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This study examines choice architecture techniques, or design techniques used to guide people toward or away from specific options, in digital choice environments. The term "nudge" has been used to describe the intentional design of choice environments; for example, product placement in stores nudges people toward more expensive items. Nudge-like choice architecture techniques are used by designers to guide decisions in digital environments. Such techniques can be designed to support and to manipulate users' decision-making.

The researcher created two sets of guidelines based on prior work with the goal of describing and delineating between (1) supportive or ethical and (2) manipulative or unethical intent in choice architecture. She used those guidelines to evaluate a sample of mobile shopping websites using a combination of document analysis and heuristic evaluation. This analysis seeks to provide insight into ethical questions inherent in design that balances organizational and end user needs.

Headings:

User interfaces

Web design

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THE EXPERIENCE OF CHOICE: ANALYZING CHOICE ARCHITECTURE ON MOBILE
SHOPPING WEBSITES

by
Sarah S Casteel

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Rob Capra

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1 Introduction

Choice architecture has been defined as the influence of behavior through the structure and presentation of decision situations. The idea of using design to persuade people to pick one outcome over another gained popular attention with the 2008 publication of *Nudge: Improving decisions about health, wealth, and happiness* (Thaler & Sunstein, 2009), which advocates for designing environments that encourage people to make the “best” decision while maintaining their own agency. In recent years, increasing attention has been given to the line between nudges and coercion, and to the application of nudges to digital choice environments.

Choice architecture can be used to nudge people toward ostensibly beneficial goals like saving for retirement; it can also be used to manipulate people through so-called “dark patterns” (e.g., Brignull, n.d.). Researchers have identified and classified choice architecture techniques, and have begun to investigate how manipulative techniques work in practice. Existing research has not focused exclusively on choice architecture on mobile platforms where purchasing decisions are made. Such an examination is warranted since nudges influence decision-making in ways that often go unnoticed by decision-makers, and since it is estimated that most internet users worldwide will access the internet solely through smartphones by 2025 (Handley, 2019). Designers can impact choice environments without meaning to, and it can be difficult to determine whether a design pattern was intended to be manipulative. All design with a goal, such as helping users reach the next step in a process, and therefore all design, is persuasive; accordingly, designers are responsible for addressing the ethical challenges inherent in design. The present research intends to build on prior work by describing choice architecture with (1) supportive or ethical and (2) manipulative or unethical intent, and delineating between them based on the existing literature. This research then codes

a sample of mobile fashion shopping interfaces for broad themes related to choice architecture, as well as characteristics of supportive and dark patterns, using a combination of document analysis and heuristic evaluation.

2 Literature Review

2.1 Decision-Making and Influence

Classical economic theory assumes that people make rational decisions based on a substantial amount of knowledge about the environment (Simon, 1955). According to this view, people have established preferences and the ability to systematically evaluate which of the available alternatives will help achieve preferred options (Johnson & Goldstein, 2003; Simon, 1955). Behavioral research has revealed ways that decision-making processes deviate from classical economic theories of rational behavior. In practice, decision-making is limited by physical capabilities and impacted by the environment (Beshears & Kosowsky, 2020; Schneider et al., 2018; Simon, 1955). As Tversky and Kahneman (1974) point out, when conditions are uncertain, lab and field observations have indicated that people tend to rely on heuristic principles, which simplify decision-making but can lead to errors and biases. For example, the representativeness heuristic demonstrates that people tend to make assumptions based on perceived similarities; for example, people often judge someone as belonging to a certain profession when that person's characteristics align with stereotypes about members of that profession (Tversky & Kahneman, 1974).

Decision-making processes are imperfect, and the field of behavioral economics has furthered theories about decision-making by documenting ways that decision-making is predictably imperfect (Beshears & Kosowsky, 2020). Dual process theories of decision-making identify two different "systems" involved in thinking: System 1 thinking is quick and automatic, while System 2 thinking is slower and more deliberate (Caraban et

al., 2019; Caraban et al., 2020; Lembcke et al., 2019). Most decisions are made quickly and automatically, and choices made based on heuristics, while often automatic, may not be rational (Beshears & Kosowsky, 2020; Caraban et al., 2019; Caraban et al., 2020).

Researchers have examined ways that decisions can be structured or framed to influence choice (Münscher et al., 2016; Thaler & Sunstein, 2009). In their description of formulation effects, Kahneman and Tversky (1984) discuss ways that framing or describing the outcome of situations can impact decision-making processes. For example, according to Kahneman and Tversky, describing surgery in terms of survivability rather than mortality makes the surgical option more appealing. Kahneman and Tversky argue that these formulation effects may be unintentional, or they can be intentionally crafted to favor one outcome over another. The influence of such frames on perceptions is apparent in the marketing practice of advertising a discount for using cash instead of a surcharge for using a credit card; people tend to be more sensitive to losses than to gains, so bringing attention to a surcharge would likely raise objections, and people tend to “evaluate options in relation to the reference point that is suggested or implied by the statement of the problem” (Kahneman & Tversky, 1984, p. 346). The frame positions the surcharge as normal and the discount as optional. Kahneman and Tversky note that tactics to influence purchasing decisions through framing are common.

The presence of a default option also impacts decision-making. Johnson and Goldstein (2003) investigated the impact of default options on decisions about organ donation. They discuss the standard public policy practice of having a “no-action” default, meaning that a default decision has been made without active input; at the time of publication, the no-action default in the United States was to opt individuals out of organ donation (Johnson & Goldstein, 2003). Johnson and Goldstein found that when participants had to either actively opt out of organ donation or make a choice between

donating or not donating, consent to be an organ donor was about twice as high as it was in the “opt-in” condition that required participants to take action to become an organ donor. Johnson and Goldstein (2003) state that the construction of default options should be carefully considered from an ethical standpoint in view of possible errors on the part of the decision-maker, as well as the potential “good done” (p. 1339) by the influence of the default.

Thaler & Benartzi (2004) investigated the power of default options in the context of retirement savings in their design of the SaveMoreTomorrow (SMarT) program, which let employees choose whether to opt into a program that would increase their retirement savings rate in the future, when they received raises. In one iteration of the program, by the time employees who opted in received their fourth raise, their savings rate had quadrupled (Thaler & Benartzi, 2004). Thaler & Benartzi point out that this kind of result is likely attributable to procrastination and inertia, behaviors which help explain why it is difficult to start saving for retirement; once participants opted into the program, they tended to remain. Similar to the situation described by Johnson and Goldstein (2003) with respect to the no-action default for organ donation, organizations must decide whether to opt their employees into or out of retirement savings programs (Thaler & Bernartzi, 2004). Because procrastination and other human behaviors that impact decision-making can be predicted, knowledge about such behaviors can be used to structure situations that encourage the selection of one choice over another.

2.2 Choice Architecture, Nudges, and Libertarian Paternalism

Thaler & Bernartzi (2004) acknowledge that the SMarT program, and similar programs which automatically opt employees into retirement plans by default, have been criticized as paternalistic; they propose that since such programs are aimed at increasing people’s retirement savings, they are examples of libertarian paternalism.

Thaler and Sunstein (2009) expand on libertarian paternalism philosophy in their book *Nudge: Improving decisions about health, wealth, and happiness*. Thaler and Sunstein (2009) define choice architecture as the organization of the “context in which people make decisions” (p. 2). Choice architecture encompasses the idea that the presentation of choices impacts which choice is made (Johnson et al., 2012). According to Thaler and Sunstein (2009), choice architects – people who structure decision contexts – engage in libertarian paternalism when they “nudge” people toward a choice with “beneficial effects” (p. 4). Libertarian paternalism purports to preserve individuals’ freedom to choose while guiding them toward choices that the individuals being nudged would evaluate as life-improving (Thaler & Bernartzi, 2004; Thaler & Sunstein, 2009).

Neutral design and choice architecture do not exist (Johnson et al., 2012; Thaler & Sunstein, 2009; Weinmann et al., 2016). Thaler and Sunstein (2009) acknowledge this and define a nudge as an aspect of the choice environment that “alters people’s behavior in a predictable way” without adding significant barriers while remaining “easy to avoid” (p. 6). Some researchers have begun to distinguish between nudges and “signposts” or “boosts” in choice architecture, which aim to build on people’s existing knowledge through attempts to educate or clarify choices (Camilleri et al., 2018; Hertwig & Grüne-Yanoff, 2017). Nudges are part of our daily lives in seemingly innocuous ways, such as the positioning of expensive items at eye level in stores (Schneider et al., 2018). Since behavioral research has begun to focus on the concept of the nudge, institutions have begun to implement nudges in strategic ways; some countries have implemented policies that automatically opt their citizens into organ donation, and most U.S. defined contribution 401(k) plans use aspects of the SMarT program (Krijnen, 2018).

The intentional use of choice architecture to influence decisions relies on assumptions drawn from behavioral economics, including the idea that since biases impact our decision-making, decisions do not necessarily reflect preferences, which

would justify an intervention on one's behalf by someone else (Beshears and Kosowski, 2020). Additionally, beyond simply understanding the psychological factors involved in decision-making, nudges seek to apply this knowledge with the goal of "improving economic outcomes" (Beshears and Kosowski, 2020, p. 4). As nudges become more commonplace, closer analysis of their role in specific contexts is warranted.

2.3 Digital Choice Environments

Choices – and nudges – are present in our everyday lives, including digital environments. Caraban et al. (2019) report that nudges have been investigated and implemented in different fields, including human-computer interaction (HCI). Choices increasingly involve information technology; people have been found to use tools including search engines and product recommendations to help identify and eliminate options, and to use computers and mobile devices to make purchasing and other decisions about daily life (Johnson et al., 2012). Any user interface can be considered a choice environment (Schneider et al., 2018; Weinmann et al. 2016). Lembcke et al. (2019) report that System 1 (automatic) thinking is especially engaged in digital choice environments since these environments are rich in visual information, and users' attention is limited. As Weinmann et al. (2016) state, digital nudging is "the use of user-interface design elements to guide people's behavior in digital choice environments" (p. 433). Digital nudges to promote certain choices can include SMS alerts and notifications, warnings, defaults, or methods like gamification (Esposito et al., 2017; Purohit & Holzer, 2019).

The heuristics and biases that impact decision-making processes in contexts like organ donation also operate in digital environments (Kitkowska et al., 2020; Schneider et al., 2018). Johnson et al. (2012) state that choices can be structured in terms of what is presented, and how the options are presented. User interface designers can leverage

techniques to encourage users to make choices that align with organizational goals; for example, designers aware of the scarcity effect, in which people perceive in-demand items as desirable, can display information about limited availability to encourage people to select a particular option (Schneider et al., 2018). Schneider et al. propose that a process for digital nudge design should include understanding and keeping organizational goals in mind, understanding heuristics and biases that could impact users' decisions, selecting an appropriate nudge for the choice environment, and evaluating the nudge with a method like A/B testing. Schneider et al. (2018) add that if nudges do not produce the desired effect, evaluating through experiments may be more reliable than obtaining feedback from users, since nudges rely on "subconscious influences on behavior" (p. 72).

2.4 Choice Architecture with User-Supportive Potential

Those who favor intentional use of choice architecture techniques point out the potential to promote welfare, either of the individual, or of society; for example, digital devices that remind us to exercise promote healthy behavior (Johnson et al., 2012; Weinmann et al., 2016). Purohit & Holzer (2019) define a functional digital nudge as one that can effectively change behavior, noting that the timing of a digital nudge is important to ensuring its effectiveness. They extend on Schneider et al.'s (2018) proposed digital nudge design process by adding steps involving identifying or inferring the optimal nudge moment and deploying the nudge at the optimal moment (Purohit & Holzer, 2019). They propose that smartphones can be used to infer when nudges should be delivered to maximize their effectiveness; for example, time of day and location could be used to nudge a person to make more health-conscious dietary choices while deciding what to eat for lunch (Purohit & Holzer, 2019).

With respect to societal benefits, Gregor and Lee-Archer (2016) state that in the context of social security administration, digital nudges are “facilitated by information technology to achieve a social policy outcome” (p. 66). Similar to Schneider et al. (2018), Gregor and Lee-Archer (2016) propose a digital nudge framework that includes understanding the context and related decision-making processes, identifying appropriate nudges and the right place to implement them, and experimenting with and evaluating different nudge options. As an example of a potential application, Gregor and Lee-Archer (2016) discuss a case where experimentation and predictive analytics could be used to evaluate a nudge that raised awareness about pension incomes and shortfalls. Schneider et al. (2018) point out that with respect to digital nudges, “characteristics of users and their environment can be inferred from a large amount of data, allowing nudges to be tailored” (p. 73), adding that choice environments could be designed based on users’ past actions or their inferred cognitive styles. Gregor and Lee-Archer (2016) also discuss the application of predictive analytics, which allows for nudges to be individualized and targeted to users with certain types of profiles.

Caraban et al. (2019) reviewed studies published from 2008-2017 in top HCI journals to identify novel forms of digital nudging. They documented four primary areas of focus for digital nudges: health promotion, encouraging sustainable behaviors, increasing human performance, and strengthening privacy or security (Caraban et al., 2019, p. 4). Following content analysis, Caraban et al. grouped nudging strategies into six categories (facilitate, confront, deceive, social influence, fear, and reinforce) and detailed 23 mechanisms of nudging. For example, according to Caraban et al., “facilitate” nudges include default options. By using knowledge of the status quo bias, also referred to as inertia, these digital nudges use logic similar to that of organ donation policies that opt people into donation by default; they minimize mental effort by defaulting to the designer or organization’s preferred choice (Caraban et al., 2019). As

an example, behavior in digital environments can be impacted by a facilitative nudge that defaults to a double-sided print option in order to reduce paper consumption (Caraban et al., 2019).

Nudges showing the time that it would take for someone to crack an online password can be used to encourage people to create strong passwords (Peer et al., 2020). Peer et al. (2020) identified different forms of effective nudges, as well as differences in decision-making styles that could impact whether the nudges were effective, to create profiles that were then used to predict which nudge would be most effective for an individual. They found that when nudges were personalized based on their predictions, individuals created passwords that were four times as strong as when a non-personalized nudge was used (Peer et al., 2020). While acknowledging concerns about data collection, Peer et al. (2020) propose that when information about people is already being collected, personalized nudges that encourage strong passwords can help people protect their data.

Signpost choice architecture techniques are sometimes contrasted with nudges, because signposts purportedly assume that people are generally competent with certain limitations, are transparent, focus on competency as opposed to behavior, and are more likely than nudges to result in long-term behavior change (Hertwig & Grüne-Yanoff, 2017). In an online simulation, Hertwig & Grüne-Yanoff (2017) investigated displaying “smart” retirement default options that varied depending on when the participant was expected to retire, compared to a standard, non-personalized default, and not offering a default. Participants often selected the default retirement option, reiterating the influence of defaults on decision-making, and participants selected the smart default more often than the standard non-personalized default. Hertwig & Grüne-Yanoff (2017) argue that because defaults are powerful, they should provide clear and personalized information to help people save optimally.

Esposito et al. (2017) investigated the potential that nudges have to discourage online shoppers from purchasing products that would not work with their existing devices. Noting that appealing to consumers' emotions tends to make warning messages more effective, Esposito et al. (2017) designed for emotion by using an emoji and encouraging participants to confirm the compatibility of the software being purchased with their device to avoid disappointment. They also varied the placement of the information on the product description page or the checkout page (Esposito et al., 2017). Esposito et al. found that overall, providing an emotive warning message and placing warnings on the checkout page were associated with fewer purchases of incompatible software. They also found that older participants purchased more incompatible products, and older participants appeared to rely on logos to convey compatibility information rather than emotive or checkout-page warnings (Esposito et al., 2017). Esposito et al. state that their results demonstrate that nudges can be used to protect vulnerable members of society, like older online shoppers, and nudges are not generalizable to all people.

