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## FAKE REVIEWS AS DARK PATTERNS: A NUDGE THEORY PERSPECTIVE USING THE SOR FRAMEWORK

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### ABSTRACT

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Aim/Purpose	To examine how fake reviews function as dark patterns and affect consumer behaviour within the Stimulus-Organism-Response (SOR) framework grounded in nudge theory.
Background	On e-commerce platforms, fake reviews function as dark patterns, serving as a manipulative digital nudge that exploits cognitive biases in accordance with Nudge Theory
Methodology	A systematic search was conducted in the Scopus database using keywords combining nudging, dark patterns, and fake reviews. The search yielded 27 relevant peer-reviewed articles for detailed analysis. This study employed a conceptual approach, utilizing the SOR framework, which is anchored in nudge theory, to understand how fake reviews act as stimuli that trigger internal consumer responses, which in turn drive behavioural outcomes.

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Contribution	Through a comprehensive analysis of 27 peer-reviewed articles, this study advances the research on fake reviews by framing them as dark patterns based on nudge theory within the SOR framework.
Findings	The study reveals that fake reviews exploit cognitive biases and emotional responses, shaping consumer purchase intentions and behaviour in online contexts.
Recommendations for Practitioners	Platforms should treat fake reviews as manipulative nudges, strengthen detection systems, and design transparent, awareness-driven interfaces.
Recommendations for Researchers	To empirically study the proposed questions and propositions, and to examine psychological mechanisms and interventions to counter fake review influence on consumers.
Impact on Society	Considering fake reviews as intentional nudges helps eradicate unethical digital practices and strengthen consumer trust in e-commerce.
Future Research	The study proposes 10 research questions and 9 propositions, urging interdisciplinary inquiry across psychology, marketing, and information systems.
Keywords	dark patterns, nudge theory, fake reviews, manipulative design patterns, persuasive design

## INTRODUCTION

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The principle of *caveat emptor*, “let the buyer beware,” has gained utmost importance in the modern digital marketplace as customers increasingly rely on online reviews to guide their purchasing decisions. Fake reviews on online platforms have emerged as a prevalent form of deception, prompting concerns about their role as a form of dark pattern (Luca & Zervas, 2015; Stavrakakis et al., 2021). UX designers (Brignull et al., 2015) introduced the term “dark pattern” to refer to misleading design techniques that compel people to make unfavourable decisions. Past research shows that these manipulations frequently exploit users’ cognitive biases to alter their behaviour in ways that advantage businesses while restricting users’ autonomy (Mathur et al., 2019). Adkisson (2008), in his review of Thaler and Sunstein’s book *Nudges*, suggests that the environment, i.e., the choice architecture in which users make decisions, can be altered through nudges to take advantage of predictable behavioural biases and help users make choices that are beneficial to them without limiting their freedom of choice. These insights are applied in this study to the online platforms review system, suggesting it as the choice architecture where the reviews (either genuine or fake) act as nudges. Genuine reviews are the actual consumer experiences shared by them regarding products or services, hence making it a good or ethical nudge, as it helps consumers make better choices.

In contrast, fake reviews are artificial or exaggerated reviews that are not genuine opinions based on one’s own experience with products and services posted by customers (Thukral, Aggarwal, Saini, & Kapoor, 2025), making them a bad or unethical nudge (Weinmann et al., 2016). Fake reviews influence the decision-making environment, directing users towards actions they may not have otherwise taken, resulting in erroneous purchasing decisions and financial losses (Wu et al., 2020). Hence, fake reviews do not directly influence users but rather nudge them, leveraging consumers’ cognitive biases (Stavrakakis et al., 2021) to make decisions that align with commercial interests, thereby creating a dark pattern. A recent study by (Thukral, Aggarwal, Garg, & Lipika, 2025) showed that fake reviews demonstrate as social proof (a type of dark pattern), where people use others’ opinions to make decisions, especially in unfamiliar situations. Businesses resorting to review manipulation exploit trust, creating an uneven playing field that harms genuine businesses that rely on authentic reviews (Gupta, 2024). Globally, fake reviews are becoming a growing issue, influencing consumer behaviour across various cultural contexts and prompting international regulatory efforts to counteract fake review practices (Zaman et al., 2023). Despite Amazon’s efforts to combat fraudulent review brokers, the

issue persists and remains more complex (Amazon, 2024). Despite extensive research on fake reviews and their impact on trust and purchasing decisions (Plotkina et al., 2020), a gap remains in understanding how they operate as a dark pattern and exploit cognitive biases through nuanced design processes grounded in nudge theory. Therefore, this study aims to investigate three research questions (RQ) to address this gap:

- RQ1.** What are the various techniques of nudging in the context of fake reviews that make them dark patterns?
- RQ2.** How do fake reviews as dark patterns trigger emotional and cognitive responses that cloud judgment and make it difficult for consumers to make rational decisions?
- RQ3.** How do distorted perceptions due to fake reviews as a dark pattern lead to consumer actions?

