on manipulative patterns as well as the corpuses by Brignull et al. [5] and UXP2 Lab [36]. Based on these principal steps, we then carefully went through the possible stimulus candidates. We focused exclusively on stimuli that met the following criteria: (i) they are situated within the domain of e-commerce; (ii) they represent a diverse range of services and brands that are well-suited to the study context (i.e., those that can be readily understood during a brief interaction); and (iii) they represent the interface interference strategy, but incorporate different types of low-level patterns to minimize learning effects. This resulted in five screenshots (i.e., stimuli 1–5). The stimuli and image sources are included in the appendix (see A.1–A.5). The manipulative patterns in the chosen stimuli give a broad coverage over manipulative patterns utilizing the strategy of interface interference. The primary patterns in the stimuli (following the definitions in the ontology by Gray et al. [14]) are manipulating the choice architecture through false hierarchy (stimulus 1), pressured selling (stimulus 2), feedforward ambiguity (stimulus 3), trick questions (stimulus 4), and visual prominence (stimulus 5). In addition, each stimulus contained instances of other manipulative patterns.

To ensure that our research design, lab setup, configurations, and stimuli met our objectives, we conducted a pilot test. Five participants were recruited to follow the planned protocol (described in more detail in chapter 3.2.). Based on the results of the pilot test, we adjusted our research setup, including clarifying instructions for the participants, adjusting technical aspects related to the eye-tracking, and refining interview protocol by removing excess questions. In addition, we changed two stimuli after the two first pilot tests as it appeared that these stimuli were easily misunderstood by the participants. The three last pilot tests confirmed that the selected stimuli were suitable for the study.

3.2 Participants

We recruited a total of 24 participants, all of whom were students at the University of Vaasa at the time of the study. One participant was excluded due to technical issues in recording resulting in 23 participants. Participants got a lunch ticket (worth approximately 5€) as compensation for participating in the study. The demographics of the participants are described in table 1.

The age range of the participants was between 20–40, with most participants (n = 16, 35%) belonging to the age group of 20–30. Regarding gender, 16 self-reported as man and seven as woman. The participants came from 10 different countries, with most participants from Finland (n = 7, 30%), Nepal (n = 7, 22%), and Bangladesh (n = 4, 17%). All participants had experience with online shopping, and most of the participants (n = 20, 87%) reported shopping online at least once a month.

3.3 Data collection

The data collection proceeded as follows. First, we conducted a survey to gather basic information regarding participants' demographics and e-commerce shopping experiences. Second, the participants were shown the stimuli images and prompted to try to find manipulative patterns in them. During viewing the stimuli, participants' gaze paths were recorded with Tobii Pro Nano eye-tracker. Before each screenshot, participants were informed of the scenario in which they would interact with the screenshot. Also, a general definition of manipulative patterns was provided at the beginning of the session. Third, after the participants had viewed the stimuli, we conducted semi-structured, open-ended interviews. In the first part of the interview, participants were asked to identify and explain the manipulative patterns they saw in the stimuli, in order to reveal whether they experienced the stimuli to include manipulative patterns and what elements affected the pattern recognition. The first part of the interview was conducted by showing the participants still images of the stimuli and by using retrospective think-aloud. During retrospective think-aloud participants narrated their gaze paths while watching the video recordings of their eye-tracking data [15]. Retrospective think-aloud was utilized as previous research has indicated it to be useful in gaining deeper understanding of the interaction between manipulative patterns and end users [17]. In the second part of the interview, participants were asked open-ended questions in semi-structured format related to three main themes: their awareness of manipulative patterns, their reactions to these patterns, and their ability to recognize them. This provided general information about the participants' behavior related to manipulative patterns. The interviews were conducted in either English or Finnish, depending on the participants' preferences. As a result, seven interviews were conducted in Finnish, and the remainder in English. The entire data collection process lasted approximately one hour per participant. All sessions were recorded, and notes were taken throughout the data collection process.

3.4 Data analysis

We began data analysis by having each of the four researchers transcribe one of the interview recordings. This process helped us familiarize ourselves with the data while a professional transcription firm was hired to transcript the remaining recordings. Then, the first and second authors did independently open-coding for a selection of the transcripts during which the codes were discussed

Table 1: Demographics of the participants.