Kitkowska et al. (2020) believe that UI designers can use visual cues, such as displaying privacy information, to positively influence privacy behaviors; their literature review showed that when participants perceived that a website had better privacy practices, they tended to be more willing to purchase from them compared to a website with no privacy information. Zimmerman & Renaud (2021) examined the impact of different types of nudges on participants' cybersecurity-related decisions, including passwords and public Wi-Fi choices. They provided simple nudges - for example, in one condition, leveraging the positioning heuristic by placing the most secure option at the top of the list of Wi-Fi options; information provision, such as displaying Wi-Fi security indicators; and a "hybrid" combination, such as sorting Wi-Fi options by security strength and providing security indicators (Zimmerman & Renaud, 2021). They found that

providing the hybrid nudge, in some cases, more effectively promoted secure choices than the nudge by itself, and did not decrease the nudge's effectiveness (Zimmerman & Renaud, 2021). This aligns with Hertwig & Grüne-Yanoff's (2017) argument in favor of transparent choice architecture techniques. Zimmerman & Renaud (2021) found that none of the nudges continued to influence behavior in a two-week follow-up study, leading to questions about how often to implement nudges, and whether nudges can contribute to long-term behavior change.

2.5 Ethical Considerations

There is disagreement about whether nudges are persuasive techniques; Münscher et al. (2016) categorize nudges as a type of behavior change technique, which in their view is distinct from persuasive techniques that focus on attitudinal change. The present research adopts the view that persuasive techniques include attempts to change behaviors and attitudes (Fogg, 1998; Fogg, 2009; Gray et al., 2018; Schneider et al., 2018), and that nudges can be viewed as a persuasive choice architecture technique. Proponents of libertarian paternalism see nudging as a "nonintrusive" (Thaler & Sunstein, 2009, p. 5) approach that guides rather than burdens the decision-maker. Bowles (2020) argues that such a perspective portrays nudging "as a technique of persuasion, not coercion" (p. 36), noting that subtle persuasive design techniques still require ethical consideration. All design with a goal, such as helping users reach the next step in a process, and therefore all design, is persuasive; accordingly, designers are responsible for addressing the ethical challenges inherent in design (Bowles, 2020; Gray et al., 2018).

Some researchers have stated that persuasive technology can help people accomplish significant goals, like smoking cessation (e.g., Fogg, 2009). Others readily acknowledge that nudging can be coercive, noting that some level of coercion, such as

compliance with laws and safety regulations, is necessarily part of society; forced contribution to social security programs, for example, enhances society as a whole (Gregor & Lee-Archer, 2016, p. 78). While acknowledging the potential benefits that digital nudges offer in helping people reach their goals, Lembcke et al. (2019) put ethical concerns about nudging into three categories: encroachment on freedom of choice or autonomy, lack of transparency, and misalignment with individuals' goals.

2.5.1 *Autonomy*

Caraban et al. (2019) acknowledge a common criticism that nudging manipulates choices. Lembcke et al. (2019) summarize this in terms of concern that nudges interfere with one's ability to make a decision in line with one's own preferences; however, they add that nudges may not violate freedom of choice since they offer guidance within choice environments that can be overwhelming. Berg and Watanabe (2020) point out that the "freedom of choice" aspect of libertarian paternalism is violated if nudges rely on System 1 (automatic) thinking, because decision-makers have not had the opportunity to make a choice. Caraban et al. (2019) note examples of nudges that encourage the reflective consideration of System 2 thinking, which do not necessarily manipulate (Caraban et al., 2019). Along similar lines, Hertwig and Grüne-Yanoff (2017) refer to signposts, which seek to make information about choices available to decision-makers.

Wachner et al. (2020) investigated how participants expected hypothetical nudges to impact their sense of autonomy and found that different kinds of nudges elicited different expectations. Participants exposed to default nudges that presented pre-selected options reported that they expected to feel less autonomy and satisfaction with their choice, and more pressure, than participants exposed to social norm nudges, direct persuasion, and control conditions (Wachner et al., 2020). Participants exposed to social norm nudges, which emphasized the popularity of a choice, reported similar expectations of autonomy, satisfaction, and pressure to participants in direct persuasion

and control conditions (Wachner et al., 2020). Notably, when the researchers removed their explanation that people are often unaware of nudges, expectations about autonomy in the default nudge condition were similar to the control condition, and in the social norm nudge condition, participants reported expecting higher autonomy (Wachner et al., 2020). The researchers suggest that future research should investigate why some types of nudges are expected to impact autonomy differently. Since participants reported lower expected satisfaction when nudges were fully defined and explained, Wachner et al. (2020) raised questions about how best to make nudges transparent.

2.5.2 Transparency

Lembcke et al. (2019) acknowledge that nudges are often criticized for lack of transparency. Schneider et al. (2018) point out that agile methodologies usually advocate for collecting feedback from software users, but that nudges rely on unconscious processes, and that making users aware of the nudge could be counterproductive. Caraban et al. (2019) found examples of nudges with questionable intent that would likely not be noticed by users, such as automatic opt-in policies; the visibility of such policies and the ease of opting out would impact whether such nudges would be considered ethical (Caraban et al., 2019). Thaler & Sunstein (2009) believe that nudges should be transparent, while Lembcke et al. (2019) question how noticeable a nudge should be to qualify as transparent. Zimmerman & Renaud (2021) advocate for transparent nudges that appeal to System 2 deliberation, rather than take advantage of the unconscious nature of System 1 thinking.

2.5.3 Goal (Mis)alignment

Lembcke et al. (2019) report that nudges can be designed to meet the goals of the choice architect, society in general, and/or the person being nudged. They add that Thaler & Sunstein (2009) would not deem a nudge motivated by the choice architect's

goals ethically acceptable, since such a nudge would not be designed to benefit the person being nudged (Lembcke et al., 2019). Potentially conflicting interests become apparent with respect to this point; as discussed, choice architects of digital choice environments are encouraged to consider their organization's goals in the digital nudge design process (e.g., Schneider et al., 2018). At the same time, Schneider et al. (2018) state that it is important for choice architects to consider the ethics "of deliberately nudging people into making particular choices, as nudging people toward decisions that are detrimental to them or their wellbeing is unethical and might thus backfire, leading to long-term negative effects for the organization providing the choice" (p. 71). Lembcke et al. (2019) state that some nudges will always direct people away from their own preferences, which leads to questions about the extent to which people should be nudged in the direction of the choice architect's goals.

Perhaps demonstrating misalignment between the goals of choice architects and decision-makers, nudges sometimes have unintended consequences (Krijnen, 2018; Peer et al., 2020). For example, there was a dramatic increase in non-donor registration following passage of a bill in the Netherlands to opt people into organ donation by default (Krijnen, 2018). Krijnen (2018) suggests that decision-makers sometimes act as social sense makers and make choices based on what they want their behavior to signal to others. Caraban et al. (2019) suggest that a nudge failing to work as intended may indicate that decision-makers have actively exercised their autonomy; however, questions arise with respect to the role of autonomy in iterative nudge design processes like those suggested by Schneider et al. (2018) and Gregor and Lee-Archer (2016), which include steps aimed at testing different versions of nudges to identify the most effective options. Caraban et al. (2019) point out that there is limited evidence about the long-term consequences of digital nudging, noting that the majority of studies reviewed did not investigate possible unintended and long-term effects.

2.5.4 Respect for Heterogeneity

Meder et al. (2018) argue that behavior change cannot be separated from the environment in which the behavior, or problem contributing to the behavior, exists. Sometimes the environment works against a behavior change intervention; for example, when banking regulators in the United States began opting people out of over drafting by default to reduce overdraft fees collected by banks, banks actively encouraged consumers to opt back in, sometimes using a social comparison nudge to point out that most banking customers prefer allowing over drafting to avoid embarrassment (Meder et al., 2018). Particularly with respect to social policies, Meder et al. (2018) encourage understanding behavioral interventions in systemic ways, and they propose three ways to characterize such interventions: determine the goal of the intervention, the sources of the problem, and potential interactions between interventions and environment (p. 41).

In contrast to recommending that policymakers consider the environment before intervening, Berg and Watanabe (2020) argue for the idea that group-level heterogeneous behavior benefits society; they note that there is rarely just one good decision in a given choice environment. Further, Berg and Watanabe point to sociology literature “acknowledging the autonomy and heterogeneity of individuals sharing a common minority group status,” (p. 109), noting the importance of context over defining a person’s identity by a single factor; they add that minority groups could be disproportionately impacted by nudge policies aimed at behaviors like dietary and health habits that deviate from “beneficial” behavior as defined by experts. Peer et al. (2020) note that research in the areas of nudges and heterogeneity is lacking. They acknowledge that implementing a nudge that appears to be effective on average may impact or harm minority groups in unanticipated ways and suggest that personalized nudges could protect the interests of individuals and groups who could be harmed by nudges (Peer et al., 2020).

2.5.5 Privacy

Several researchers (e.g., Caraban et al., 2019; Gregor and Lee-Archer, 2016; Peer et al., 2020; Schneider et al., 2018) have proposed the use of personalized nudges to overcome some of the limits of using the same nudges for everyone. As Caraban et al. (2019) state, “While nudging was initially conceived as a one-size-fits-all approach, technology provides new opportunities as nudges can be tailored to particular contexts; some of us may be more susceptible to particular nudges than others, and some nudges may be more effective in particular contexts than others” (p. 11). Peer et al. (2020) acknowledge that users’ sensitive data are being used for “less benevolent” (p. 8) purposes than nudge personalization; they suggest that personalized nudges could make use of information that is already being collected and stored in locations like users’ browsers to protect privacy. Gregor and Lee-Archer (2016) point out the need for ethical considerations of individual privacy while balancing public interests; they note that choice architects need to ensure that individuals engaging in activities like applying for social security are not negatively impacted by digital nudges.

2.5.6 Qualifications of Choice Architects

Caraban et al. (2020) state that over one hundred cognitive biases exist, and applying knowledge about biases to create an applicable nudge is difficult. Choice architects need to learn about biases, choice environments, and which nudges would be appropriate in a given situation in order to implement a nudge successfully; accordingly, Selinger and Whyte (2010) argue that Thaler & Sunstein (2009) should, but do not, describe a way for choice architects to know which nudges to use and when to use them. Selinger and Whyte (2010) point to the idea of competence as a necessary component for judging whether nudges are ethical. Competence is an important factor in deciding whether experts can be trusted in various fields, such as scientists and other

researchers who make recommendations, and Selinger and Whyte (2010) argue that the role of choice architects in nudging behavior, often without decision-makers' knowledge, should be considered similarly. They further point out the possibility for variance in how different people perceive the same choice context, and that in order to earn trust, choice architects should be able to account for this variance (Selinger and Whyte, 2010).

Cartwright and Hight (2020) cast more doubt on whether it is possible for choice architects to meet the ethical standards suggested by Thaler & Sunstein (2009), noting that there are not explicit guidelines for how choice architects can know whether the person being nudged would judge themselves as better off because of the intervention.

2.6 Manipulative Choice Architecture (Dark Patterns)

Choice architects can use their knowledge to create supportive environments, and they can use their knowledge to manipulate. As described by Bowles (2018):

“In the tech world, unethical persuasion often takes the form of a dark pattern, an intentionally deceptive interface that exploits cognitive weakness for profit. Most dark patterns today are extortive nuisances – fake scarcity on hotel sites, bait-and-switch subscriptions – but the dark pattern becomes more threatening as technologies become embedded in everyday life.” (p. 37)

Luguri and Strahilevitz (2021) point out that dark patterns differ from marketing tactics, which are designed to change consumers' preferences; dark patterns often subvert consumers' preferences. While there tends to be a gap between academic research approaches like critical design theory and ethical challenges in User Experience (UX) practice, leveraging knowledge from academic researchers and UX practitioners helps advance knowledge about design ethics (Fansher et al., 2018; Gray et al., 2018).

According to Gray et al. (2018), UX practitioner and cognitive scientist Harry Brignull first described unethical design patterns in terms of their intention to trick users into doing things that they otherwise would not do. Brignull (n.d.) had identified and

described twelve kinds of dark patterns as of April 2021; examples of Brignull's dark patterns include "Bait and Switch," in which the user's desired path switches to an undesired one, and "Friend Spam," in which the user is asked to provide their contacts ostensibly for social purposes, but contacts instead receive messages that appear to be from the user. Gray et al. (2018) used and expanded on Brignull's classification of dark patterns to investigate UX and HCI practitioners' conversations about dark patterns. Based on examples of dark patterns shared by practitioners, Gray et al. (2018) found that dark patterns fell into five primary categories: nagging, obstruction, sneaking, interface interference, and forced action. Each of these strategies can, in contrast to typical user-centered design methods, be used to manipulate users' choices to benefit stakeholders (Gray et al., 2018).

Fansher et al. (2018) analyzed UX practitioners' conversations about dark patterns on Twitter. The most commonly identified pattern was interface interference, which includes manipulation of the interface in ways that benefit the organization, such as visually emphasizing an option to remain subscribed to a newsletter over an option to unsubscribe (Fanscher et al., 2018). Another commonly identified pattern was sneaking, in which a site hides or delays showing relevant information; for example, one UX practitioner pointed to a dark pattern that resulted in a customer being subscribed to a monthly service after one purchase (Fanscher et al., 2018). The researchers found that practitioners most commonly used the #darkpatters hashtag to bring attention to dark patterns and to companies who use them, demonstrating that practitioners are actively confronting issues of design ethics (Fanscher et al., 2018).

Costello et al. (2020) use the term "digital dark nudge" to describe nudge-like patterns that guide users' online behavior toward profit-generating choices in the context of e-commerce. They describe a common dark pattern that involves showing a discount to attract attention or clicks and displaying the full cost of a product or service toward the

end of the transaction (Costello et al., 2020). The researchers implemented a pilot study using functional near-infrared spectroscopy to test the hypothesis that consumers can become aware of manipulative patterns (Costello et al., 2020). In their “good nudge” condition, a product’s original price was clearly displayed alongside the fee-inclusive final price, while in the “dark nudge” condition, a discounted price was shown, and the higher final price was shown in small text on a subsequent page (Costello et al., 2020). Results of the pilot study showed no significant differences in the decision to purchase between either the “good” or “dark” nudge condition, potentially reflecting that dark nudges can influence purchasing decisions without the decision-maker initially being aware of potential manipulation; however, participants showed a higher intention to purchase and recommend products in the future for the “good” over the “dark” nudge (Costello et al., 2020). The researchers plan to further investigate the role of digital dark nudges in consumers’ decisions to purchase from online retailers (Costello et al., 2020).

Graßl et al. (2021) discuss digital nudges in the context of cookie consent requests. They compared dark patterns intended to influence users to quickly (using automatic System 1 thinking) consent to allowing the collection of users’ personal data to “bright” patterns that nudged people toward protecting their data. They found that when dark nudges were used, most participants across conditions accepted all cookie requests (Graßl et al., 2021). The researchers suggested that participants did not tend to make rational, considered choices about cookie requests, possibly because in practice, many websites fail to provide options to disallow cookies, or only function if users enable cookies (Graßl et al., 2021). A second experiment showed that when bright nudges were used, acceptance of cookie requests was reduced by about 40%, leading the researchers to conclude that nudges impact choices about consenting to data collection. The researchers suggested the possibility that nudges toward accepting cookies, which participants likely experienced over a long period of time in their daily internet use,

influenced participants' acceptance of cookies in the experimental conditions, even when they were not being nudged in that direction (Graßl et al., 2021).

Bhoot et al. (2020) note that some of the dark patterns identified by Brignull (n.d.) are easier for users to identify than others. The researchers found that five main variables contributed to whether participants tended to identify dark patterns: how often they had experienced the pattern before (frequency of occurrence); how they would rate their level of trust (trustworthiness); how they would rate their frustration in a situation (level of frustration); how misleading they found a situation (misleading behavior); and how appealing they found an interface to be (physical appearance) (Bhoot et al., 2020). The researchers found that the Roach Motel pattern, in which the seemingly simple task of cancelling an online account was intentionally overcomplicated, was identified the least by participants; the Forced Continuity pattern, in which credit card information was required to sign up for a free trial, was identified most often (Bhoot et al., 2020). They found that certain variables helped participants identify dark patterns in different ways; for example, the combination of frequency of occurrence, misleading behavior, and level of frustration helped users identify the Disguised Ads pattern (Bhoot et al., 2020). Participants reported frustration and lack of trust when they encountered dark patterns, despite reporting that they would likely continue to use websites that employed such tactics if no alternatives existed; the researchers note that designers should consider the frustrating effects of such tactics on users (Bhoot et al., 2020).