By examining fake reviews using the frameworks of nudge theory and dark patterns, academicians might gain insight into the psychological elements that lead consumers to fall for these manipulations. These insights can be utilized to develop more effective systems and regulatory frameworks that better safeguard consumers. This research presents a novel approach to understanding and mitigating the impact of fake reviews on online platforms by employing a dark pattern perspective and integrating nudge theory within the Stimulus–Organism–Response (SOR) framework. The next two sections describe the theoretical foundation and the literature review. The discussion and findings are then presented, followed by an outline of future research directions and suggested propositions. Finally, the theoretical and practical implications, the limitations, and the conclusion are presented.

## **THEORETICAL BACKGROUND**

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### ***NUDGE THEORY***

According to Nudge Theory (Thaler & Sunstein, 2021), small and subtle interventions can have a significant impact on people’s decisions without imposing any restrictions on their freedom of choice. Founded on the libertarian paternalism philosophy that guides people toward decisions that improve their well-being while allowing them to exercise their own autonomy (Alberts et al., 2024). The goal of nudge theory is to modify the choice architecture to encourage actions that benefit both people and society (Arno & Thomas, 2016). For instance, Chang et al. (2024) demonstrated that placing healthier food selections at eye level in a grocery store encourages customers to choose them over less healthy options, even when they still have access to the less healthy options. The change in the display of options can considerably influence customer behaviour, as individuals tend to select the most accessible alternative. There are various ways to nudge users on online platforms, such as through social proof, defaults, and anchoring (Hansen & Jespersen, 2013; Özdemir, 2020). Past research shows that the utilization of defaults is one of the most important elements of nudging, exhibiting that humans frequently adhere to predetermined decisions, as exercising active choice necessitates cognitive exertion (Ortmann et al., 2023). For instance, Weinmann et al. (2016) showed in the context of organ donation that simply changing default options (from opt-in to opt-out) nearly doubled the percentage of people who consent to being organ donors. Qin (2025) explained anchoring as the tendency to rely on the first piece of information encountered when making decisions. For instance, if a product’s original price is displayed alongside a discounted price, the high original price acts as an anchor, making the discounted price appear more appealing.

Social proof is a psychological and social phenomenon wherein people copy the actions of others in an attempt to undertake normative behaviour in a given situation (Park & McCallister, 2023). Begho and Liu (2024) explained the role of social proof in influencing a person’s choice of food and how much they consume. In environmental campaigns, showing individuals how their neighbours have reduced energy consumption can nudge them to do the same, as they are influenced by the actions of their peers (Gajdzik et al., 2024). Nudge theory has been widely used across various domains, namely

environmental conservation, financial decision-making, and public health. However, the ethical application of nudges remains a vital consideration for policymakers and businesses alike. Nudge theory can be manipulative if applied maliciously to exploit consumer biases rather than for their benefit. For example, Bovens (2009) highlights that, in contrast to social advertising, nudges influence decisions by subtly exploiting cognitive biases rather than using direct persuasion or information. This presents ethical questions regarding manipulation, autonomy, and moral boundaries in nudge theory. Similarly, Weinmann et al. (2016) demonstrated that businesses can encourage customers to opt for non-essential options they offer. Although these unethical nudges may benefit the business in the short term, they could have long-term consequences, including a decline in goodwill, negative publicity, or even legal action.

### ***DARK PATTERN***

The design strategies used in digital interfaces, such as applications or websites, that trick consumers into making choices that are not in their best interest are known as dark patterns (Brignull et al., 2015). Dark patterns exploit psychological and cognitive biases to encourage users into activities they might otherwise ignore if they had complete knowledge (Thukral, Aggarwal, Garg, & Lipika, 2025). These patterns may mislead or coerce users into making choices, such as subscribing to services or disclosing more personal information than intended. Narayanan et al. (2020) stated that dark patterns, such as hidden fees, misleading buttons, or forced subscriptions, make it difficult for people to make informed choices or fully utilize their power. Customers frequently find themselves in bad situations, such as being overcharged, signing up for services they don't want, or purchasing items they did not intend to purchase (Sin et al., 2025), as a result of these manipulations, which are designed to benefit businesses at the cost of their autonomy (S. Ahuja & Kumar, 2022). The insurance industry makes extensive use of dark patterns (Chugh & Jain, 2021). For example, advertisements for travel insurance frequently use labels or colour cues that are highly recommended, or frame rejection options that make the user feel uncomfortable, such as 'No, don't protect my vacation', which makes the user feel guilty or nudges them toward the insurance. Dickinson (2023) shows how people's perceptions of risk and value are altered by this deliberate framing of options and omission of crucial information regarding refunds or compensation. These dishonest strategies demonstrate how dark patterns on online platforms influence people's decisions by taking advantage of cognitive biases and information asymmetries.