ID	Age	Gender	Nationality	Frequency of online shopping
P1	22	Man	Finnish	Less than once a month
P2	20	Man	Finnish	Once a month
P3	21	Man	Lithuanian	2-3 times a month
P4	29	Man	Turkish	2-3 times a month
P5	23	Man	Finnish	2-3 times a month
P6	36	Woman	Finnish	Once a month
P7	24	Man	German	Once a month
P8	35	Woman	Vietnamese	2-3 times a month
P9	28	Man	Finnish	Once a month
P10	35	Woman	Indian	1-3 times a week
P11	38	Man	Bangladeshi	Once a month
P12	24	Man	Nigerian	2-3 times a month
P13	25	Man	Finnish	Once a month
P14	38	Man	Nepalese	Less than once a month
P15	27	Man	Nepalese	Less than once a month
P16	28	Man	Bangladeshi	Once a month
P17	29	Woman	Nepalese	2-3 times a month
P18	22	Woman	Nepalese	Once a month
P19	27	Woman	Finnish	Once a month
P20	28	Woman	Nepalese	2-3 times a month
P21	33	Man	Sri Lankan	Once a month
P22	26	Man	Bangladeshi	Once a month
P23	38	Man	Bangladeshi	2-3 times a month

in bi-weekly sessions held with the full research team. After agreeing on the initial codes, we divided the 23 transcripts among the team and coded them independently. Both NVivo software and paper-based methods were used for coding. Simultaneously during the coding process, we held several meetings where we discussed, refined, and finally reached consensus on codes, subthemes, and themes. Our analysis process was inspired by the practices of thematic analysis as described by Braun and Clarke [3]. We took a hybrid approach to the analysis by combining inductive approach with insights from the persuasion knowledge theory [11]. As a result of the analysis, we derived three themes with several subthemes: awareness of manipulative patterns with four subthemes; recognition of manipulative patterns with four subthemes; and reactions to manipulative patterns with four subthemes. After that, we further compared our findings with the persuasion knowledge model [11] as well as the persuasion knowledge framework [31], which resulted in the model explaining consumers´ behavior when encountering manipulative patterns, building upon these theories. The themes, subthemes, and the model are presented in the next section.

4 FINDINGS

Based on the interviews, we could recognize three overarching themes that describe the consumer interaction with manipulative patterns; factors affecting the awareness of manipulative patterns, factors affecting the recognition of manipulative patterns, and factors that describe the reactions to manipulative patterns. In this section, we illustrate these themes and their subthemes, whereafter we present how the factors are intertwined through introducing a model that explains how consumers behave when encountering manipulative patterns in the context of e-commerce.

4.1 Awareness of manipulative patterns

Data emerging from interviews shows that factors affecting consumers awareness related to manipulative patterns can be described with four subthemes: cultural background, self-awareness, context knowledge, and brand knowledge. First, cultural background is related to participants' native culture and their work culture, affecting how the participants become aware of manipulation. Native culture showed through people referring to their experiences from their home countries and reflecting the level of risk and the expected functionalities to that. As P7 stated:

> "I think, in Germany, or I don't know if it's international. I think it's trust or something like that." [P7].

Participants also referred to their work experience and profession when interpreting the interaction with the system, as can be seen from the following quotation where P12 describes an element that they find suspicious:

> "And with my experience, because I'm also like a full-stack developer, a web developer, so with my experience developing websites and web applications, I don't think we do things like this." [P12].

Second, with self-awareness we refer to participants' understanding of themselves and issues in the context of manipulative patterns, and the ability to be responsible and self-critical. This theme of self-awareness is shown as voiced by P4 when discussing stimulus 4:

> "But normally…when playing this kind of game, like free version, then we don't want to go further. So, I basically choose "No" to every option. Even I don't look at that instruction there." [P4]

Third, context knowledge describes how the service where the consumer confronts manipulation affects awareness. For example, the service type (e.g., online games or online casinos) created certain expectations as to whether the service could feature manipulative patterns. This is shown in the following comment related to stimulus 2:

> "When we book our flights, this kind of that screen appears every time." [P14].