Mathur et al. (2019) point out that beyond causing frustration, dark patterns can cause harm by influencing users to spend their money, give up their personal data, or engage in addictive behavior. Building on the taxonomies that have helped identify dark patterns (e.g., Brignull, n.d.; Gray et al., 2018), Mathur et al. (2019) used a web crawler across approximately 11,000 popular shopping websites globally and documented 1,818 examples of dark patterns, which were used on approximately 11% of the sites crawled.

Based on these examples, they presented a taxonomy of dark patterns along with cognitive biases thought to be targeted by the patterns (Mathur et al., 2019). Their taxonomy considers tactics that emphasize some choices unequally (asymmetric), hide effects of choices (covert), encourage false beliefs through incorrect or incomplete information (deceptive), omit or delay information (hides information), and limit available choices (restrictive); further analysis revealed “15 types of dark patterns contained in 7 broader categories” (Mathur et al., 2019, p. 81:13). They found that popular websites were more likely to use dark patterns, and that third-parties like plugins for Shopify and other shopping platforms added or enabled such patterns. For example, some third parties provided a service that displayed notifications about the shopping activities of other people, demonstrating the “Social Proof” dark pattern, which targets a cognitive bias toward impulse buying in the presence of others (Mathur et al., 2019). The researchers suggest that dark patterns could be considered a form of market manipulation; they encourage future research into impacts of dark patterns on consumers and measures to combat dark patterns (Mathur et al., 2019).

Luguri & Strahilevitz (2021) point out that companies currently have the ability to test different versions of dark patterns against each other with existing users to determine which patterns work well. Notably, this sounds similar in practice, if not intent, to the iterative digital nudge design processes suggested by Gregor and Lee-Archer (2016) and Schneider et al. (2018). Luguri & Strahilevitz (2021) tested a version of the bait-and-switch dark pattern, in which participants took a survey and were then led to believe that were enrolled in a paid identity theft protection program. Participants were given the opportunity to opt out of the imaginary program, and the researchers exposed participants to various types of dark patterns during the opt-out process (Luguri & Strahilevitz, 2021). Participants could click to “Accept” or “Decline” the identity theft protection in the control group, which did not include dark patterns; click “Accept and

continue (recommended),” which was selected by default, or “Other options” to find a way to decline in the mild dark pattern condition; or encounter more significant obstructions to declining by reading more information about identity theft over several steps in the aggressive dark pattern condition (Luguri & Strahilevitz, 2021). Luguri & Strahilevitz found that when mild dark patterns were used, acceptance rate of the identity protection increased from 11.3% in the control group to 25.8%; when aggressive dark patterns were used, the acceptance rate rose to 41.9%. In the two dark pattern conditions, most participants accepted on the screen that presented the choice between the suggested default “Accept and continue (recommended),” or “Other options,” highlighting the influence that even minor dark patterns have over decision-making (Luguri & Strahilevitz, 2021).

In a second experiment, Luguri & Strahilevitz (2021) identified the most effective dark patterns, including “hidden information (smaller print in a less visually prominent location), obstruction (making users jump through unnecessary hoops to reject a service), trick questions (intentionally confusing prompts), and social proof (efforts to generate a bandwagon effect)” (p. 47). The researchers also found no significant difference in acceptance rates between a low stakes condition in which the program cost \$8.99 per month and a high stakes condition in which the program cost \$38.99 per month; dark patterns appear to be effective even when they are very expensive to users (Luguri & Strahilevitz, 2021). Further, 33.4% of participants who encountered a confusingly-worded (trick) question ultimately accepted the program, although 16.7% of those participants later reported that they accepted the program, indicating that when dark patterns are present, consumers may not understand choices that they make (Luguri & Strahilevitz, 2021). Luguri & Strahilevitz also found that participants with less education were more vulnerable to dark patterns than participants with more education. In addition, participants exposed to aggressive dark patterns reported having a

significantly more negative mood than participants in the control and mild dark pattern conditions; this suggests that consumers may become aware of obvious dark patterns, but they may not become aware of less noticeable tactics (Luguri & Strahilevitz, 2021). Luguri & Strahilevitz discuss potential legal issues around dark patterns, noting that the Federal Trade Commission (FTC) is becoming more involved in limiting companies' use of dark patterns online as part of their enforcement against unfair and deceptive trade practices, while acknowledging that courts are not well-positioned to understand the ways in which dark patterns are often used together, or which dark patterns cause the most harm.

2.6.1 Dark Patterns in the News

High profile examples of dark patterns have attracted the attention of the public and lawmakers in the U.S. Around 2015, LinkedIn used a version of a dark pattern referred to by Brignull (n.d.) as Friend Spam. The company collected stored information about its users' contacts, and repeatedly sent those contacts messages that appeared to be from the user (Brownlee, 2015). As a result of a lawsuit, LinkedIn was ordered to pay \$13 million; this did not result in large financial payouts to LinkedIn's users, but at the time was viewed as a penalty and a warning against use of such tactics (Brownlee, 2015).

California's Consumer Privacy Act, which was approved in March 2021, included provisions banning certain kinds of dark patterns (Claypool, 2021; Provenzano, 2021). The regulations were intended to keep companies from adding confusing steps or language that would make it difficult for people to opt out of the sale of their personal data, and establish a Privacy Options icon to signal that users can opt out of such a sale (Claypool, 2021; Provenzano, 2021).

Goldmacher (2021) reported that during Donald Trump's re-election campaign in 2020, the for-profit company that processed online donations for the Trump campaign

began to default online donors to weekly recurring donations; the option to opt out was hidden, and the explanation of the opt-in default was displayed in fine print. The New York Times spoke to donors who reported that they believed they had been victims of fraud, while Harry Brignull commented, “It should be in textbooks of what you shouldn’t do” (Goldmacher, 2021). While the pre-checked donation option is not new in the political donation space, donors were clearly confused by the design; 10.7% of the funds raised on the platform for Trump’s causes in 2020 were refunded, compared to 2.2% of funds raised on a different platform for opponent Joe Biden (Goldmacher, 2021). As an indication of increased public interest in dark patterns, the FTC announced that a workshop on digital dark patterns would be held in April 2021, noting their intention to consider the potential for regulation (Claypool, 2021).

2.7 Mobile Choice Environments

Mobile devices have been mentioned by several researchers in the context of nudging. Johnson et al. (2012) discuss the expansion of choice environments to mobile devices as people increasingly make purchases online. Purohit & Holzer (2019) discuss using location and other smartphone-based data to deliver nudges at specific times. Gent (2021) points out that mobile apps use dark patterns intended to keep people engaged, including strategies to keep people scrolling continuously.

Meanwhile, there is global trend in the direction of increasing mobile internet use, along with mobile-only internet use. According to the Statista Research Department (2021), over 90% of those who use the internet globally used a mobile device to access the internet in 2020. Handley (2019) reported that about 2 billion people worldwide, or about half of mobile users, accessed the internet solely by smartphone in 2019; projections indicate that about 75% of people worldwide will be mobile-only internet users by 2025. This represents a growing opportunity for businesses to sell their

products on mobile platforms (Handley, 2019). In 2019, about 17% of U.S. adults were mobile-only internet users, with about half of those users reporting that they did not need internet access beyond their mobile device (Anderson, 2019). Mossberger & Tolbert (2021) reported that in the U.S., mobile-only internet access is more common in low-income communities, and that the limited nature of mobile web capabilities compared to desktop versions “has led some researchers to characterize mobile-dependent internet users as a digital underclass” (p. 22). The present research intends to examine choice architecture techniques used by popular mobile shopping platforms in the context of intended benefits to as well as manipulation of users, with the view that mobile shopping platforms present opportunities for vendors to manipulate potentially vulnerable consumers.

3 Methodology

The researcher selected a sample of 30 mobile shopping sites for analysis based on their use of supportive and manipulative choice architecture techniques, using methods inspired by Meyer (2015). The researcher chose to select apparel-focused sites since according to Chevalier (2021), clothing was the most popular online shopping category globally as of 2018.

3.1 Identification of Sites

The researcher selected popular sites because of interest in the kinds of choice architecture techniques used on websites with a large customer base, and since Mathur et al. (2019) found that popular websites were likely to use dark patterns. Accordingly, market research reports were used to identify the most popular websites globally and in the U.S.; with the intention of triangulating data sources (Bowen, 2009), sites were then selected based on their presumed popularity as indicated by their search engine ranking. The sample websites were identified for analysis based on a combination of:

- ecommerceDB.com and Statista's (2019) identification of the most popular online stores in the fashion segment in the United States;
- SEMrush's (2020) identification of the most-visited fashion e-commerce sites in 2020; and
- The researcher's searches for clothes shopping sites.

The researcher first selected the sites identified by ecommerceDB.com and Statista (2019) and SEMrush (2020), resulting in 16 sites. If an English-language version of the site was not available, the researcher did not include it; for example, trendyol.com

was identified by SEMrush (2020) as the second most visited fashion site worldwide in 2020, but it was not analyzed since it was not available in English.

To select the remaining 14 sites, the researcher used exploratory searches on Google and then Bing from an incognito browser window in Google Chrome. She searched for “new clothes” and then “buy clothes,” selecting the top 3 and the top 4 results, respectively, from each search engine results page. When results overlapped between search engines or previously selected sites, or the result was not a landing page for a site selling its clothing online, the researcher skipped to the next result.

The sample was restricted to English-language websites due to the researcher’s language ability. All samples were analyzed on an iPhone 12 Pro using an incognito window in the Chrome browser and a high-speed internet connection.

3.2 Focus on Mobile Shopping Sites

Past research has used examples of behavioral nudges and dark UX design patterns found on mobile websites and apps in order to create taxonomies and classifications of such patterns (e.g., Brignull et al., n.d.; Gray et al., 2018); it has not focused exclusively on choice architecture on mobile shopping sites where purchasing decisions are made. The present research focuses on shopping sites since nudges are specifically used “... for liberating people from their money or time” (Bowles, p. 36), and on mobile versions of the selected sites based on the global trend toward mobile-only internet access. The researcher was interested in whether choice architecture techniques used on mobile sites (specifically fashion sites) would differ from the techniques identified by the literature to date, and whether such sites would use certain techniques more than others.

3.3 Analysis

3.3.1 Selected sites

The sites selected for analysis, along with the source from which they were selected, are included in Table 1 below.

#	Site Name	Description	Source
1.	amazon.com	The second most popular online fashion store in the U.S. in 2018.	ecommerceDB.com and Statista (2019)
2.	anthropologie.com	Google search result.	Google search for "new clothes"
3.	asos.com	The sixth most visited fashion e-commerce site worldwide in 2020.	SEMrush (2020)
4.	bloomingdales.com	Google search result.	Google search for "buy clothes"
5.	bloomwholesale.com	Bing search result.	Bing search for "buy clothes"
6.	chicos.com	Google search result.	Google search for "new clothes"
7.	dressbarn.com	Bing search result.	Bing search for "buy clothes"
8.	express.com	Google search result.	Google search for "buy clothes"
9.	freepeople.com	Bing search result.	Bing search for "new clothes"
10.	gap.com	The third most popular online fashion store in the U.S. in 2018. The ninth most visited fashion e-commerce site worldwide in 2020.	ecommerceDB.com and Statista (2019); SEMrush (2020)
11.	gojane.com	Google search result.	Google search for "new clothes"
12.	hm.com	The third most visited fashion e-commerce site worldwide in 2020.	SEMrush (2020)
13.	jcpenny.com	The tenth most popular online fashion store in the U.S. in 2018. The tenth most visited fashion e-commerce site worldwide in 2020.	ecommerceDB.com and Statista (2019); SEMrush (2020)
14.	kohls.com	The fifth most popular online fashion store in the U.S. in 2018.	ecommerceDB.com and Statista (2019)
15.	loft.com	Bing search result.	Bing search for "new clothes"
16.	macys.com	The most popular online fashion store in the U.S. in 2018. The fourth most visited fashion e-commerce site worldwide in 2020.	ecommerceDB.com and Statista (2019); SEMrush (2020)
17.	maurices.com	Bing search result.	Bing search for "buy clothes"
18.	nike.com	The most visited fashion e-commerce site worldwide in 2020.	SEMrush (2020)

#	Site Name	Description	Source
19.	nordstrom.com	The fourth most popular online fashion store in the U.S. in 2018.	ecommerceDB.com and Statista (2019)
20.	nyandcompany.com	Bing search result.	Bing search for “new clothes”
21.	overstock.com	Google search result.	Google search for “buy clothes”
22.	poshmark.com	Google search result.	Google search for “buy clothes”
23.	qvc.com	The ninth most popular online fashion store in the U.S. in 2018.	ecommerceDB.com and Statista (2019)
24.	shein.com	The seventh most visited fashion e-commerce site worldwide in 2020.	SEMrush (2020)
25.	stitchfix.com	The seventh most popular online fashion store in the U.S. in 2018.	ecommerceDB.com and Statista (2019)
26.	uniqlo.com	The eighth most visited fashion e-commerce site worldwide in 2020.	SEMrush (2020)
27.	victoriasecret.com	The eighth most popular online fashion store in the U.S. in 2018.	ecommerceDB.com and Statista (2019)
28.	venus.com	Bing search result.	Bing search for “buy clothes”
29.	walmart.com	The sixth most popular online fashion store in the U.S. in 2018.	ecommerceDB.com and Statista (2019)
30.	zara.com	The fifth most visited fashion e-commerce site worldwide in 2020.	SEMrush (2020)

The researcher pasted a list of sites alphabetized by site name into an Excel spreadsheet in Column A and used the RAND formula to generate a random number for each adjacent cell in Column B. She then copied and pasted the randomly generated values into another column and deleted the RAND column to prevent further recalculating. She then sorted by Column B (containing pasted random numbers) in descending order to create the order in which to evaluate the sites. The researcher stopped after analyzing 25 sites. Results are reported in the order that the researcher analyzed the sites.

3.3.2 Heuristic Evaluation

Heuristic evaluation typically involves the evaluation of a website interface by multiple experts to determine whether the site adheres to a set of usability guidelines (Hasan et al., 2012; Nielsen, 1994). While heuristic evaluation has its limits, such as painting an incomplete picture of an interaction that a site user would encounter in the

real world, it is also viewed as a relatively cost-effective way to gain useful insights into usability problems (Hasan et al., 2012). Accordingly, the researcher used heuristic evaluation as a basis for analyzing each site.

As Mathur et al. (2021) state, dark pattern research in the HCI community has not approached the identification of dark patterns using a single definition; their review of the literature identified 19 definitions of dark patterns. The scope of the heuristic guidelines created for the present evaluation is limited to design techniques identified and discussed by two papers describing user-supportive techniques, and two papers describing dark patterns

Johnson et al. (2012) and Münscher et al. (2016) described tools and techniques that choice architects can use to frame choices in both offline and digital contexts. Schneider et al. (2018) reported that “existing guidelines for implementing nudges have been developed primarily for offline environments...” (p. 68). The researcher used descriptions of choice architecture techniques proposed by Johnson et al. (2012) and Münscher et al. (2016) to guide her analysis of supportive choice architecture techniques and validate the use of these techniques in digital environments. With respect to her analysis of manipulative techniques, the researcher used the descriptions of dark patterns proposed by Grey et al. (2018) and Mathur et al. (2019), which each integrate patterns identified and described by Brignull (n.d.).

User-supportive and manipulative choice architecture techniques have been described and delineated based on the selected literature, as summarized in Tables 2 and 3 below, respectively. Similar to Hasan et al. (2012), the researcher used these as a set of heuristic guidelines to evaluate the selected sites' choice architecture. The researcher visited each site twice; the researcher briefly familiarized herself with each site during the first visit, and evaluated the site's choice architecture during the second visit (Hasan et al., 2012; Nielsen, 1994). During the second visit, the researcher went

through the process of buying an item and abandoning the purchase at the last stage (Hasan et al., 2012). While there was some variation between sites due to differing designs, the researcher adhered to the following steps as closely as possible during the second visit: land on home page; navigate to a section of the site selling clothing; click to view details of a piece of clothing; add item to cart; proceed through checkout; check out as guest, if possible, or create new account, if required; enter shipping information; change shipping option; abandon purchase by removing item from cart.