## **LITERATURE ANALYSIS**

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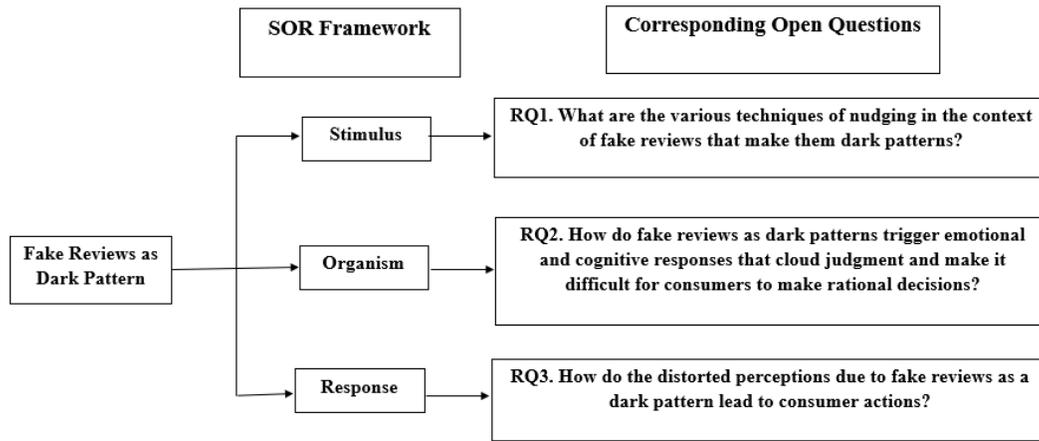
### ***RESEARCH DESIGN***

A systematic search of journal articles was conducted in the Scopus database to explore the topics of fake reviews, nudge theory, and dark patterns. Scopus, being one of the largest abstract and citation databases for peer-reviewed research, was chosen for its comprehensive coverage. To ensure a rigorous and exhaustive search process, specific keywords were employed using the following query: TITLE-ABS-KEY (nudging and dark patterns OR nudging and fake reviews OR dark patterns and fake reviews). This search was completed as of October 30, 2024. Each article was manually reviewed for relevance, resulting in a final selection of 27 articles for detailed analysis.

### ***RESEARCH METHODOLOGY***

For studying fake reviews as dark patterns, the SOR framework was chosen as it offers a structured psychological model to understand how manipulative tactics (nudging) may influence consumer behaviour (Cao et al., 2024; Xia et al., 2024). The SOR framework helps categorize the process by which external stimuli (various techniques of nudging in the context of fake reviews, which constitute dark patterns) affect an individual's internal psychological state (organism), resulting in a behavioural

response (such as a purchase decision). To address this, we propose a study utilizing the SOR framework (Figure 1) to investigate fake reviews as dark patterns in accordance with nudge theory.



**Figure 1. Research methodology to study fake reviews as dark patterns based on nudge theory using the SOR framework**

In the Stimulus stage, fake reviews serve as deceptive signals that alter consumers' perceptions of product quality, desirability, and trustworthiness. Specifically, we need to understand the nudging techniques used in the context of fake reviews, which act as stimuli and nudge users towards making biased decisions by exploiting cognitive biases (RQ1). By manipulating these biases, businesses can influence consumers to purchase products that may not be as valuable as portrayed, creating an artificially inflated marketplace.

At the Organism stage, consumers' emotional and cognitive processes come into play. We will first attempt to understand how fake reviews (stimulus) trigger emotional responses that cloud judgment and make it difficult for consumers to engage in rational decision-making (RQ2). Second, how fake reviews as dark patterns increase cognitive load by overwhelming consumers with excessive and often conflicting information, making decision-making more complex and mentally taxing.

Finally, in the Response stage, these psychological and emotional reactions result in tangible consumer behaviours, such as purchasing decisions, purchase intention, or post-purchase satisfaction. The SOR framework enables us to understand how distorted perceptions (resulting from fake reviews as dark patterns) lead to consumer actions (RQ3) that ultimately benefit the manipulative party, whether it is a seller or a platform, while harming the consumer.

### ***STIMULUS (S): NUDGING TECHNIQUES USED IN THE CONTEXT OF FAKE REVIEWS THAT MAKE THEM DARK PATTERNS***

In the context of fake reviews, several nudging techniques that act as stimuli are utilized, creating a dark pattern that manipulates consumer behaviour by leveraging choice architecture to subtly guide decision-making processes. These techniques include social proof nudge, default nudge, and anchoring nudge. According to recent research by Dubiel et al. (2024), choice architecture can be used to unethically manipulate people, particularly in our example, through the use of fake reviews. In this manipulated choice architecture, the following are some of the primary nudging techniques:

#### **Social proof nudge**

When people do not have any prior preferences, social proof nudges can help them make decisions more quickly and with less ambiguity (Venema et al., 2020). It is an effective tool that allows users to seek advice from others when they are unsure (Sin et al., 2025; Thaler & Sunstein, 2021). Customers

use reviews to guide their judgments while making purchases on internet platforms (Thukral, Aggarwal, Saini, & Kapoor, 2025). Social proof nudging in the context of fake reviews is the practice of increasing reviews or ratings by businesses through incentivization. Social proof encourages people to believe that many others have had a positive experience with a particular good or service, which builds consumer trust. This finding is consistent with a previous study by Song et al. (2023), which also found online reviews to be a trustworthy source of information. This marketing strategy makes use of the idea that consumers are more inclined to purchase a product if they believe that others have validated its quality. This can increase sales and provide the company with a more reliable image (Mathur et al., 2019; Sin et al., 2025).