Fourth, brand knowledge refers to how brand familiarity and brand reputation affected awareness. If participants were familiar with the brand, they were more trusting, whereas unfamiliar brands made the participants to be cautious, as is shown in the following excerpt related to stimulus 2:

> "I have never seen the brand before, so I was a little bit skeptical" [P23].

Based on the interviews, participants also tolerated manipulative elements and continued interaction despite these elements, if they judged that the online store was generally seen as trustworthy.

4.2 Recognition of manipulative patterns

Participants identified several factors that support manipulation recognition which we categorized into four subthemes: visual elements, layout elements, interaction design elements, and text content. Visual elements include static UI components like colors, affordances, images, and typography. Color played a key role in attracting participants to recognize manipulation. Participants found it alarming when the color usage in the service did not follow color conventions. They also recognized that colors were used to highlight the choices the service provider wanted them to make. This is shown in the following:

> "…the green color indicates that now you are making the right choice, and this is what is wanted from you." [P5].

Participants observed that affordances (i.e., perceivable action possibilities assigned to a certain element [29]) were employed to prompt users into selecting specific options, as voiced by P1:

> "…in general, the design is done so that it [button] pops out on some level, so it focuses your attention before the other one." [P1].

Participants commented also on images (e.g., logos and decorative images), especially related to searching for potential distortions to identify outright scams. Also, images (along with colors) were crucial for brand recognition, enabling participants to assess the likelihood of manipulation. Some decorative images were perceived as emphasizing certain values, as illustrated by one participant:

> "…the diamond, I think it represents value… like now you get a lot of value from this." [P5].

Moreover, typography such as using all-caps was perceived as a method to attract user attention and even coerce users into making choices. For instance, P20 described the frequent use of the word "FREE" in all caps in stimulus 5 as "*pushy*" and indicating "*Look at this, this is free, you should take this*".

With layout elements we refer to gaze steering, element placement, and button order. Participants noted gaze steering as a manipulation tactic, as seen in the following comment related to stimulus 5:

> "…and that [No thanks, I don't want free delivery] on the left side, it's not particularly easy to notice … all information has been moved to the right side. So, I feel that they want me to look at the right side of the screen." [P5].

Regarding element placing participants noted that for example the placing of buttons made it more difficult to make the choice the user would've wanted to make, as was voiced by P11:

> "…the back button and cancel button should not be kept so close. It can create some confusion for the user … what option I should select." [P11]

Participants also mentioned that deviations from the expected button order indicated manipulation intent:

> "…aren't these usually the other way around, so that 'Yes' is on the right and 'No' is on the left? … And I'm used to the green button being on the right and the red button on the left." [P1].

With interaction design elements we refer to UI components that facilitate user interaction with the system, including missing functionalities and task confusion. Participants reported that noticing a missing functionality, such as the absence of an exit option, raised suspicions of manipulation. Also, task confusion—such as not understanding the intended task or being uncertain about the outcome of selecting an option—was identified as a factor indicating potential manipulation. This was commented by P18 when discussing stimulus 1:

> "The button is like so not quite visible. Like everything else is like quite like in your face, like right there. . . But then, if you're looking like [the button], I don't want it, . . . it's very small and tiny, and it takes time to see it. So, I would say [the design is] quite manipulative." [P18]

With text content we refer to confusion related to text meaning and word selection. Finding contradictory information in the text alerted participants of possible manipulation. Also, confusing word selection made participants cautious, as voiced by P22 in relation to stimulus 3:

> "This "Cancel", I think, means to cancel the cancellation. And the "Back" also means to get back to previous options. So, I … for me, both of these seems like the same action right now…" [P22].

In addition, word choices and phrases that made overly optimistic claims (such as "great value for a low price") suggested manipulation.

4.3 Reactions to manipulative patterns

Based on the data we categorized reactions to manipulative into four subthemes: emotional, behavioral, cognitive, and social reactions. Participants described emotional reactions such as irritation, frustration, confusion, and discomfort when encountering manipulative patterns. Some had a neutral attitude, considering possible manipulation as something that can be expected in the context:

> "When you get the idea, then you... then you get this kind of acceptance, that this is just the way it goes." [P13].