The researcher then used a combination of document analysis (Bowen, 2009; Gray et al., 2018) and heuristic evaluation (Hasan et al., 2012; Nielsen, 1994), to analyze each selected mobile website for the presence of the identified choice architecture techniques and the emergence of broader choice architecture themes. Mathur et al. (2021) stated that HCI research into dark patterns has been primarily descriptive, based on common themes, and should begin to ground itself in normative issues underlying such themes to contribute to a common language about what, exactly, constitutes problematic design. Along those lines, the researcher kept three of the four normative lenses identified by Mathur et al. (2021) in mind throughout the evaluation, including impact of the user interface on: individual welfare, whereby an interface benefits the designer over the user; collective welfare, whereby an interface benefits the designer over a society or group; and individual autonomy, whereby an interface “undermines individual decision-making.” (The fourth normative lens, regulatory objectives, was outside the scope of the present research.)

3.3.2.1 Heuristic Guidelines for Choice Architecture with User-Supportive Intent

Johnson et al. (2012) identified tools available to choice architects and discussed them in terms of whether they were used in structuring the choice task or describing the choice options. Münscher et al. (2016) created a taxonomy of ideal types of choice architecture techniques intended for successful interventions and categorized each in

terms of decision information, decision structure, and decision assistance. Descriptions of the techniques identified by Johnson et al. (2012) and Münscher et al. (2016) are included below in Table 2.

The accompanying descriptions were used to guide document analysis for user-supportive choice architecture based on the authors' suggestion that choice architects use these techniques.

Table 2: Types of supportive techniques available to choice architects as identified by Johnson et al. (2012) and Münscher et al. (2016)			
Technique	Description	Examples	Source
<i>Structuring the choice task:</i> Reducing alternatives	Balance the number of options; encourage consideration while preventing overwhelm	<ul style="list-style-type: none"> • Four or five choices may be “reasonable initial values” • Start with a small number of choices and give the option of accessing more 	Johnson et al. (2012)
<i>Structuring the choice task:</i> Technology and decision aids	Technology that aids the decision process	<ul style="list-style-type: none"> • Product recommendations • Personalization to reflect user preferences 	Johnson et al. (2012)
<i>Structuring the choice task:</i> Defaults	Settings that apply in the absence of active steps taken by the user	<ul style="list-style-type: none"> • Referred to as “Change choice defaults” by Münscher et al. (2016) • Pre-checked options or no-action defaults, such as privacy options that are chosen without action • Forced choice, in which the user must make a choice to move forward 	Johnson et al. (2012); Münscher et al. (2016)
<i>Structuring the choice task:</i> Focus on satisficing	Help overcome procrastination by emphasizing alternatives	<ul style="list-style-type: none"> • If one option is unavailable, suggest alternatives 	Johnson et al. (2012)
<i>Structuring the choice task:</i> Limited time windows	Help overcome procrastination by emphasizing time	<ul style="list-style-type: none"> • Placing expirations on incentives 	Johnson et al. (2012)
<i>Structuring the choice task:</i> Decision staging	Simplify a long search or decision process by emphasizing one or a subset of attributes	<ul style="list-style-type: none"> • Sorting results in a specific order, such as by popularity • Provide clear information about range of possible prices 	Johnson et al. (2012)
<i>Describing choice options:</i> Partitioning of options	Arranging options or	<ul style="list-style-type: none"> • Partitioned options or attributes so that important attributes are 	Johnson et al. (2012);

Table 2: Types of supportive techniques available to choice architects as identified by Johnson et al. (2012) and Münscher et al. (2016)

Technique	Description	Examples	Source
	attributes into a set	<p>emphasized, and less important attributes are confined</p> <ul style="list-style-type: none"> • Alternatives, such as additional or decoy options 	Münscher et al. (2016)
<i>Describing choice options:</i> Attribute parsimony and labeling	Describe and appropriately weight all relevant aspects of a choice in a way that requires the least effort	<ul style="list-style-type: none"> • Letting users select an attribute to filter by • Using clear grades or “good/bad” labels for quantitative information 	Johnson et al. (2012)
<i>Describing choice options:</i> Translate and rescale for better evaluability	Change or simplify the context to allow for easier evaluation	<ul style="list-style-type: none"> • Referred to as “Translate information” by Münscher et al. (2016) • Simplify information to make it more useful • Showing the monthly payment needed to eliminate a credit card balance in 3 years • Reframe information, such as referring to blood donation as death-preventing rather than lifesaving 	Johnson et al. (2012); Münscher et al. (2016)
<i>Decision information:</i> Make information visible	Simplify access to information	<ul style="list-style-type: none"> • Make the user’s behavior visible, such as giving feedback by tracking step counts • Make external information visible, such as providing nutrition information 	Münscher et al. (2016)
<i>Decision information:</i> Provide social reference point	Create a social reference point	<ul style="list-style-type: none"> • Refer to descriptive norms, such as highlighting that other people contribute to charity • Refer to an opinion leader, such as referring to a well-known source’s opinion or behavior 	Münscher et al. (2016)
<i>Decision structure:</i> Change option-related effort	Change how much effort it takes to make a choice	<ul style="list-style-type: none"> • Increase or decrease physical effort, such as making a product easier to access • Increase or decrease financial effort, such as 	Münscher et al. (2016)

Table 2: Types of supportive techniques available to choice architects as identified by Johnson et al. (2012) and Münscher et al. (2016)			
Technique	Description	Examples	Source
		postponing costs without decreasing the final price	
<i>Decision structure:</i> Change range or composition of options	Change the presented options to influence how options are perceived in relation to each other	<ul style="list-style-type: none"> Strategically emphasize certain categories or attributes relative to others 	Münscher et al. (2016)
<i>Decision structure:</i> Change option consequences	Make small changes to the costs of or benefits to choices	<ul style="list-style-type: none"> Connect the decision to benefit or cost by using micro-incentives or micro-disincentives, such as rewarding desired behavior with participation in a lottery Change the social consequences of the decision, such as encouraging microloan repayment by only offering new loans when existing loans are paid off 	Münscher et al. (2016)
<i>Decision assistance:</i> Provide reminders	Re-focus attention to support decision-makers' commitments or intentions	<ul style="list-style-type: none"> Provide reminders, such as sending text messages, or make undesired cues less visible, such as positioning undesired options in the middle of a list 	Münscher et al. (2016)
<i>Decision assistance:</i> Facilitate commitment	Help people commit to their decisions	<ul style="list-style-type: none"> Support self-commitment, such as tools that support self-imposed limits on screen time Support public commitment, such as providing options for users to share publicly 	Münscher et al. (2016)

Where techniques overlapped, the researcher considered them as part of the same technique; for example, *translate and rescale for better evaluability* (Johnson et al., 2012) and *translate information* (Münscher et al., 2016) were considered together,

and *defaults* (Johnson et al., 2012) and *change choice defaults* (Münscher et al., 2016) were considered together.

3.3.2.2 Heuristic Guidelines for Manipulative or “Dark” Choice Architecture

As previously discussed, Brignull (n.d.) has identified and described twelve kinds of dark patterns. Gray et al. (2018) identified five main types of dark patterns and several subtypes based on the categories identified by Brignull (n.d.), and expanded on them based on a corpus of dark patterns identified by UX professionals. Mathur et al. (2019) created a taxonomy of dark patterns that built on work by Brignull (n.d.) and Gray et al. (2018). Descriptions of the techniques described by Gray et al. (2018) and Mathur et al. (2019) are included below in Table 3.

The accompanying descriptions were used to guide document analysis for dark patterns. Again, where techniques overlapped, the researcher considered them as part of the same technique.

Table 3: Types of dark patterns as described by Gray et al. (2018) and Mathur et al. (2019).			
Technique	Description	Examples	Source
Nagging	A user’s task is redirected unexpectedly, sometimes multiple times	<ul style="list-style-type: none"> • Pop-ups that hide the interface or audio that distracts • Repeated prompts to enable notifications 	Gray et al. (2018)
Obstruction	Design that intentionally makes an action more difficult than it should be (Gray et al., 2018)	<ul style="list-style-type: none"> • A barrier to a user’s desired action, such as limiting access to settings that would disable ad tracking (Gray et al., 2018) • A situation that is hard to get out of, such as a difficult account cancellation process, termed “Roach Motel” by 	Gray et al. (2018); Mathur et al. (2019)

Table 3: Types of dark patterns as described by Gray et al. (2018) and Mathur et al. (2019).			
Technique	Description	Examples	Source
	An easy sign-up followed by a difficult cancellation (Mathur et al., 2019)	<p>Brignull (n.d.) (Gray et al., 2018) and “Hard to Cancel” by Mathur et al. (2019)</p> <ul style="list-style-type: none"> • Preventing users from copying, and thereby comparing, information between sites, termed “Price Comparison Prevention” by Brignull (n.d.) (Gray et al., 2018) • “Intermediate Currency,” in which money is spent on virtual currency, which is interacted with in a different way than money (Gray et al., 2018) 	
Sneaking	Efforts to keep relevant information from users, often so that users complete an action they otherwise would not; the outcome conflicts with the action	<ul style="list-style-type: none"> • Offering a free trial, and then charging the user after it expires, termed “Forced Continuity” by Brignull (n.d.) (Gray et al., 2018) and “Hidden Subscription” by Mathur et al. (2019) • Advertising a price that later increases due to added costs, termed “Hidden Costs” by Brignull (n.d.) (Gray et al., 2018; Mathur et al., 2019) • Adding items that a user did not select to their basket, termed “Sneak into Basket” by Brignull (n.d.) (Gray et al., 2018; Mathur et al., 2019) • When users experience a result that contradicts the implied result, such as a red “X” not closing a window, termed “Bait and Switch” by Brignull (n.d.) (Gray et al., 2018) 	Gray et al. (2018); Mathur et al. (2019)
Interface interference	An interface manipulation that results in confusion by emphasizing certain information or actions	<ul style="list-style-type: none"> • Hidden Information, where relevant information or actions are obscured, such as fine print or terms and conditions • Preselection, such a default that has been selected without user 	Gray et al. (2018); Mathur et al. (2019)

Table 3: Types of dark patterns as described by Gray et al. (2018) and Mathur et al. (2019).

Technique	Description	Examples	Source
		<p>action, which usually prioritizes shareholders' goals over users' goals</p> <ul style="list-style-type: none"> • Aesthetic Manipulation, such as user interface design that re-focuses attention in order to distract, termed "Misdirection" by Brignull (n.d.) and "Visual Interference" by Mathur et al. (2019) <ul style="list-style-type: none"> ○ Toying with emotion, such as persuasive language or imagery to encourage or discourage ○ False hierarchy, where a choice is given visual priority, such as a manufacturer's preferred installation method being called "recommended" while a custom installation method appears unclickable ○ Brignull's (n.d.) "Disguised Ad," in which ads do not appear to be ads, but appear as download buttons or other clickable options ○ Brignull's (n.d.) "Trick Questions," in which confusing wording such as double negatives are used, and/or checkboxes are required to opt out instead of opt in 	

Technique	Description	Examples	Source
Forced action	When users must complete a specific action to get to or continue on a path	<ul style="list-style-type: none"> • Being unable to continue using an operating system without shutting down the system to install an update (Gray et al., 2018) • The Social Pyramid pattern, where users are asked to recruit other users; an extension of Brignull's (n.d.) "Friend Spam" (Gray et al., 2018) • Brignull's (n.d.) "Privacy Zukering," in which users share personal information without being fully informed, such as the sale of personal data to third parties (Gray et al., 2018) • Gamification, when only repeated use of a service enables functionality, such as requiring game players to remain on one level longer if they do not make a purchase (Gray et al., 2018) • "Forced Enrollment," where information must be shared or an account must be created (Mathur et al., 2019) 	Gray et al. (2018); Mathur et al. (2019)
Urgency	Attempts to speed up decision-making by emphasizing time limitations.	<ul style="list-style-type: none"> • Countdown timer, in which a timer alerts users that a price is temporary and will expire • Limited-time Message, in which users are alerted that a price is temporary, but no time is stated 	Mathur et al. (2019)
Misdirection	An expanded conception of Brignull's (n.d.) Misdirection that includes leveraging language and emotion to guide users toward or away from choices	<ul style="list-style-type: none"> • Confirmshaming, a pattern identified by Brignull (n.d.) in which shame is used to influence choice, such as an option to decline using language like "No thanks, I hate fun" (Mathur et al., 2019) • Pressured Selling, through pre-selecting or guiding users toward more expensive product options (Mathur et al., 2019) 	Mathur et al. (2019)

Table 3: Types of dark patterns as described by Gray et al. (2018) and Mathur et al. (2019).

Technique	Description	Examples	Source
		<ul style="list-style-type: none"> Visual Interference, or emphasizing certain choices visually (Mathur et al., 2019) and Trick Questions, or use of confusing language (Mathur et al., 2019) were considered separately as part of Aesthetic Manipulation as described above and by Gray et al. (2018), rather than with Misdirection as described by Mathur et al. (2019) since Mathur et al. extracted these patterns from text (p. 81:17) while the present research relied on visual analysis 	
Social Proof	Emphasizing the behavior of others to influence decision-making	<ul style="list-style-type: none"> Activity Messages broadcast the activity of other site users, which may use fake user names, but attract consumers' attention Testimonials of Uncertain Origin, in which it is unclear whether the testimonials were created by actual users 	Mathur et al. (2019)
Scarcity	Emphasizing a product's desirability through demonstrating demand	<ul style="list-style-type: none"> Low-Stock Messages indicate when supply of a product is low, often without displaying the remaining amount The inverse of Low-Stock Messages, High-Demand Messages indicate that a product may sell out 	Mathur et al. (2019)

3.4 Positionality

The researcher approaches the research question from her perspective as a white, middle-class female in the United States who received an undergraduate degree in Psychology, is currently enrolled in a graduate program, and is employed as a Research Assistant. Her perspective and the present research are undoubtedly influenced by her experiences, including her role as a student, past employment in the

fields of finance and technology, and prior exposure to critical theories of design. She can only complete her analysis through these lenses; she cannot, for example, replicate the lived experience of a user with less mobile shopping exposure who may shop for clothing on an older mobile device in the context of their daily life. As a result, the present research is limited. The researcher acknowledges that she may not have fully understood the impact that different nudges could have on different site users. Additional limitations include a primary focus on describing and interpreting visual and interactive web design elements. The researcher has likely failed to identify certain design patterns, such as the third-party JavaScript libraries used to display deceptive “low stock” or “out of stock” messages identified by Mathur et al. (2019). The researcher also acknowledges the subjective nature of evaluating the intent of an interface design, and the possibility that she has misinterpreted the intent of a design. As Mathur et al. (2021) point out, HCI researchers should begin to focus more on using empirical methods including lab studies to evaluate dark patterns in terms of their impacts on users. The evaluations resulting from the present research are ultimately subjective judgements about design techniques that are open to interpretation and should be explored further in future research.

4 Discussion and Results

Analysis of supportive techniques was guided by choice architecture techniques described by Johnson et al. (2012) and Münscher et al. (2016), which were not developed specifically for digital environments; the researcher validated that these techniques were commonly used in the design of selected sites. In some cases, it seemed that these techniques were more consistent with dark than user-supportive patterns in the context of online shopping for apparel. With respect to limited time windows, Johnson et al. (2012, p. 492) state that in some cases, uncertainty about the future can lead people to procrastinate because the decision can be made later or a better option might be available in the future; for example, people tend to delay saving for retirement. To mitigate this, Johnson et al. propose using limited time windows to encourage focusing on the present. In the context of the analyzed sites, limited time windows seemed more consistent with the dark pattern of urgency, in which designers add time pressure through deceptive means, such as timers that count down to an expiration date that does not exist. The benefit to the seller of making a sale in the present is clear in terms of short-term monetary gain; the buyer will gain the purchased item, but if they made the purchase due to misleading time pressure, then they have made the purchase because of deceptive design. Johnson et al. (2012) and Münscher et al. (2016) do not go into specific detail about how designers might approach such potential ethical problems, but touch on ethical issues during their description of the identified techniques.

Johnson et al. (2012) identified individual differences as an implementation issue for choice architects, noting that different people process decision environments in different ways. They suggest that design should be informed by knowledge about the decision environment and characteristics of decision-makers, noting that "...we already know quite a bit about how individual differences influence decisions and how they interact with situations" (p. 497); in addition to the implication that choice architects are capable of understanding the inner lives and environmental contexts of the many kinds of people they are designing for, from a practical standpoint, this suggests that digital design should be informed by cookies and other tracking tools. With respect to ethical considerations, Johnson et al. (2012) acknowledge that some have criticized the idea of influencing people through choice architecture without their knowledge and mention the possibility of informing people about the use and potential effects of choice architecture.