### **Default nudge**

Based on the quantity of reviews, online platforms often show some products under the categories as the top-rated or most popular products. Default nudge uses this strategy by carefully planning the product's visibility on online platforms on which positive fake reviews are being posted. This gently nudges consumers' decisions towards those products that are shown by default by the platforms. This corresponds with the previous study by Narayanan et al. (2020), which demonstrates that consumers readily accept pre-selected or pre-advised options with minimal scrutiny.

### **Anchoring nudge**

Anchoring nudge occurs when people make choices based on the first piece of information they encounter, which is typically a review or rating, while purchasing products or services online. Companies could use this to their advantage by making up and exaggerating the early positive reviews, which can create a strong anchor that influences consumers' purchasing decisions (Mathur et al., 2019).

## ***ORGANISM (O): INTERNAL EMOTIONAL AND COGNITIVE REACTIONS***

The organism under the SOR framework indicates a customer's internal emotional and cognitive reactions to external stimuli (Cao et al., 2024). The organism influences the consumer's perception and processing of stimuli, which impacts their purchasing decisions. These influences change how people assess the product and lead them to believe fake reviews when making a purchase decision. Various psychological reactions are triggered, and consumers' critical thinking and logical reasoning abilities are hindered by fake reviews. Consequently, consumers make less informed decisions in such situations. Cognitive overload, Fear of Missing Out (FOMO), confirmation bias, trust, and perceived credibility are the responses of consumers when they come across various nudging techniques.

### **Cognitive overload**

When consumers encounter fake reviews as a dark pattern, it becomes significantly more challenging for them to discern the validity of all the available information (Joukema, 2023). Cognitive load refers to the amount of mental effort required to process information, which can lead to decision fatigue (Mathur & Mayer, 2021). Fake reviews further complicate decision-making, as they provide false information and make it harder for consumers to distinguish genuine reviews from fake ones. Overwhelmed by information, consumers often resort to heuristics (such as inflated star ratings or reviews), which can lead to biased decisions (Mariani & Borghi, 2020). Also, the substantial volume of reviews can lead to choice paralysis, which in turn makes decision-making more challenging. In such cases, customers may opt for products with the most visible positive reviews, thereby succumbing to the manipulative effects of fake reviews.

### **FOMO**

Fake reviews manipulate people by playing on their emotions. According to Caraban et al. (2019) and Özdemir (2020), two common emotional triggers are a false sense of urgency and fear of missing out (FOMO). Fake reviews lead consumers to incorrectly assume a product is more popular or in demand than it actually is, leading them to feel compelled to act quickly to avoid missing out (Sin et al.,

2025). People frequently make impulsive and hasty purchases due to urgency rather than properly analyzing all of their options (Krämer, 2014). People who rely on fake reviews may also be tempted to move quickly out of fear of losing out on an opportunity (Kumar et al., 2023).

### **Confirmation bias**

According to Thornhill et al. (2019), confirmation bias refers to the tendency for individuals to accept information that supports their pre-existing opinions without critically evaluating its accuracy. Marketers use fake reviews to exploit confirmation bias, which is the tendency for people to seek information that supports their preconceived notions (Caraban et al., 2019; Rieger et al., 2021). Customers are more likely to stick with the default settings due to this bias, which increases the likelihood that they will trust fake reviews and make a purchase (Henkel et al., 2019).

### **Trust and perceived credibility**

The trust that consumers place in online reviews is another critical organism-level factor affected by fake reviews. Through social proof (Walther et al., 2023) and default display (Singh et al., 2024) review nudges, fake reviews create a false sense of credibility and trustworthiness. Consumers rely on reviews to make informed choices, and fake positive reviews foster overconfidence in the product's quality. Because of social proof and the default review display, the bandwagon effect occurs (Wang et al., 2023). When consumers observe that many others have seemingly had a positive experience with a product, they are more likely to join in, trusting that the collective opinion is correct (Begho & Liu, 2024; Chang et al., 2024), even though it may be artificially inflated by fake reviews.

## ***RESPONSE (R): CONSUMER BEHAVIOUR AND DECISION-MAKING***

The response refers to the behavioural or decision-making outcomes that occur after the consumer processes the stimulus through their internal cognitive and emotional reactions, the organism (O). When consumers encounter nudging techniques embedded in fake reviews, they are subtly guided toward specific purchasing decisions. In the context of this study, consumers may respond with increased purchase intentions or by reduced post-purchase satisfaction.

### **Increased purchase intentions**

Nudging techniques employed in fake reviews often lead to increased purchase intentions (Song et al., 2023; Wu et al., 2020). Even if consumers haven't done a critical evaluation of the product, they are more likely to develop a greater sense of assurance regarding it when they encounter a large number of evidently positive reviews. The perception that others have had a positive experience (as a result of social proof) encourages them to follow the masses and make a purchase, thereby contributing to the bandwagon effect. Consumers may purchase products that they would otherwise be hesitant to buy due to the perceived credibility and popularity generated by fake reviews (Begho & Liu, 2024).

### **Reduced post-purchase satisfaction**

Despite the increased likelihood of purchasing a product influenced by fake reviews, consumers may experience reduced post-purchase satisfaction when the product fails to live up to the artificially inflated expectations (Román et al., 2019). The cognitive dissonance between the expectations created by the fake reviews and the actual product experience can lead to buyer's remorse, dissatisfaction, or even product returns (Chatterjee et al., 2023).