This was true especially if manipulation hadn't affected the consumers. Participants also commented that strong feelings every time they encountered manipulation would only hurt themselves:

> "So it's obvious that we feel sad, but like there's nothing we can do from our part. . . So, I think at last, they had this... At the end like the company is also losing and we are also losing at the same time." [P18].

Behavioral reactions ranged from disengagement and non-engagement to concentration, finding workarounds, and finally, relenting. Participants expressed an immediate desire to cancel or exit when they perceived manipulation. They also reported exercising increased caution and paying closer attention, particularly when an immediate escape was not apparent. Participants described various strategies they employed to mitigate or avoid the negative effects of manipulation, or even to utilize them for their benefit, such as accepting an offer and subsequently canceling it before costs were applied. P15 recounted an experience:

> "I linked my card with Apple Pay in my wife's account because she wanted to make a purchase. The service was for one month. After the month ended, we did not wish to continue the subscription. However, we found it difficult to unsubscribe and remove our card information from the Apple account. We have not yet removed the card; instead, we simply stopped using it and removed money from our account" [P15].

Participants also indicated that in certain situations, it was easier to comply with the manipulation rather than undertake the laborious task of avoiding it, especially when the perceived harm was minimal. The comments related to the behavioral reactions highlighted that when consumers become skilled in recognizing the manipulative patterns, they can also learn how to ignore them and start to consider them as more or less normal part of the business. In addition, we could see that if the consumers truly wanted to purchase something, they continued with the purchase despite manipulation.

Cognitive reactions such as problem-solving and learning were observed when users encountered manipulative patterns. Participants indicated that manipulation attempts facilitated learning, enabling them to avoid similar manipulations during the same interaction or in the future. P4 reflected on their experience:

> "I previously made a couple of mistakes. I've fallen into some of their traps in my early days. So, something in the back of my head is about those experiences. Whenever I feel similarly, I stop what I'm doing, take a step back, and start from the beginning. I read the text more carefully. As they refine their tactics, I also refine my defence mechanisms." [P4].

Social reactions included seeking support from others or from online communities. This was done in various ways, such as looking at reviews and asking friends, as P19 described:

> "...I could send a message to my friends on Snapchat or somewhere and ask [sic] why this is like that." [P19].

4.4 Model of consumer behaviour when encountering manipulative patterns

Based on the findings, we synthesized a conceptual model of consumers' behavior when encountering manipulative patterns (see Figure 2). The model comprises three interconnected processes: the acquisition of knowledge on manipulative patterns, the recognition of manipulative patterns, and the reaction to manipulative patterns. The model is described as follows.

The acquisition of knowledge of the manipulative patterns process (a in Figure 2) means that consumers acquire or become aware of those manipulative patterns from different sources of information, both internal (e.g., own memories of past interactions) and external sources (e.g., online reviews and news stories). The factors that contribute to this process include cultural background, self-awareness, context knowledge, and brand knowledge. This indicates that individuals learn to recognize when agents (e.g., marketers, sellers, and providers) are attempting to persuade or deceive them [11]. Consumers often utilize their knowledge to assess the persuader's identity, motives, and credibility. In our case, for example, brand trust led consumers to trust the company, assuming there was no harm from its services. The outcome of this process is the persuasion knowledge on manipulative patterns that ***facilitate*** the recognition process of manipulative patterns.

The recognition of manipulative patterns process (b in Figure 2) involves consumers identifying potential manipulation through both persuasion and agent knowledge [11]. Knowledge from the acquisition process (a in Figure 2) helps consumers understand the true intentions of companies in a persuasion scenario. In our case, they include visual elements, layout elements, interaction design elements, and text content. The outcome of this process is the perception of the underlying motives of the agents (e.g., companies) that ***prompts*** targets to engage in coping strategies against those manipulative patterns.

Reactions to manipulative patterns process (c in Figure 2) reflect consumers' topic knowledge and their responses to persuasion attempts [11]. They include emotional, behavioral, cognitive, and social reactions. Once consumers recognize these intentions in the recognition process (b in Figure 2), they use different strategies to protect themselves. After taking action, such as clicking on an offer, consumers evaluate their experience. Those experiences ***accumulate*** their knowledge and become an integral part of the acquisition process (a in Figure 2), helping consumers improve their strategies for future scenarios.