Münscher et al. (2016) devote more time to considering the complexity of choice architecture techniques, noting that different techniques likely rely on the same underlying cognitive processes; for example, emphasizing public commitment and changing social consequences may be effective because people tend to want other people to view them in a positive light. Additionally, one technique might rely on different cognitive processes. They encourage consideration of the potential impacts of these techniques, stating that choice architecture would likely not be warranted if the people who ultimately display the intended behavior oppose it or could face negative consequences from their surrounding environment. They add that because of "multiple variables" (p. 513), they cannot provide instructions for connecting specific choice architecture techniques to specific reasons that people do not automatically engage in the architect's desired behavior. They believe that the field of choice architecture "is too complex to suggest a straightforward toolkit for generalists" (p. 520) and instead

recommend that choice architects use their proposed taxonomy to determine whether such techniques would apply to the task at hand.

Dark patterns by their definition have been considered from a more critical standpoint, as described by Grey et al. (2018) and Mathur et al. (2019), than patterns intended to support users. The term “dark pattern” emerged as a way for UX practitioners to identify and talk about techniques that leveraged knowledge about human nature and psychology against users (Grey et al., 2018). Mathur et al. (2019) identified dark patterns in approximately 11% of their data set and found that more popular shopping websites were more likely to use dark patterns. Dark patterns are becoming more common (Mathur et al, 2019), and the researcher validated their use within the analyzed sites.

The researcher took detailed notes during her analysis of the 25 selected sites. The following results include detailed analyses of the first eight sites in the order they were analyzed. Table 4 provides a visual summary of instances of choice architecture techniques identified across the websites, including where supportive and dark techniques were present and absent. During analysis, the researcher judged some techniques to be gray areas, meaning that they could be used in supportive or manipulative ways. The researcher also made note when she encountered particularly supportive techniques and identified them within the table as best practices. The table represents a total of 626 instances, including 298 supportive techniques, 13 instances when supportive techniques were absent, 142 dark techniques, 29 instances when dark techniques were absent, 132 instances of gray areas, and 12 instances of best practices.

In the researcher’s view, all the sites analyzed implemented at least some supportive choice architecture techniques; for example, limiting the number of navigation options was commonly observed as one method for reducing alternatives. The

researcher observed some form of interface interference, such as hidden information and defaults in favor of privacy settings that benefit companies over the people buying their products, in 24 out of the 25 sites analyzed. Sneaking, which included unexpected price increases, and forced action, such as requiring account creation, were observed on 21 out of the 25 sites analyzed. Nagging was also common, with 19 out of the 25 sites using techniques like popup windows that interrupted the researcher's task. Examples of best practices included techniques that balanced business and end user needs, such as clearly stated data collection practices, and defaulting to settings that opted users out of sharing their data.

The researcher noted many instances that she could not classify as exclusively supportive or dark. Many of these instances were related to defaults; the reasons that item category views defaulted to "featured," for example, were unclear. In the researcher's view, this lack of clarity around whether and when choice architects guide users toward certain choices highlights the need for interface designers to consider the potential impacts of such "nudges" on people who are likely unaware that they are being guided at all.

4.1 Overstock.com

4.1.1 Supportive Choice Architecture

4.1.1.1 Reducing Alternatives.

After choosing the "Women's Clothing" category within "Clothing & Shoes," the image carousel at the top of the "Women's Clothing Store" showed images representing four categories of clothing at a time; this helped reduce the over 180,000 Women's Clothing items to a manageable number of groups.

4.1.1.2 *Technology and Decision Aids.*

The homepage presented a “Things We Know You’ll Love” section, presumably providing product recommendations based on browsing history. This design pattern was present across many of the analyzed sites.

4.1.1.2.1 **Potentially Supportive.**

Personalized product recommendations could help customers discover items that they need but may have otherwise missed.

4.1.1.2.2 **Potentially Dark.**

Technology that provides recommendations by tracking users’ online behavior may violate individual welfare (Mathur et al., 2021) by prioritizing the sale of recommended goods over user privacy. Acknowledging this potential dark side, the researcher considered this to be a supportive technique during her analysis.

4.1.1.3 *Defaults (Change Choice Defaults).*

After an individual item was selected, the selected quantity defaulted to one, likely a safe assumption to help streamline the process of adding a single item to the cart.

4.1.1.4 *Focus on Satisficing.*

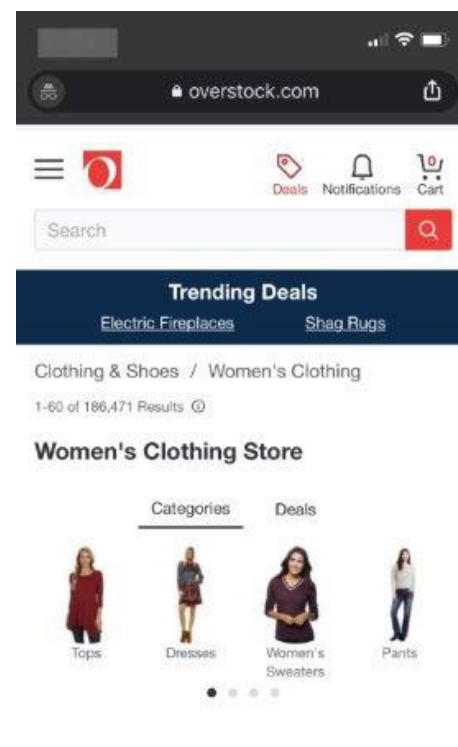
Along with displaying the details of an individual clothing item, Overstock.com suggested alternative similar options in a different department.

4.1.1.5 *Limited Time Windows.*

This analysis took place close to Labor Day, and Overstock.com displayed a “Labor Day Sale” graphic. Individual items that were on sale for Labor Day were also

Figure 1 (4.1.1.1)

Overstock.com Categories



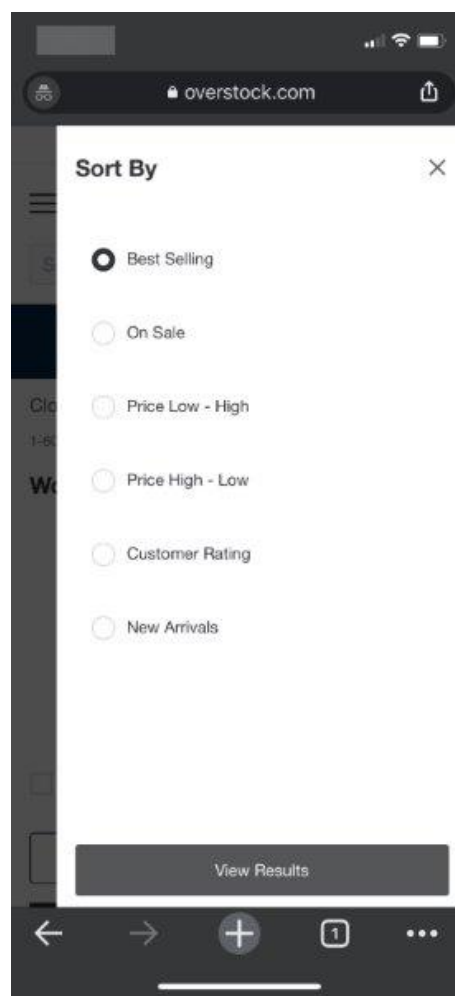
tagged with a “Labor Day” identifier. It was unclear to the researcher whether this limited time window supported users’ potential goals or added time pressure; accordingly, the researcher considered this design pattern to be a gray area.

4.1.1.6 *Decision Staging.*

According to Johnson et al. (2012), buying clothing involves choosing between a small set of alternatives; in situations that involve complex, multi-step decisions, information architecture would simplify the decision process. Decision staging in the context of Overstock.com was observed in the presentation of different size and color options. Notably, there were 55 possible size and color options to choose from, and the options were presented in a long list that did not allow the researcher to easily choose an available size and option. Staging was present, but since the intent behind presenting the long list of options was unclear, the researcher considered this a gray area.

Figure 2 (4.1.1.6)

Overstock.com Sort: Best Selling



The researcher also observed that many of the decision staging patterns on clothes shopping sites focused on the default way to sort and therefore visually present items to users. Items in the Overstock.com Women’s Clothing Store were sorted by the “Best Selling” attribute.

4.1.1.6.1 Potentially Supportive.

Information architects must choose a sort order, and it is reasonable to assume that users may be most interested in the most popular items due to their style, quality, or some other feature.

4.1.1.6.2 Potentially Dark.

It was unclear whether presenting best-selling items first at least partially leveraged the social proof dark pattern or prioritized the site making a sale over users' various goals, violating individual welfare (Mathur et al., 2021). The researcher considered this to be a gray area.

4.1.1.7 Partitioning of Options.

On Overstock.com's homepage, the researcher encountered aspects of an advertised sale partitioned into sections, each with different visual emphasis. In the upper left side of the screen, where eye tracking studies have consistently demonstrated that website visitors who read from left to right focus substantial attention (Pernice, 2017), an extra 15% off was advertised in large white font with high contrast against a dark blue background. Partitioned to the right was a section in smaller print with less contrast against the lighter blue background clarifying that the 15% off applied to select furniture by a specific brand. The "Shop Now" button was positioned below a large

image of a sofa; the dark blue button color was consistent with the 15% off background.

Figure 3 (4.1.1.7)

Overstock.com Partitioned Ad



4.1.1.7.1 Potentially Supportive.

In this context, this choice architecture encouraged the user to click “Shop Now” by advertising a sale; users looking specifically for furniture might be interested in the sale.

4.1.1.7.2 Potentially Dark.

It’s possible that the designers intended to attract clicks that they might not otherwise have gotten through de-emphasizing the limited application of the sale. This would prioritize business needs over user needs, and influence user decision-making in a specific direction, violating individual welfare and individual autonomy, respectively (Mathur et al., 2021); accordingly, the researcher considered this to be a gray area.

4.1.1.8 Attribute Parsimony and Labeling.

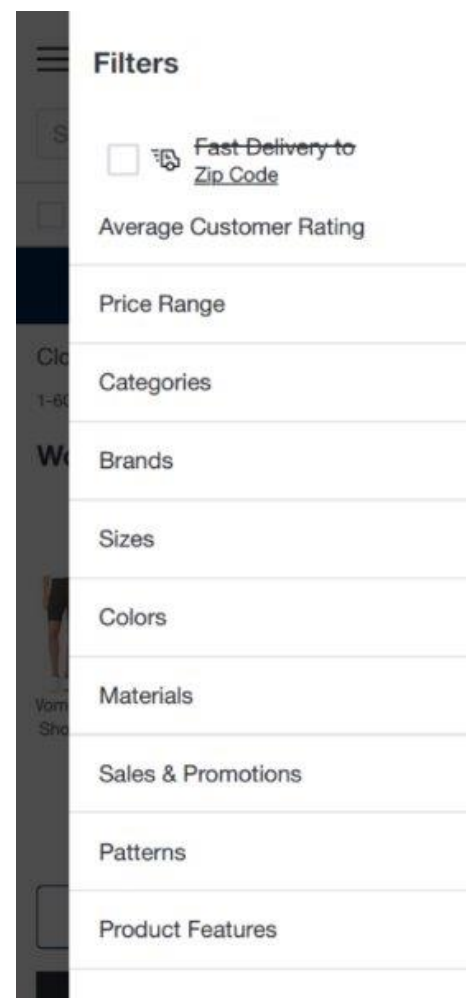
From the list of results in the Women’s Clothing Store, it was possible to select the “Filter” option and filter based on 12 different attributes.

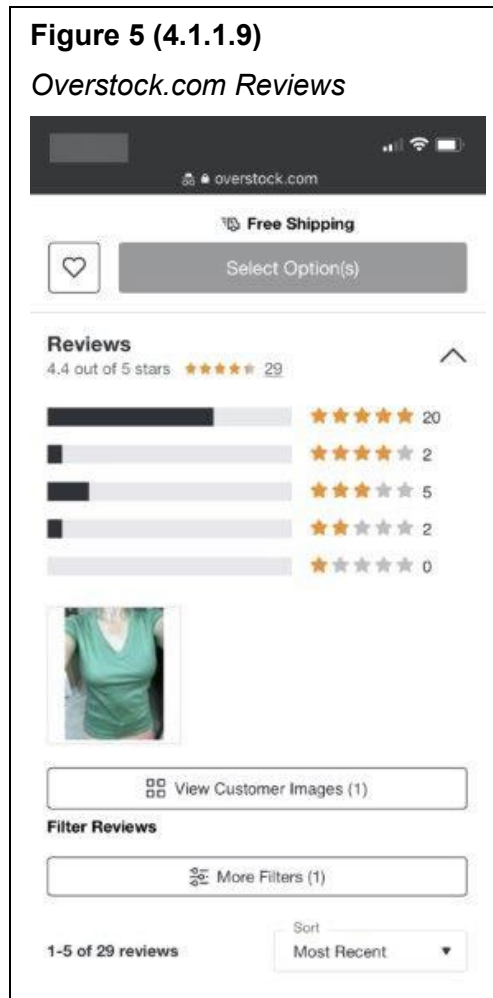
4.1.1.9 Translate and Rescale for Better Evaluability (Translate Information).

Clothing item reviews were displayed in aggregate, and a breakdown of individual reviews was shown in horizontal bar chart format. The average of all reviews alongside the number of reviews that fell into each rating category helped convey the item’s overall rating.

Figure 4 (4.1.1.8)

Overstock.com Filters



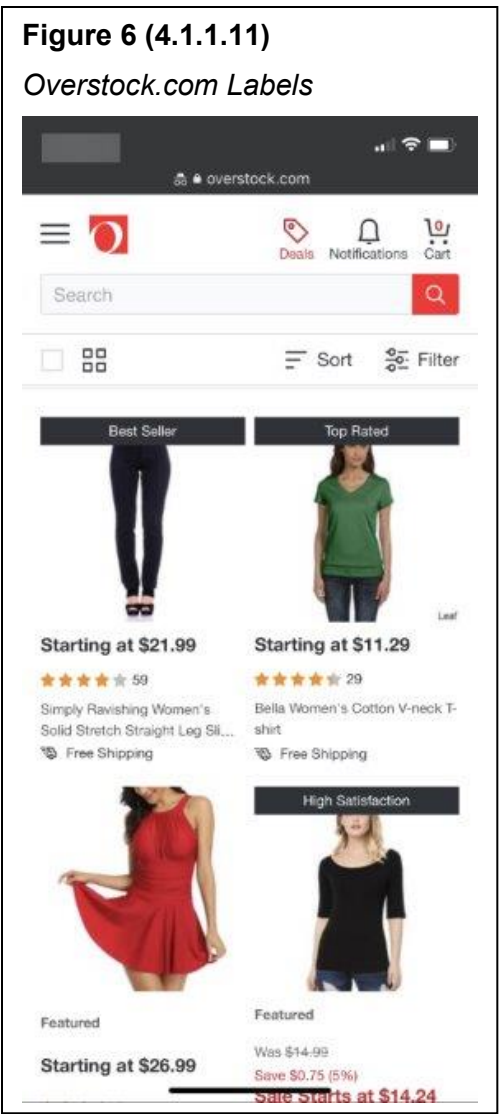


4.1.1.10 Make Information Visible.

The researcher received visual feedback on where she was within the site via breadcrumbs (see Figure 1, above), which made her behavior visible (Münscher et al., 2016).

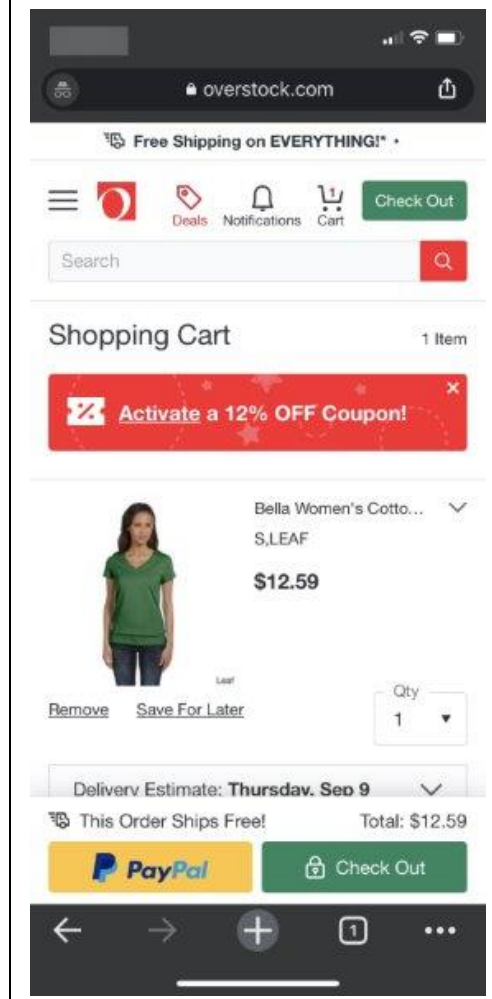
4.1.1.11 Provide Social Reference Point.