The influencing mechanisms of nudging techniques, conceptualized as fake reviews as dark patterns under the SOR framework, are depicted in Table 1 to address RQ1–RQ3.

**Table 1. The influencing mechanisms of nudging techniques, conceptualized fake reviews as dark patterns under the SOR framework**

Stimulus (S): Nudging Techniques used in the context of Fake Reviews that make them Dark Patterns- RQ1		Explanation
	Social Proof Nudge	A high number of positive fake reviews or five-star fake ratings can create the impression of product reliability, nudging consumers into believing they are making a safe purchase. For example, <i>10,000+ 5-star reviews</i>
	Default Nudge	Consumers are nudged toward a product that appears as the best or recommended choice, relying on the false default recommendation without considering alternatives. For example, <i>top rated products or most popular products appear first by default.</i>
	Anchoring Nudge	The first set of reviews, particularly those that are artificially positive, anchors consumers' expectations, leading them to perceive the product more favourably than they might have otherwise. For example, <i>initial 5-star reviews influence later perception.</i>
Organism (O): Internal Emotional and Cognitive Reactions – RQ2		Explanation
	Cognitive Overload	When a consumer is bombarded with numerous (fake) positive reviews, it overwhelms their ability to critically assess the product.
	FOMO	Positive fake reviews can create urgency, making consumers feel they need to buy the product immediately before it is gone.
	Confirmation Bias	Customers trust the goods because fake reviews match their expectations, making them less inclined to doubt their validity.
	Trust and Perceived Credibility	Consumers may initially trust the product based on the volume and consistency of positive feedback, which triggers an emotional inclination to purchase.
Response (R): Consumer Behaviour and Decision-Making – RQ3		Explanation
	Increased Purchase Intentions	Fake reviews that leverage nudging techniques often lead to heightened purchase intentions.
	Reduced Post-Purchase Satisfaction	Fake reviews boost the likelihood of buying a product, but when it fails to meet expectations, consumers may be less satisfied.

## DISCUSSION AND FINDINGS

A systematic review of 27 peer-reviewed articles indicates that fake reviews on e-commerce are a manipulative form of choice architecture, turning the ethical foundation of nudge into commercially exploitative dark patterns. This paper contributes by answering three research questions: (a) RQ1, which explored the type of nudging techniques used in fake reviews as stimulus; (b) RQ2, which explored the emotional and cognitive reactions in consumers to these techniques; and (c) RQ3, which investigated the behavioural responses of consumers.

Three nudging techniques were identified within the SOR framework, namely social proof, anchoring, and defaults, that shape consumer perception of products and services on online platforms. The interface designs, recommendation systems, and default sorting of online platforms determine the

visibility of reviews or products, making them an important intermediary. Similar to the case of fake reviews, social proof nudges emerge when online platforms' algorithms highlight products based on the number of reviews and ratings, which may not always be genuine. Similarly, default nudge operates when platforms' algorithms prioritise top-rated or most popular products based on fake reviews, encouraging users to accept the default recommendation of the platform without further investigation. Moreover, the display of recent fake positive reviews, i.e., anchoring nudge to consumers, sets the tone for consumers for how they will rate product quality or value, making manipulation even worse.

The organism stage showed various emotional and cognitive responses triggered by the various nudging techniques. The findings indicate four reactions, namely: cognitive overload, FOMO, confirmation bias, and trust and perceived credibility. Consumers often experience cognitive overload as they come across a large number of fake reviews while purchasing products or services online. This finding aligns with a prior study by Mariani and Borghi (2020), which stated that cognitive overload enables consumers to trust cognitive heuristics, such as product star ratings, product placement, or review volume, to facilitate faster purchase decisions. Dark patterns signal like misleading cues of urgency created by fake reviews, creating anxiety in the consumer of losing out on the best opportunity or limited offers, leading them to FOMO. This tendency is intensified by confirmation bias, a phenomenon where individuals disregard information that challenges their existing beliefs or expectations, opting instead to pursue assessments that validate them. Last, perceived credibility, shaped by the fake positive reviews, builds trust among consumers towards that product.

In all, these emotional and cognitive responses demonstrate how subtly changing the choice architecture in terms of fake reviews can lead consumers to make hasty and erroneous decisions. The behavioural consequences have been shown in the last stage of the SOR framework. These are purchase intention and reduced post-purchase satisfaction. When consumers see too many positive fake reviews for a product, which is also placed by the platforms as a default or anchoring nudge, it certainly builds trust in the minds of consumers for that product. Consequently, their purchase intention for the product rises sharply, and without analysing the validity of the reviews, they end up purchasing the product. However, the discrepancy between the reviews and the actual quality of the product leads to post-purchase dissonance and diminishing satisfaction. Our study demonstrates that using manipulative nudging may boost sales in the near term, but it will undermine confidence in the seller and the platform ecosystem in the long run.