Knowledge of manipulative patterns (a in Figure 2) affects how consumers recognize manipulative pattern intentions, which ***influences*** their reactions (c in Figure 2). Their reactions then help them acquire more knowledge, creating a loop where their acquisition of

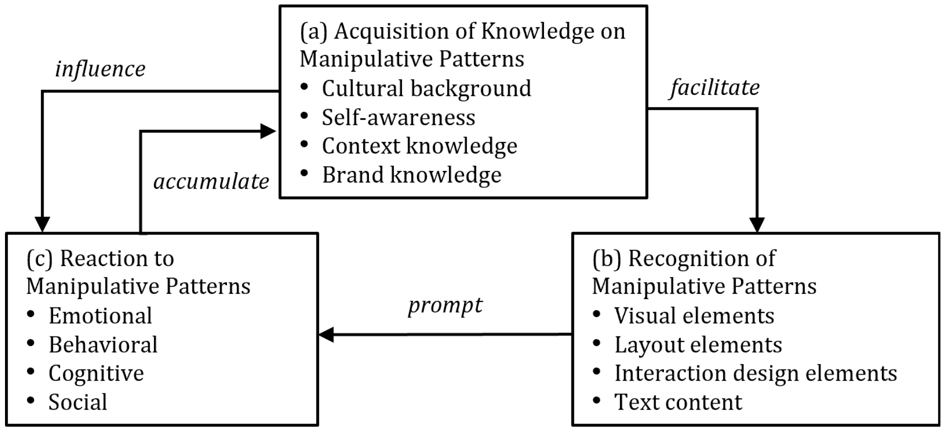

Figure 2: Model of consumers' behavior when encountering manipulative patterns.

knowledge on manipulative patterns is constantly improving, and amending.

5 DISCUSSION

Research suggests that consumer manipulation involves three key aspects: lack of transparency, perceived loss of autonomy, and the sensation of being deceived (c.f. [37]). Manipulative patterns can be used for all these aspects, and our model thus provides the processes of how consumers behave when they encounter manipulative patterns. To the best of the authors' knowledge, this work represents the first attempt to address the use of manipulative patterns in the context of e-commerce through the lens of the persuasion knowledge model. Our proposal benefits academics, practitioners, and policymakers.

First, the model provides a comprehensive, integrated understanding of how consumers behave when encountering manipulative patterns, as well as insight into the interconnected factors that influence behavior across different stages of interaction. Our model thus provides theoretical advancement by providing a structured framework for understanding consumer behavior in the context of manipulative patterns. This can lead to new approaches to developing new theories that can be tested in future research. This model can be used as a starting point for researchers to identify gaps in current research and design their research to delve into the details of consumer knowledge acquisition, recognition, and reaction processes, such as in the relation of AI [18]. The model can be also used as a model to help students to understand the complex of consumer behavior related to how different processes interact in real-world scenarios as a case of manipulative patterns [16]. Second, the practical implications of the model for marketers and companies are several ways. For example, the model helps practitioners to explain how to understand each of these processes, i.e. the acquisition of persuasion knowledge, the activation of persuasion knowledge, and the reaction to persuasion knowledge, can help them design more ethical and transparent marketing strategies [34]. Third, policymakers can benefit from our model. For example, legislators can utilize insights from the model to craft effective consumer protection regulations by comprehending how consumers discern and respond to manipulation [30]. It can also be used to evaluate existing policies or even lawmakers can develop educational programs that enhance consumer awareness and knowledge about manipulative patterns.