The buying behavior and experiences of other Overstock.com users were visible through item labels including “Best Seller,” “Top Rated,” and “High Satisfaction.”

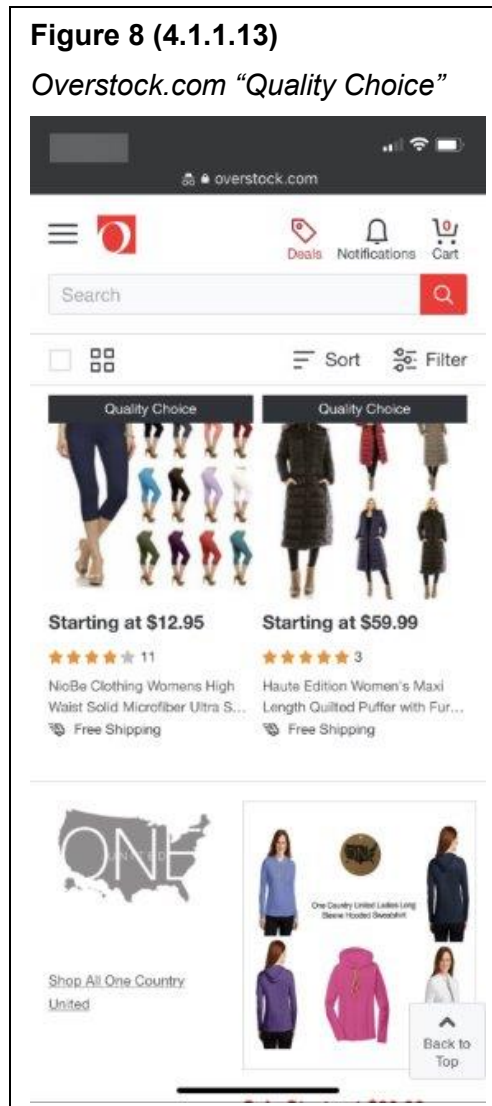


4.1.1.12 Change Option-Related Effort.

In the researcher's view, the process of using a coupon was simplified compared to other sites; the coupon was applied to the cart automatically after the researcher selected it. The researcher was able to activate the coupon when prompted rather than having to remember and enter a coupon code.

Figure 7 (4.1.1.12)*Overstock.com Coupon Prompt***4.1.1.13 Change Range or Composition of Options.**

Different pieces of clothing displayed different indicators; for example, certain items were distinguished with a “Quality Choice” indicator. The researcher was not prioritizing quality while browsing through clothing options, but the presence of this indicator could have influenced her preference in the moment, or the “decision situation” (Münscher et al., 2016, p. 518).



4.1.1.14 Change Option Consequences.

The clothing options displayed the opportunity to “Shop All One Country United,” a brand that purports to support a message of American unity and donate a portion of its proceeds to charity (see Figure 8, above). This could connect the decision to purchase from Overstock.com to positive social outcomes.

In addition, the researcher received an option to activate a coupon immediately after adding an item to the shopping cart (see Figure 7, above); the consequence of adding an item to the cart and completing the sale would be receiving 12% off.

4.1.1.14.1 Potentially Supportive.

A small discount would likely be a bonus for users who are already certain that they will complete their purchase.

4.1.1.14.2 Potentially Dark.

This choice architecture technique works by providing an “insignificant” benefit that “changes the probability of occurrence” (Münscher et al., 2016, p. 518). A choice architect’s conception of a significant financial incentive is likely to be different from that of the site’s users. It is possible that some users who are more vulnerable than others would be enticed into making a purchase by a small discount when they would be better served by postponing the purchase.

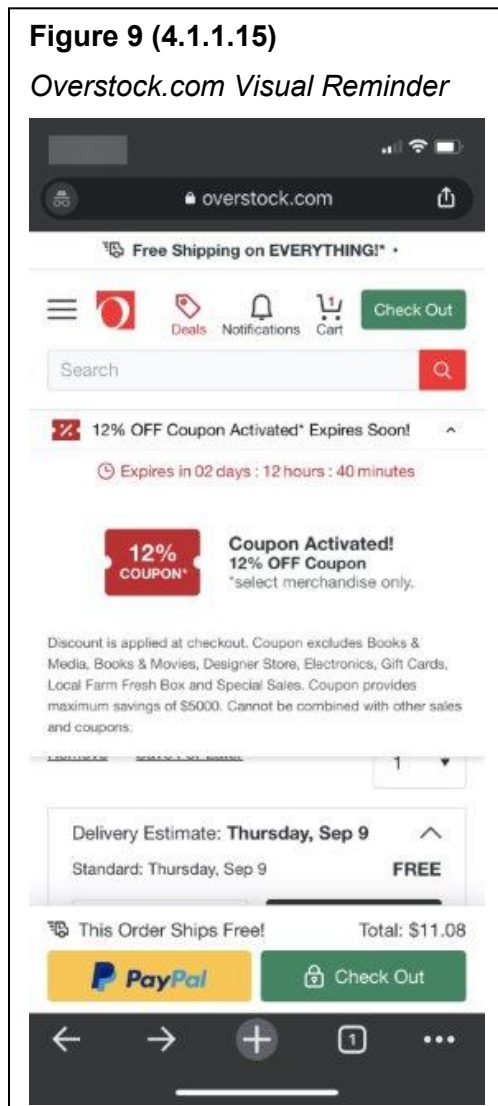
Accordingly, the researcher considered this pattern to be a gray area.

4.1.1.15 Provide Reminders.

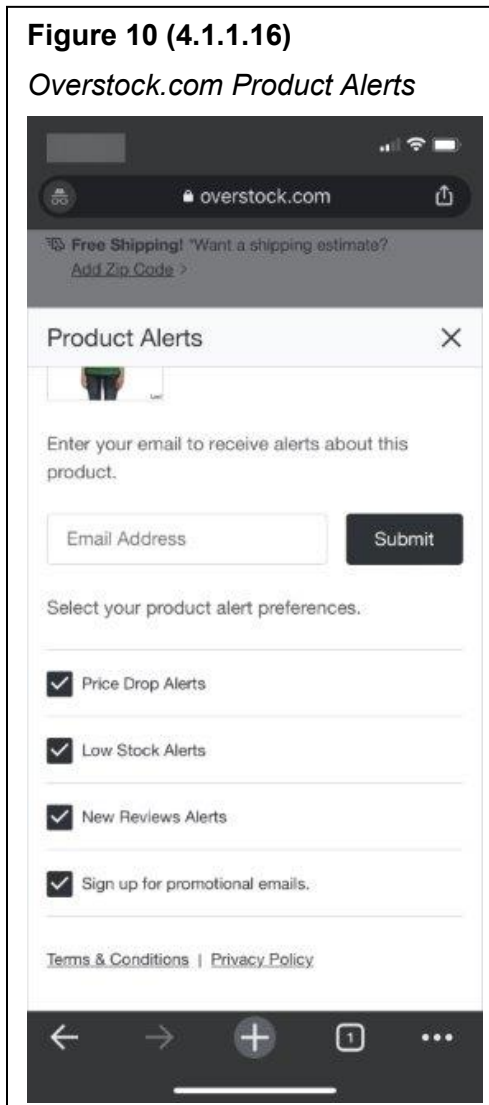
Activating the coupon resulted in applying it, which introduced a red icon across the top of the shopping cart that served as a visual reminder that the coupon had been applied. This re-focused the researcher’s attention on the shopping cart and the checkout process.

4.1.1.16 Facilitate Commitment.

Overstock.com encouraged public commitment through providing the option to share items with other people by email or social media channels.



Within the same section, self-commitment (to saving money by waiting for the item's price to drop, for example) was supported through product alerts; the researcher could have signed up to receive price drop, low stock, and other alerts related to the selected item.



4.2 Overstock.com

4.2.1 Dark Patterns

4.2.1.1 Nagging.

While the researcher's actions were not unexpectedly interrupted or redirected while using the Overstock.com site, this site gave the researcher her first experience during this analysis with an after-the-fact email reminder.

4.2.1.1.1 Potentially Supportive.

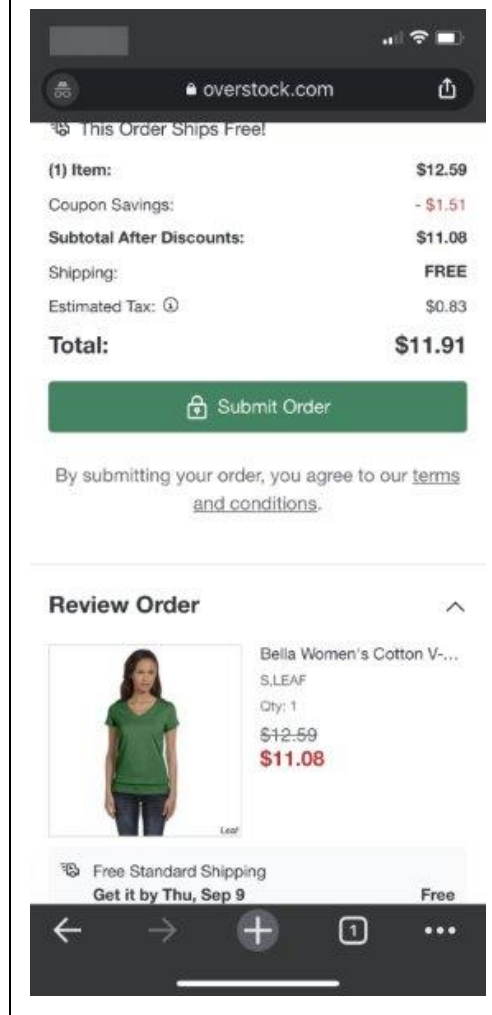
The researcher used the guest option and provided her email address to proceed through the first part of the checkout process, as outlined in the Methods section. A user who abandoned their purchase might appreciate receiving a follow-up email and see it as a reminder to pick up their shopping where they left off.

4.2.1.1.2 Potentially Dark.

Since the researcher did not create an account or complete a purchase and was not clearly informed that her personal information would be saved, receiving an unsolicited email felt like nagging. Accordingly, the researcher considered this pattern to be a gray area.

4.2.1.2 Obstruction.

In the researcher's judgment, it was more difficult than it should have been to make order changes during the checkout process; the checkout page offered space for shipping address and payment information along with a "Submit Order" button, but the only way to make changes to the order being placed was to use the browser's back button. The researcher could not conclude that the omission of an easy way to edit the cart was intentionally obstructive, so she considered this to be a gray area.

Figure 11 (4.2.1.2)*Overstock.com Submit Order Page***4.2.1.3 Sneaking.**

To distinguish sneaking from other patterns that obscured information, the researcher characterized sneaking as a pattern “snuck in” an outcome that conflicted with an action. The researcher did not observe this type of sneaking on Overstock.com.

4.2.1.4 Interface Interference.

The researcher observed multiple instances of the hidden information pattern on Overstock.com. She noticed a fine print message on Overstock’s homepage that indicated that shopping served as consent to Overstock’s use of cookies. As noted

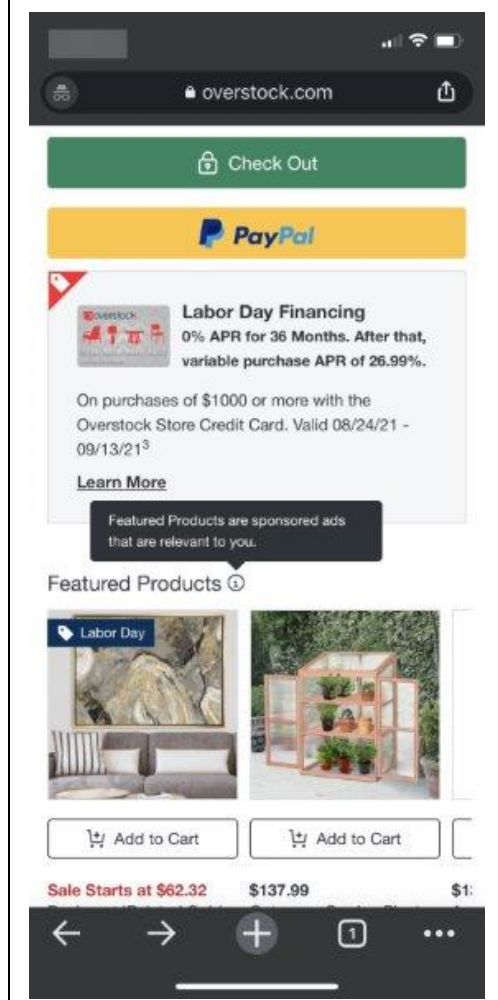
previously, the researcher received an email after using the site. The pertinent in-site information that conveyed that an active step would need to be taken to unsubscribe from promotional emails was hidden in the site's "Privacy and Security Policy" accessed through the "Learn More" link within the fine print message. Additionally, after applying a coupon, the researcher observed that the coupon only applied to certain items; the exclusions were partially obscured by the use of fine print.

The researcher also observed the preselection pattern in the shopping cart. In one instance, the option to use the shipping address as the billing address was preselected, while in another case, user consent to receive SMS updates about the order was preselected. Preselected defaults can be designed and implemented in supportive ways, but the motivation for preselecting SMS order updates was unclear and raised questions about whether opting into SMS updates would also opt users into receiving promotional SMS content.

The researcher also observed a section of "Featured Products" during the checkout process. After selecting the information icon, she observed that the products shown in this section were advertisements. Visually, the Featured Products category matched the design of the rest of the Overstock.com site and could be mistaken for product recommendations based on browsing history or some other factor. This type of "Disguised Ad" pattern is a form of

Figure 12 (4.2.1.4)

Overstock.com Featured Products



Aesthetic Manipulation that draws attention away from the fact that the content is sponsored (Gray et al., 2018).

4.2.1.5 Forced Action.

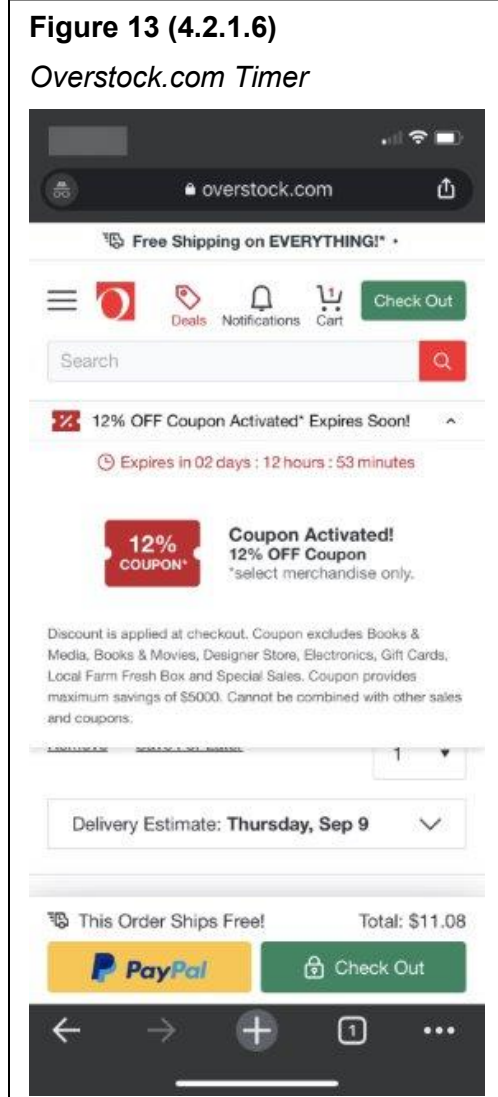
As previously mentioned, the researcher received an unsolicited promotional email after going through part of the checkout process. To use the site, the researcher had to consent the site's Privacy and Security Policy, which was hidden, and which referred to Overstock's information collection and sharing practices, to use the site. Accepting this policy included accepting the sale of personal information to third parties. This was an example of "Privacy Zuckering," in which users are likely unaware of the multiple ways in which their information is shared.