Using nudge theory with bad intentions is another important finding from this study. Nudges improve user welfare, while dark patterns deceive or exploit consumers for profit. Fake reviews demonstrate this abuse. This is in line with the study by Bovens (2009), which stated that nudges, as opposed to social advertising, influence decisions through the subtle use of cognitive biases instead of direct information or persuasion. Nudge theory's benefits and drawbacks depend on its purpose and execution. It can encourage healthy eating (Begho & Liu, 2024) or environmental responsibility (Gajdzik et al., 2024) when used ethically. Nudging becomes a problem when behavioural insights are used to create fake reviews, misleading consumers, raising expectations, and weakening confidence. Such circumstances violate the nudge theory's autonomy and rationality. Thus, transparency, intent, and consequence determine a "good" or "bad" nudge, demonstrating that fake reviews are a manipulative use of behavioural science rather than a welfare-oriented intervention.

The strength of this study lies in its institutional grounding, which underpins established theories, such as nudge theory, within the SOR framework. This study is one of the early attempts to examine fake reviews as a form of dark pattern. The study demonstrates how online platforms utilise nudges in their review systems as a psychological tactic to transform a welfare-driven intention into a profit-oriented mechanism. For a fairer online review system, these insights call for a robust regulatory mechanism, and platforms need to be held accountable. The default sorting algorithms of e-commerce platforms should be reviewed, and there should be more transparency regarding the veracity

of reviews. Finally, this study highlights how false reviews are part of a larger pattern of deliberate behavioural manipulations that take advantage of human psychology through social influence.

## **FUTURE RESEARCH QUESTIONS AND PROPOSITIONS**

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We now target and identify 10 future research questions (FQ1-FQ10) and 9 corresponding propositions (P1-P9) under the SOR framework to enhance the direction of future study. These research questions are explained in detail below and are summarized in Table 2.

### ***STIMULUS***

Social proof, default, and anchoring nudges affect buyer behaviour when fake reviews and default settings on e-commerce platforms interact (Özdemir, 2020). Because a large number of positive fake reviews often appear at the top due to anchoring nudge, they become the primary reference for product evaluation, creating a halo effect that biases future judgments. The prominent positioning of fake reviews steers purchasers towards distorted product assessments and reduces critical thinking. Online platforms often label products as top-rated or popular to popularize the products, which are inflated by fake reviews. By strategically organizing feedback, fake reviews exploit default nudge, nudging consumers toward pre-selected choices with minimal scrutiny (Narayanan et al., 2020). This encourages quick, impulsive purchases by reducing the possibility of considering other options (Walther et al., 2023). Thus, we present Proposition 1 (P1) for guiding FQ1 and FQ3.

- P1.** Because default settings emphasise top reviews, fake reviews displayed at the top of review lists will have a greater nudging effect on consumer decision-making than those at the bottom of the page. By using the anchoring effect, this positioning of reviews exposes consumers to more fake reviews, which ultimately leads to quicker purchase decisions.

Consumers' past experiences with fake reviews affect how well these nudges work on their future buying decisions. When consumers have previously encountered fake reviews, particularly if they resulted in adverse outcomes, such as receiving a substandard product or feeling deceived, they are likely to cultivate skepticism and an increased awareness of the possibility of fraudulent reviews (Salminen et al., 2022). This prior knowledge affects how well they can judge reviews in future shopping situations (Costa Filho et al., 2023; Munzel, 2016). These buyers are less likely to be fooled by fake reviews because they are now more aware of their cognitive biases, like anchoring and the tendency to trust early, highly rated reviews. They might also be more wary of language that is too excited, phrases that are too similar, or reviews that don't give enough detail, all of which are possible signs of fake reviews. But people who haven't had bad experiences with fake reviews are still more likely to be swayed by these nudges. In this scenario, fake reviews may persist in shaping their choices, solidifying their perceptions, and steering them towards biased, impulsive purchasing decisions. We present Proposition 2 (P2) to help FQ2.

- P2.** Prior negative experiences with fake reviews will reduce the effectiveness of different types of nudging techniques in influencing consumer behaviour.

### ***ORGANISM***

Confirmation bias occurs when people seek online for material that confirms their pre-existing opinions or values and ignore other options (Rieger et al., 2021). Confirmation bias makes fake reviews appear authentic by reinforcing consumers' product perceptions. Consumers are more inclined to believe fake reviews that reinforce these beliefs, particularly when they are backed by social proof (such as helpful reviews) (Carbonell et al., 2019). Because of this prejudice, consumers are less likely to critically evaluate reviews, which allows fraudulent reviews to sway their decisions (Soll et al., 2013). We offer Proposition 3 (P3) to guide FQ4.

- P3.** When examining fake reviews, consumers tend to exhibit confirmation bias, concentrating on facts that support their preconceived notions about the product.

Age, gender, and level of education are among the demographic segments that react differently to the nudges included in fake reviews. While older consumers may have more faith in online information, making them more susceptible to persuasive nudges, younger consumers, who are more accustomed to digital settings, are routinely more skeptical and have a better ability to identify fraudulent reviews (Morris & Venkatesh, 2000; Thaichon, 2017). While men tend to place greater emphasis on factual information, women are usually more influenced by emotional and social aspects of reviews, such as personal narratives that evoke empathy and connection (González et al., 2021). Furthermore, consumers with higher levels of education are more likely to critically evaluate reviews and spot manipulation (Thomas & Kureshi, 2020), whereas consumers with lower levels of education may rely more on cognitive heuristics or default settings, making them more vulnerable to misleading reviews. These demographic characteristics have a big impact on how customers perceive and respond to fraudulent reviews, which in turn affects their decision to buy. As a result, we offer Proposition 4 (P4) to direct FQ5.