Furthermore, through utilizing the persuasion knowledge model [11] in the context manipulative patterns we contribute to the knowledge about the applicability of the theory. Part of the historical importance of persuasion knowledge model stems from it defining the target as an active party in the persuasion attempt through describing how the roles of target and agent can change during the bargaining process. In our case, although targets (i.e., consumers) can be somewhat active e.g., via utilizing the agents' (i.e., companies) offers to their benefit, the possibility of a complete change of roles is impossible as the agent is represented in the interaction by a webpage or application. This study also provided new knowledge related to the themes and subthemes of awareness, recognition and reactions. As mentioned earlier, previous studies have outlined factors influencing end users' ability to recognize manipulative patterns [1, 2, 13, 19, 21, 22]. For example, Gray et al. [13] describe that end users determine manipulation in early phases of the interaction based on the intuition that something was wrong and by focusing on details in the user interface. In this study, we advance existing knowledge by providing a more detailed and practical description of the UI and interaction elements that assist end users in recognition, among other things about the role of colors, typography, and text content in manipulation recognition. Furthermore, as earlier research has described especially emotional reactions (e.g., [1, 13]) and social reactions (e.g., [32, 33]) related to manipulative patterns, our model aids broadening the description of reactions by dividing the reactions into four categories (emotional, behavioral, cognitive, and social reactions).

This research has its limitations. First, we acknowledge the possible effect of our positionality affecting the interpretation of the results. However, as our research team included members with different cultural and scientific backgrounds, that helped to minimize these threats. Second, regarding manipulative patterns our study focused especially on patterns related to the strategy of interface interference, which might limit our findings as we acknowledge the effect of manipulative pattern type to manipulation recognition (see e.g., [1, 2, 21]). However, it should be noted that the participants were able to recognize a range of manipulative patterns demonstrating different manipulation strategies in each screenshot. Future studies could continue this work by comparing the findings study conducted on stimuli featuring manipulative patterns utilizing different strategies. Third, it should be noted that while the participants represent a wide range of different nationalities, our participants represent certain generations and education level, and there are more man-identified participants than women. In addition, this research prompts future research to focus on specific aspects of the model, such as how the cultural background facilitates recognition and influences reactions. Lastly, our study focused on consumers in the context of e-commerce, and thus the applicability of the model in other contexts should be further examined. In the future, the model could be further developed to include among other things the situational factors (e.g., usage frequency, trust in the system, experienced value, experienced risk, user aim, and the subtleness of manipulation, as recognized in our study as well as in previous studies [13, 19, 21, 22]).

6 Conclusion

In this article, we proposed a model that explains consumers' behavior when encountering manipulative patterns in the context of e-commerce. The model comprises three interconnected processes: acquisition of knowledge on manipulative patterns, recognition of manipulative patterns, and reaction to manipulative patterns, and describes the relationships between these processes. Furthermore, our study detailed the factors affecting consumer awareness related to manipulative patterns, as well as the UI and interaction elements that consumers rely on when recognizing manipulative patterns. In addition, based on our data we described the variety of reactions consumers have to manipulative patterns. Future studies can build on our results by benefiting the model when describing end-user behavior related to manipulative patterns, especially in the context of e-commerce. As a practical contribution, these results can be used to aid in educating consumers and designing countermeasures for manipulative patterns.

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A APPENDICES

A.1 Stimulus 1

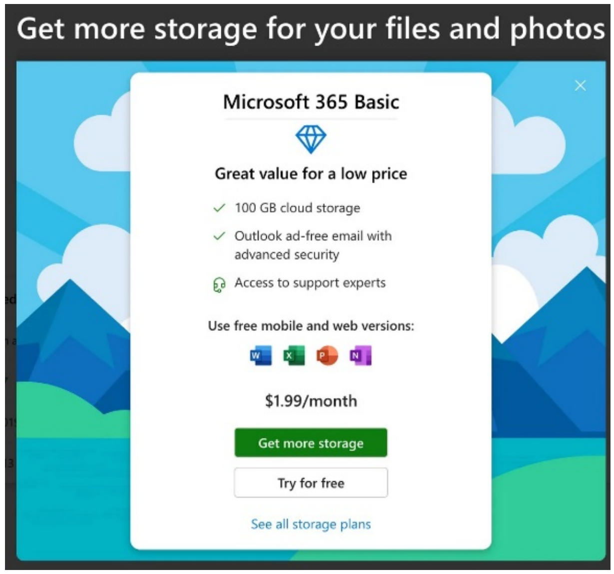

Figure 3: A screenshot related to Microsoft 365 service upgrade. Image source: Reddit (r/darkpatterns). Retrieved October 31, 2024, from https://www.reddit.com/r/darkpatterns/comments/165oo8j/buy_it_try_it_or_see_it_can_you_spot_how_to_close/