4.2.1.6 Urgency.

After the researcher applied the offered coupon to her order, a timer started counting down the remaining time, as if the coupon would no longer be available when the timer expired. The language used about the coupon indicated "...Expires soon!" while the timer displayed over two days before the coupon would expire. This type of countdown design pattern emphasizes time limits to speed up decision-making (Mathur et al., 2019).

4.2.1.7 Misdirection.

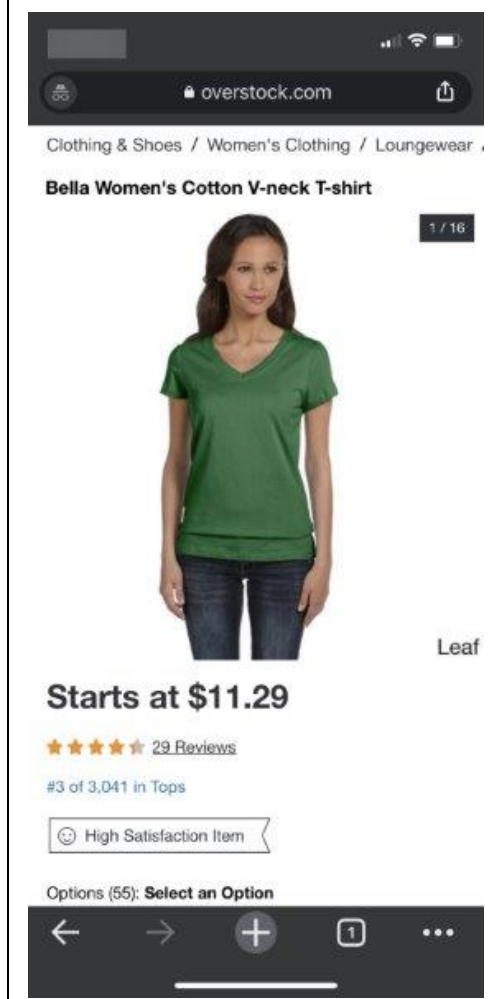
The researcher did not observe examples of blatant confirmshaming, such as directing emotionally manipulative language at



users, or pressured selling, such as encouraging users toward the most expensive options, as described by Mathur et al. (2019). She did observe more subtle use of emotion in the form of emojis, which could influence users' purchasing decisions. The clothing item that the researcher selected was labelled as a "High Satisfaction Item," and the message was paired with a smiley face. As noted by Esposito et al. (2017), pairing messages with emojis can make messages more effective for some consumers. While the presence of an emoji does not seem particularly dark, it may fall in a gray area of choice architecture that influences decision-making without the full knowledge of the decision-maker.

Figure 14 (4.2.1.7)

Overstock.com "High Satisfaction"



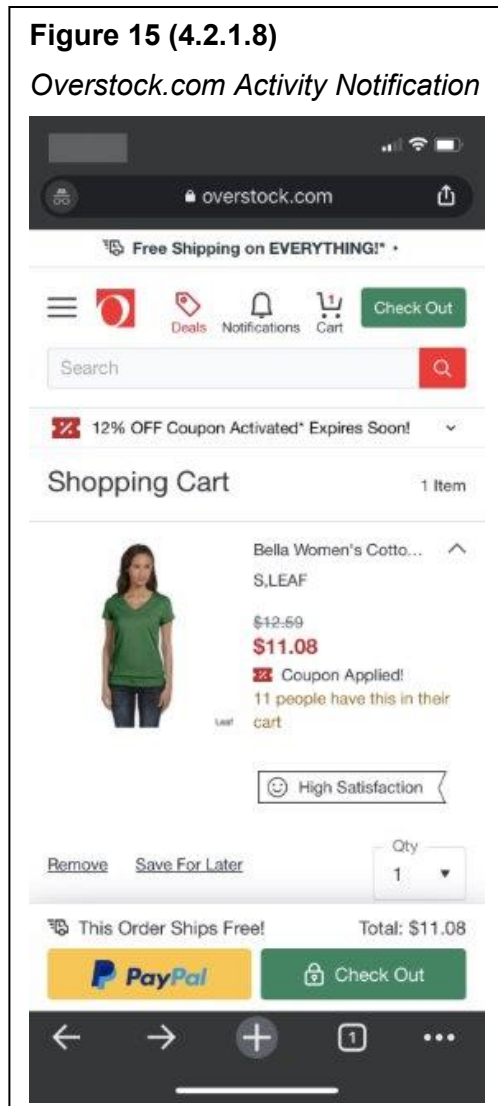
4.2.1.8 Social Proof.

People often look to the behavior of others to determine what their actions will be; showing the behavior of others can be used to speed up decision-making (Mathur et al., 2019). After adding a product to the cart, the researcher was shown a message stating, “11 people have this in their cart.” According to Mathur et al. (2019), this type of “Activity Notification” may be legitimate or deceptive. Some sites use randomly generated numbers or are coded to show that a specific number of people have viewed or purchased an item.

4.2.1.9 Scarcity.

If a product is shown to be scarce through limited availability or high demand, it is often perceived to have high value (Mathur et al., 2019). While Overstock did not explicitly state the remaining quantity of or demand for the item the researcher selected, it displayed that the product was ranked third out of over 3,000 products in its category (see Figure 14, above), implying high demand for the product.

Overstock.com also emphasized the behavior of their site’s users (social proof) and potential scarcity in subtle ways including displaying a “Trending Deals” banner at the top of the Women’s Clothing Store. Additionally, individual items were distinguished from other items with a “Best Seller” identifier. If items are trending, it is reasonable to assume that others are buying them; if items are best sellers, it is reasonable to assume



that there may be limited quantities remaining. Since these design patterns were subtle, the researcher considered that these subtle references fell into a gray area.

4.3 Bloomwholesale.com

4.3.1 Supportive Choice Architecture

4.3.1.1 Reducing Alternatives.

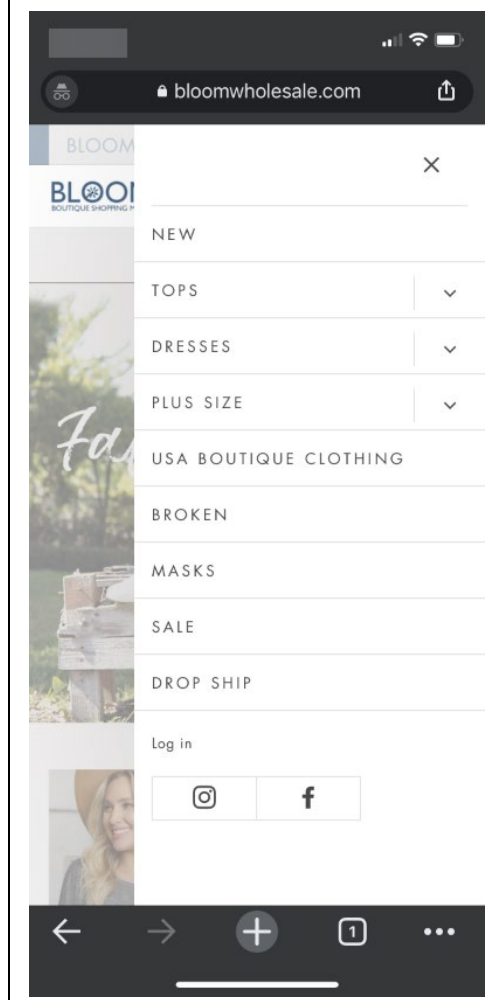
The menu options presented in the right-hand side navigation limited the number of clothing categories to nine; this balanced the tradeoffs between presenting too few categories which could discourage consideration and presenting too many categories which could overwhelm the decision-maker (Johnson et al., 2012).

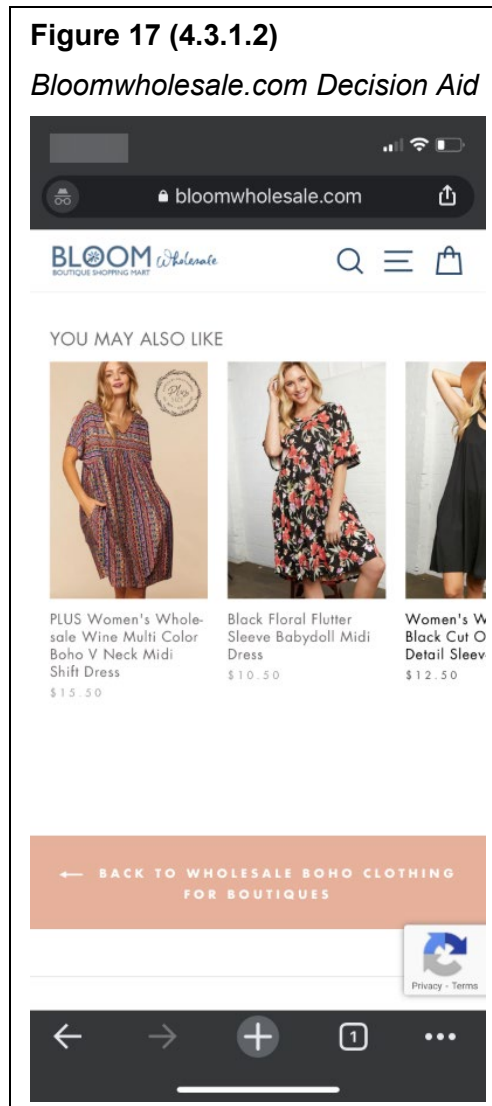
4.3.1.2 Technology and Decision Aids.

When viewing a clothing item, the researcher scrolled past the item details and observed a “You May Also Like” section, which suggested similar clothing items. This type of decision aid could help users find items that they might like but were previously unaware of (Johnson et al., 2012).

Figure 16 (4.3.1.1)

Bloomwholesale.com Categories





4.3.1.3 Defaults (Change Choice Defaults).

The researcher eventually deduced that by default, a “pack” of the selected item (see Figure 18, below) included two of each small, medium, and large size option; there was no way to choose a different combination of sizes, making this an example of a no-action default.

4.3.1.4 Focus on Satisficing.

Johnson et al. (2012) point out that encouraging consideration of alternative or “second-best outcomes” (p. 492) can combat a tendency to put off decisions. By presenting alternatives, the You May Also Like section (see Figure 17, above) could

encourage satisficing if the user observed that none of the alternative options met their needs as well as the selected item.

4.3.1.4.1 Potentially Supportive.

Eliminating the presented alternatives could help a user identify a product that meets their needs.

4.3.1.4.2 Potentially Dark.

A user may have a valid reason to put off their purchase for another time, such as the need to wait for payday, in which case being influenced toward a quick decision would not be to their benefit. The researcher acknowledged this possibility, and for the purposes of the present research, considered this type of pattern as supportive.

4.3.1.5 Limited Time Windows.

The researcher did not observe an emphasis on limited time windows.

4.3.1.6 Decision Staging.

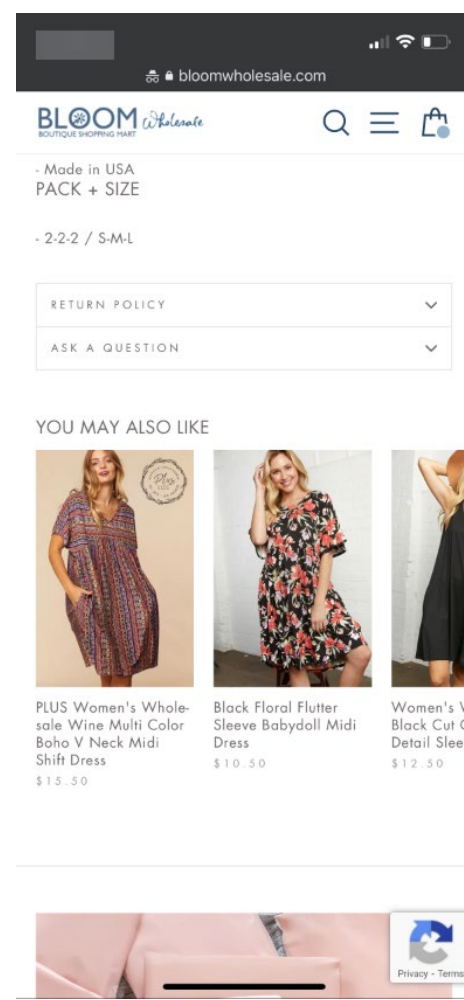
In contrast to the many possible size and color combinations noted on Overstock.com, decision staging in the context of Bloomwholesale.com was minimal; the clothing item was shown in one color and set of sizes.

4.3.1.7 Partitioning of Options.

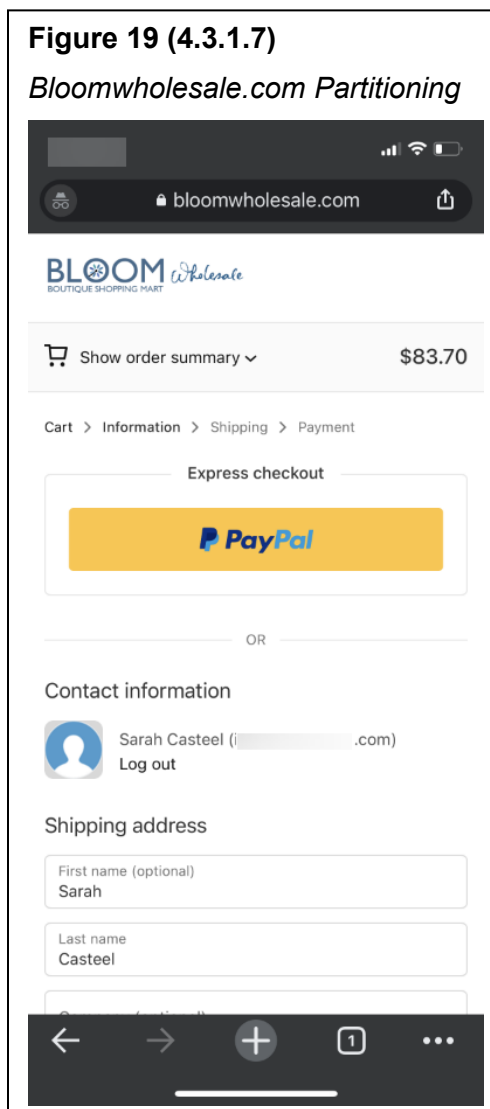
The payment page was partitioned into separate sections to strategically emphasize the “Express checkout” option. Express checkout was visually distinguished with an outline and bright color; it was separated from the “Show

Figure 18 (4.3.1.6)

Bloomwholesale.com Size Staging

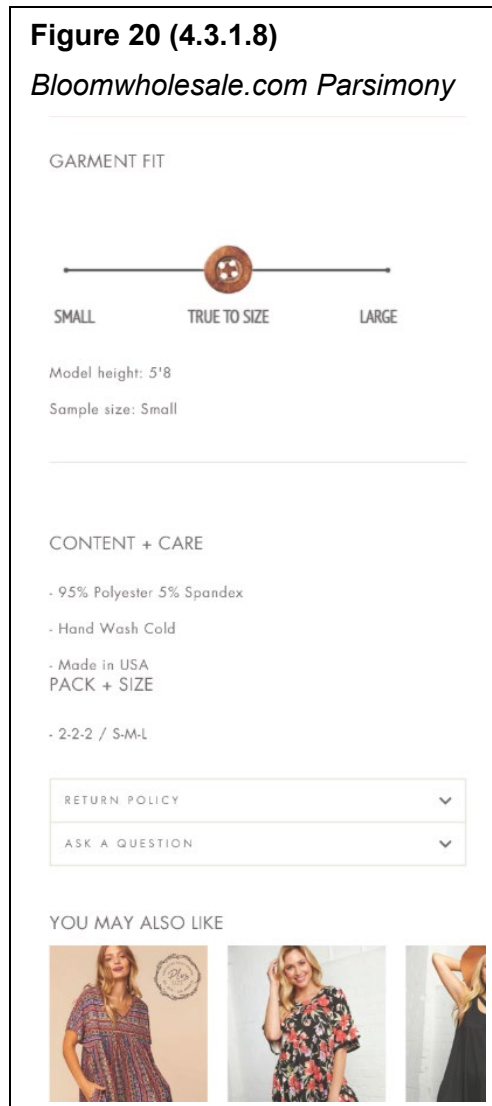


order summary” section above, which was collapsed with the ability to expand to see details, and from the “Contact information” section below, where the process of using any other payment form would start.