- P4.** Younger consumers are less prone to the nudging effects than older consumers, and the impact of fake reviews as nudges will vary depending on demographic aspects.

According to Fazio et al. (2015), repeated exposure can lead to an increase in beliefs about different kinds of misinformation. Consumers who frequently encounter fake reviews may get conditioned and are unable to recognize subtle manipulations. But with time, consumers' awareness and skepticism may also rise as a result of this recurrent exposure (Salminen et al., 2022). They increasingly become cautious as they learn more about the manipulative patterns of fake reviews. People who have previously been deceived might become more skeptical, looking for reviews that are fair, detailed, and validated, and they might also stop depending on emotional or overly complimentary comments. Consequently, we offer Proposition 5 (P5).

- P5.** Repeated exposure to fake reviews will diminish consumers' ability to distinguish between genuine and fake reviews in future purchasing decisions, leading to a biased blind.

Fake reviews that emphasize product popularity and consumer satisfaction can strongly evoke a sense of FOMO in consumers, compelling them to make a purchase. These reviews often highlight the number of customers who have acquired and appreciated the product, fostering an impression of great desire and significant value among other consumers. Social proof capitalises on customers' tendency to follow trends and avoid missing out on others' experiences (Begho & Liu, 2024). Fake reviews that claim a product is popular and well-received may make consumers want to act quickly before they miss out. FOMO can make consumers prioritise instant enjoyment over critical judgement (Bläse et al., 2024). Such evaluations work by exploiting buyers' fear of losing out on a popular and highly valued event, which encourages impulsive purchases. Therefore, we present Proposition 6 (P6) for guiding FQ7.

- P6.** Customers experience FOMO when they read fake reviews that highlight a product's widespread popularity and customer satisfaction because they believe they might be losing out on something worthwhile.

Consumers' psychological responses to online reviews are greatly influenced by trust, especially when comparing between first-time and repeat customers (Baek et al., 2012). Trust in the reviews is a crucial factor in the decision-making process for first-time buyers who have no prior experience with the platform, brand, or product. Consumers are more vulnerable to manipulation because of their trust in the platform, brand, or product, which may lead them to accept fake reviews that seem genuine without any doubt. Repeat consumers, on the other hand, have expectations based on previous experiences. Consumers who have previously had positive experiences may be more likely to believe reviews and ignore possible red flags, making them vulnerable to fake reviews (Ahmad & Sun, 2018).

Returning consumers show less trust if they have already come across fake or deceptive reviews. As a result, before making a purchase, they approach reviews more skeptically, assessing the information critically and searching for indications of validity (Salminen et al., 2022). Thus, trust significantly impacts how consumers process fake reviews, with first-time customers being more trusting and repeat customers more likely to scrutinize based on previous experiences. Therefore, we present Proposition 7 (P7) for guiding FQ8.

- P7.** Trust in a product is positively correlated with the authenticity consumers attribute to fake reviews, especially among first-time buyers.

The prospect theory states that negative information is often considered more useful or diagnostic in decision-making and is therefore given greater weight than positive information (Kahneman & Tversky, 1979). When the decision-making process emphasizes message content, such as the quality of information, negative framing tends to be more persuasive than positive framing (Lee et al., 2008). Therefore, the emotional impact of a loss is stronger than the satisfaction of gaining an equivalent amount. As a result, negative fake reviews can have a stronger effect on consumers' brand evaluations and purchase intentions compared to positive messages (Dwivedi et al., 2021). In the context of fake reviews, negative information nudges consumers away from purchasing certain products by exploiting key psychological triggers such as loss aversion and social proof. Loss aversion, the tendency for people to strongly prefer avoiding losses over acquiring gains (Hwang, 2017), is triggered when consumers read negative reviews, as they instinctively wish to avoid making bad purchases. Negative fake reviews amplify any product faults, engendering fear of disappointment or regret that may outweigh any perceived benefits of the product. These reviews typically provide social proof that others have had terrible experiences, validating the argument that avoiding the product is the best course of action. Consumers tend to avoid products with low ratings due to psychological triggers, including a fear of loss, sensitivity to negative feedback, and a desire for social validation, regardless of the legitimacy of the reviews. We submit Proposition 8 (P8) to guide FQ9.

- P8.** Negative fake reviews utilize loss aversion, manipulating consumers' fear of making a suboptimal choice, which reduces the likelihood of purchasing the targeted product.

## ***RESPONSE***

Dissatisfaction after purchase makes consumers more selective and critical of evaluations (Ahmad & Sun, 2018; Salminen et al., 2022). After reading highly positive fake reviews, people look for unclear wording or overly enthusiastic comments to verify reviews. This requires more negative ratings and manual categorisation (Agnihotri & Bhattacharya, 2016). Consumers with post-purchase regret often leave detailed comments to help others avoid similar mistakes (Zaman et al., 2023). Repeated unfavourable experiences may weaken trust in the platform's review mechanism, pushing users to seek expert recommendations or independent reviews. This defensive behaviour reduces their susceptibility to fake reviews and helps consumers make more informed and wise purchasing decisions. Therefore, we present Proposition 9 (P9) for guiding FQ10.