A.2 Stimulus 2

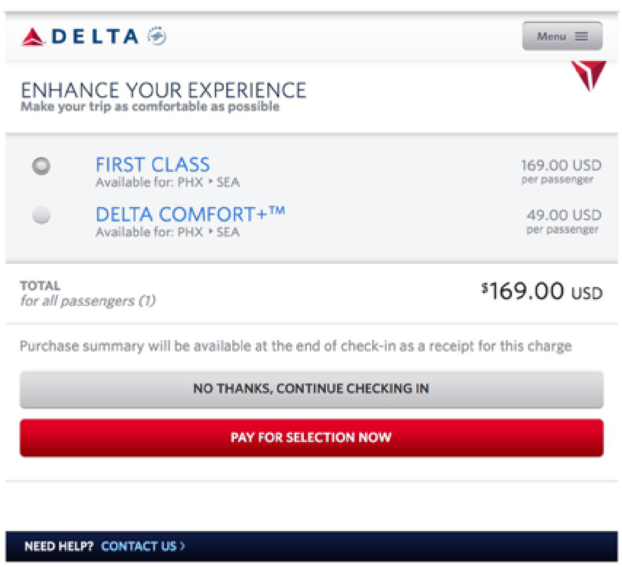

Figure 4: A screenshot related to Delta Airlines flight booking upgrade. Image source: UXP2 Dark Patterns. Retrieved October 31, 2024, from https://darkpatterns.uxp2.com/pattern/delta-deceiving-upgrade/

A.3 Stimulus 3

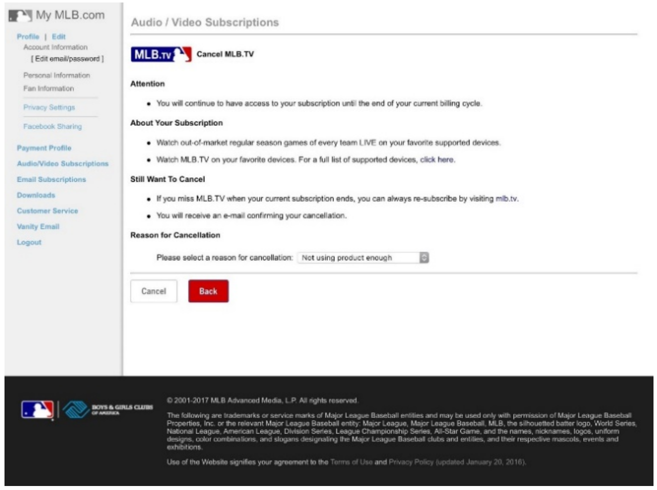

Figure 5: A screenshot related to Major League Baseball streaming service cancellation. Image source: UXP2 Dark Patterns. Retrieved October 31, 2024 from https://darkpatterns.uxp2.com/pattern/unclear-instructions-to-unsubscribe/

A.4 Stimulus 4

Figure 6: A screenshot related to purchase decline confirmation in Cooking Diary game. Image source: Reddit (r/assholedesign). Retrieved October 31, 2024 from https://www.reddit.com/r/assholedesign/comments/dkwqj9/they_make_the_yes_red_so_you_click_no_by_accident/

A.5 Stimulus 5

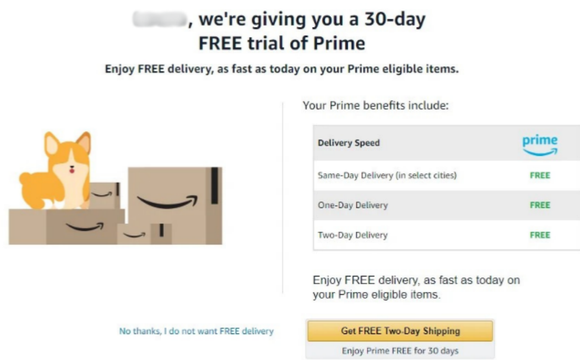

Figure 7: A screenshot related to Amazon Prime trial offer. The blurred text is added by researchers. Image source: Reddit (r/darkpatterns). Retrieved October 31, 2024 from https://www.reddit.com/r/darkpatterns/comments/ncsti8/just_let_me_buy_a_pan_in_peace/