- P9.** Consumers who experience post-purchase regret due to fake reviews will engage in negative word-of-mouth behaviour, such as writing critical reviews or sharing dissatisfaction on social media.

**Table 2. Future research direction**

SOR framework	Future research questions (FRQs) based on propositions for guiding future research
<b>Stimulus (S):</b> Nudging Techniques used in the context of Fake Reviews that make them Dark Patterns- RQ1	<ul style="list-style-type: none"> <li>FRQ1. What role does the order of reviews (with fake reviews appearing first) play in nudging consumer purchasing behaviour? (P1)</li> </ul>
	<ul style="list-style-type: none"> <li>FRQ2. How do consumers' previous experiences with fake reviews moderate the effectiveness of these nudges in future purchasing decisions? (P2)</li> </ul>
	<ul style="list-style-type: none"> <li>FRQ3. How default sorting on e-commerce platforms magnify fake reviews through popularity-driven consumer choices? (P1)</li> </ul>
<b>Organism (O): Internal Emotional and Cognitive Reactions – RQ2</b>	<ul style="list-style-type: none"> <li>FRQ4. What role does confirmation bias play in how consumers interpret and accept fake reviews as genuine? (P3)</li> </ul>
	<ul style="list-style-type: none"> <li>FRQ5. How do different demographic groups (age, gender, and education level) respond to nudges embedded in fake reviews? (P4)</li> </ul>
	<ul style="list-style-type: none"> <li>FRQ6. How does repeated exposure to fake reviews influence consumers' ability to distinguish between real and manipulated reviews in future online interactions? (P5)</li> </ul>
	<ul style="list-style-type: none"> <li>FRQ7. How do fake reviews that highlight product popularity and consumer satisfaction create a sense of FOMO in consumers, leading them to feel compelled to make a purchase? (P6)</li> </ul>
	<ul style="list-style-type: none"> <li>FRQ8. What is the role of trust in shaping the internal reactions (organism) to fake reviews, especially in first-time vs. repeat customers? (P7)</li> </ul>
	<ul style="list-style-type: none"> <li>FRQ9. How do negative fake reviews nudge consumers away from purchasing certain products, and what psychological triggers do they exploit? (P8)</li> </ul>
<b>Response (R):</b> Consumer Behaviour and Decision-Making – RQ3	<ul style="list-style-type: none"> <li>FRQ10. How does post-purchase regret or dissatisfaction influence consumer engagement with reviews on e-commerce platforms in the future? (P9)</li> </ul>

## THEORETICAL AND PRACTICAL IMPLICATIONS

### *THEORETICAL CONTRIBUTION*

This study innovatively applies nudge theory to e-commerce manipulation, using fake reviews to influence consumer behaviour without limiting their choices. This unique approach increases knowledge of how minor digital changes may affect online marketplace decision-making. Based on previous research (Luca & Zervas, 2015), this study examines how fake reviews affect consumer trust and decision-making and how cognitive and emotional nudges affect user behaviour.

Research on consumer behaviour gains a new dimension when the SOR framework is applied to fake reviews as dark patterns using nudge theory. This combination makes it possible to explore how fake

reviews (stimuli) generate emotional and cognitive reactions (organisms) and behavioural outcomes in a more methodical and multifaceted way.

Third, the study offers 10 future research questions and 9 propositions to guide future research studies for examining the impact of fake reviews as nudges on consumer decision-making.

### ***PRACTICAL IMPLICATIONS***

First, platform designers must think about the ethical implications of using anchoring and social proof nudges in the review system. Platforms can create more transparent and balanced review processes that encourage informed decision-making by exposing these approaches' deception.

Second, by comprehending the cognitive effects of nudges such as fake reviews, regulators may be able to establish more explicit guidelines to curb deceptive practices and shield customers from deception.

Third, by proposing 10 future research questions and 9 propositions, the study provides avenues to researchers for future empirical studies.

### **LIMITATIONS**

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The study also has several shortcomings. This study relies on a systematic review of the current literature; hence, its findings are constrained by the limitations of the existing research. Contextual elements such as platform type, product category, and cultural disparities may not be entirely represented, and theoretical findings may not accurately represent actual consumer behaviour.

### **CONCLUSION**

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This study clarifies how fake reviews on e-commerce platforms function as dark patterns that take advantage of cognitive biases based on nudge theory to influence consumer choices. The study uses the SOR framework to conceptualize fake reviews as deceptive stimuli that cause emotional and cognitive reactions, which in turn influence consumer behaviour. Nudging strategies, such as social proof, anchoring, and default nudges, are employed in the context of fake reviews, turning nudges intended for welfare improvement into deceptive methods that further business goals. This viewpoint highlights the need for more transparency and stronger detection techniques to mitigate the impact of fake reviews. This study offers researchers new avenues for empirical research into the psychological mechanics by offering 10 future research questions and 9 propositions.

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## AUTHORS

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