4.3.1.8 Attribute Parsimony and Labeling.

Presenting a small number of attributes simplifies decision-making effort (Johnson et al., 2012). Attribute parsimony was observed in the “Garment Fit” and “Content + Care” sections of the item description, which consisted of a mostly bulleted list of key facts about the item.



4.3.1.9 Translate and Rescale for Better Evaluability (Translate Information).

Translating can involve reframing or simplifying content (Münscher et al., 2016). Bloomwholesale.com translated the size of the clothing item shown; rather than displaying only size labels and measurements, the site provided the height of the person modelling the clothing to help the user evaluate how the item would look (see Figure 20, above).

4.3.1.10 Make Information Visible.

The researcher's place in the overall checkout process was made visible within the shopping cart. The steps in the process were shown at the top of the cart, and the text describing the current step in the process darkened when it was reached.

4.3.1.11 Provide Social Reference Point.

People tend to take the opinions and actions of well-known individuals into account when making decisions (Münscher et al., 2016).

While the researcher did not observe the opinion of a well-known person being featured on Bloomwholesale.com, she observed the presence of the "Boutique Clothing Blog" that contained articles focused on advice for wholesalers. The researcher interpreted this as the brand's attempt to position itself as an opinion leader; opinion leaders are sometimes used as social reference points by choice architects to influence decision-making.

4.3.1.12 Change Option-Related Effort.

During the checkout process, auto-complete suggestions during address entry reduced the effort it took to complete the purchase. When the address appeared incomplete, the site also displayed an informational icon and prompt suggesting that the address might be incomplete.

Figure 21 (4.3.1.10)

Bloomwholesale.com Checkout

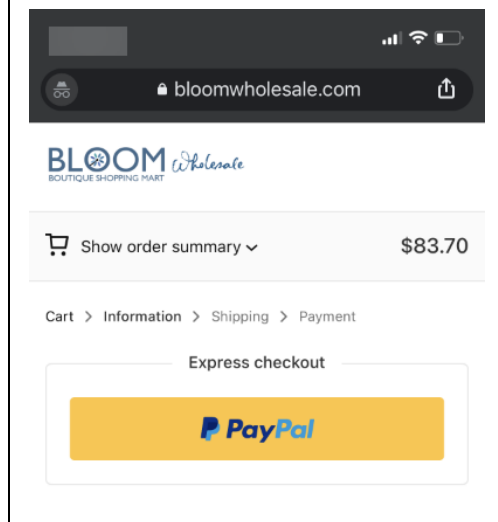


Figure 22 (4.3.1.12)

Bloomwholesale.com Prompt

4.3.1.13 Change Range or Composition of Options.

While the default shopping option was “Bloom Wholesale,” the homepage also presented a “Bloom Dropship” option. The researcher did not know what dropship meant, but the presentation of a dropship tab alongside wholesale (as well as its emphasis above the first and within the second image) attracted consideration of dropship as an option.

Figure 23 (4.3.1.13)

Bloomwholesale.com Dropship Option



4.3.1.14 Change Option Consequences.

After clicking the homepage link to “Review our latest launch,” the researcher landed on a description of the company’s drop shipping program. Following the description was a list clearly connecting the choice to drop ship with benefits.



4.3.1.15 Provide Reminders.

The day that the researcher created an account, she received an email confirming her account creation, which could serve as a reminder to visit the site. Since repeated reminders would constitute nagging, the researcher considered this to be a gray area.

4.3.1.16 Facilitate Commitment.

The previously mentioned benefits to drop shipping (see Figure 24, above) described a plan that Bloomwholesale.com had in place to support boutique owners through minimizing the owners' effort, which is one form of supporting self-commitment as described by Münscher et al. (2016).

4.4 Bloomwholesale.com

4.4.1 Dark Patterns

4.4.1.1 Nagging.

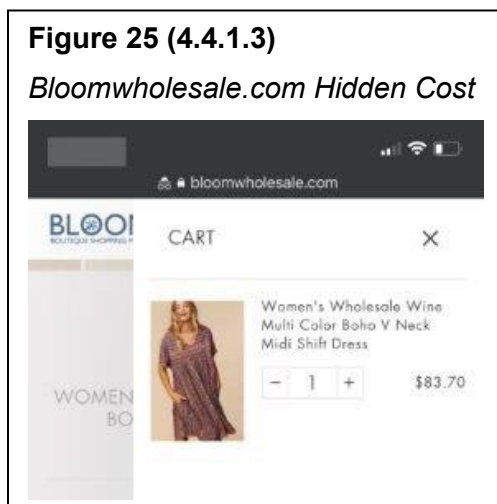
The researcher's actions were not unexpectedly interrupted or redirected while using the Bloomwholesale.com site. Due to human error, the researcher re-added an item to her shopping cart after completing her analysis of this site. The next day, she received two reminders sent within an hour of each other advising that an item had been left in her cart. This type of reminder did not meet the definition of in-site nagging but raised questions about when a supportive reminder becomes a nagging dark pattern, which lead the researcher to consider this to be a gray area.

4.4.1.2 Obstruction.

The researcher did not observe any obstructive design patterns.

4.4.1.3 Sneaking.

The researcher determined that Bloomwholesale.com used the "Hidden Costs" design pattern with respect to the unit price. When she selected a clothing item, the researcher was only able to view the unit price, or the price of one unit or piece of clothing; however, because this site catered to boutique



owners, users would be buying the same piece of clothing in multiple sizes for resale purposes. The full price inclusive of each unit being purchased was not displayed until after the researcher added an item to her shopping cart.

4.4.1.4 *Interface Interference.*

Related to the hidden costs mentioned above, the researcher observed interface interference in the form of hidden information about the definition of a unit. While “unit price” was openly displayed, the clothing item description did not define a unit or clearly state which items were included in the package being purchased.

4.4.1.5 *Forced Action.*

The researcher was forced to create an account to go through the purchasing process, a form of forced enrollment (Mathur et al., 2019). Beyond creating an account, the researcher noted the requirement to provide a phone number, which was a common requirement across the analyzed sites, and which this and other sites stated was necessary in case the

company needed to initiate contact about the order. The researcher questioned the necessity of collecting users’ phone numbers when she observed that another of the analyzed sites (QVC.com) made the phone number field optional.

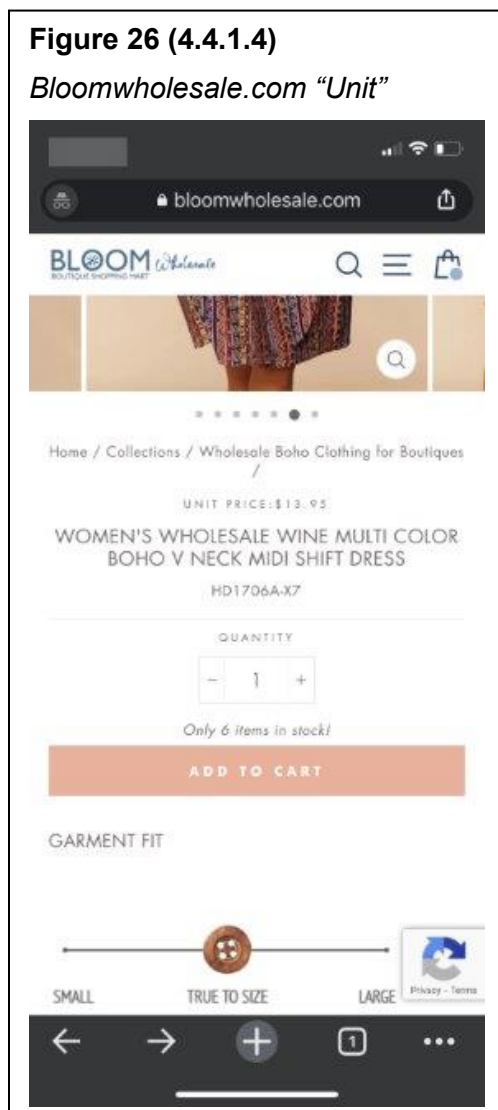


Figure 27 (4.4.1.5)***Bloomwholesale.com Forced Account***

The screenshot shows a mobile web form for creating an account on Bloomwholesale.com. The form is titled "Sarah" and includes the following fields: Last name (Casteel), Company (optional), Address (Manning Hall), Apartment, suite, etc. (optional), City (Chapel Hill), Country/region (United States), State (North Carolina), ZIP code (27514), and Phone. A red border highlights the Phone field, which has a red error message below it: "Enter a valid phone number". A tooltip above the Phone field reads: "In case we need to contact you about your order". At the bottom of the form, there is a black button labeled "Continue to shipping" and a link labeled "< Return to cart". At the very bottom, there are links for "Refund policy", "Privacy policy", and "Terms of service".

4.4.1.6 Urgency.

The researcher did not observe an emphasis on urgency.

4.4.1.7 Misdirection.

The researcher did not observe examples of blatant confirmshaming, such as directing emotionally manipulative language at users, or pressured selling, such as encouraging users towards the most expensive options, as described by Mathur et al. (2019). It is possible that placing "New Arrivals" at the top of the list of categories within the right-side navigation could be a subtle form of pressured selling that guides users

toward full-priced over sale-priced options, so the researcher considered this to be a gray area.

4.4.1.8 Social Proof.

In the researcher's judgment, there was a lack of explicitly stated social proof on Bloomwholesale.com; there were no customer reviews or testimonials. She observed subtle forms of social proof as noted below.

4.4.1.9 Scarcity.

After adding an item to the shopping cart, the researcher noticed a Low-stock Message on the item's description: "Only 6 items in stock!" (see Figure 26, above). This may have been true, but as previously noted, such messages are sometimes displayed despite there being sufficient stock to give the appearance that there may not be another chance to buy the item.

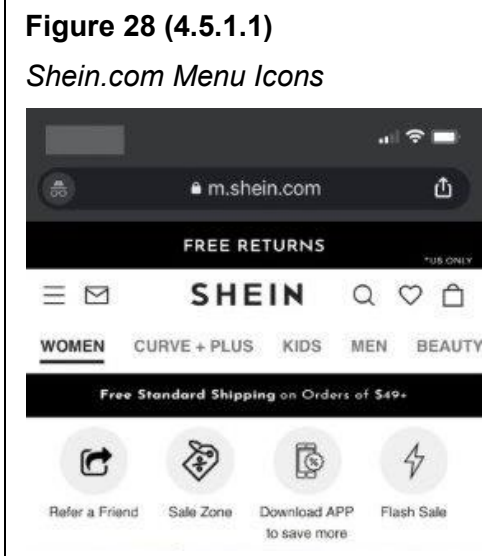
Like Overstock.com, Bloomwholesale.com emphasized the behavior of their site's users (social proof) and potential scarcity in subtle ways by sorting items by the Best Seller attribute by default. As previously noted, if items are best sellers, it is reasonable to assume that there may be limited quantities remaining, leading the researcher to consider those subtle social proof and scarcity references to be in a gray area.

4.5 Shein.com

4.5.1 Supportive Choice Architecture

4.5.1.1 Reducing Alternatives.

The top menu icons below the "Free Standard Shipping" banner emphasized just four categories. It was clear to the researcher that these categories could be scrolled



horizontally, simplifying the initial impression of categories while encouraging consideration of additional categories if desired.

4.5.1.2 Technology and Decision Aids.

After the researcher selected an item and scrolled past the shipping details, three top menu options appeared: “Goods,” “Reviews,” and “Recommend.” The Recommend section was divided into “You May Also Like” and “Often Bought With” sections, which offered product recommendations and featured products that other users bought with the selected item, respectively. The basis for the recommendations was unclear, but as previously mentioned, such decision aids can help users discover products that they like.

4.5.1.3 Defaults (Change Choice Defaults).

When the researcher first selected the option to collect coupons that were offered, she was directed to a landing page that defaulted to a “Sign in” option. The researcher could have selected the option to register or to use a third-party sign-in, but the option to sign in using Shein.com credentials was the default, perhaps to streamline the process for existing customers.

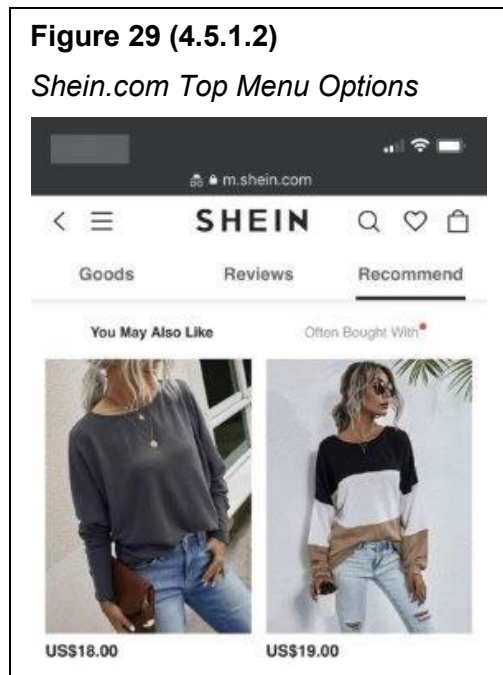


Figure 30 (4.5.1.3)*Shein.com "Sign In" Default*

The screenshot displays the mobile sign-in interface for Shein.com. At the top, the browser address bar shows 'm.shein.com'. Below the SHEIN.us logo, there are two buttons: 'SIGN IN' and 'REGISTER'. A dropdown menu indicates the 'Country/Region' is set to 'United States'. There are two input fields: 'EMAIL ADDRESS' and 'PASSWORD'. A 'SIGN IN' button is positioned below the password field. A link for 'Forgot your password?' is located to the right of the password field. At the bottom, there is a section 'Or Join With' with icons for Facebook and Google.

4.5.1.4 Focus on Satisficing.

In the event that a user found an item that was unavailable in their size, the ability to select items based on the user's size criteria provided a way to find "good enough" items that meet their criteria in the moment.

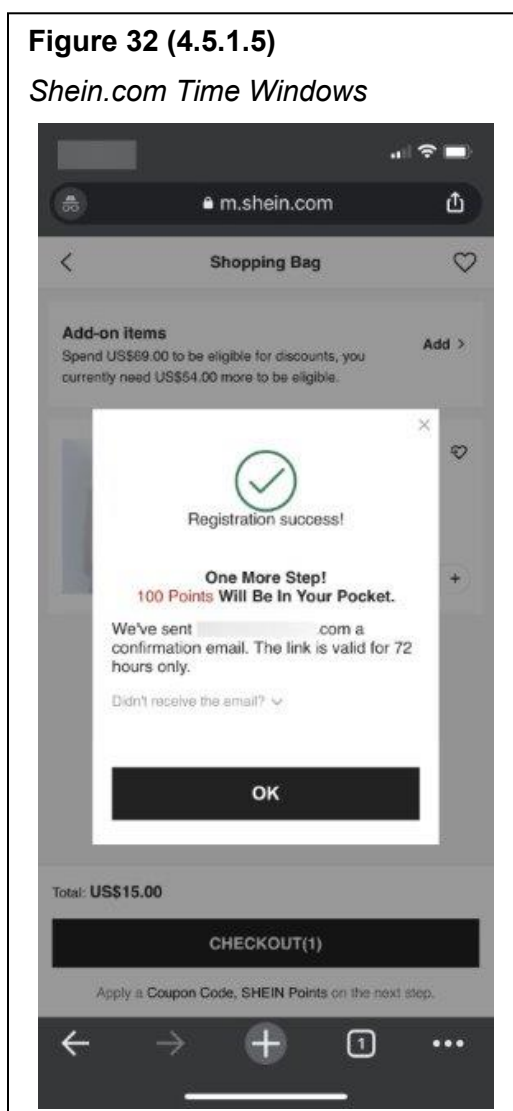
4.5.1.5 Limited Time Windows.

After creating an account, the researcher received a notification that she would need to confirm her account registration by clicking a link in an email that had been sent to her. The notification stated that the link would be valid for

Figure 31 (4.5.1.4)*Shein.com Size Selection Option*

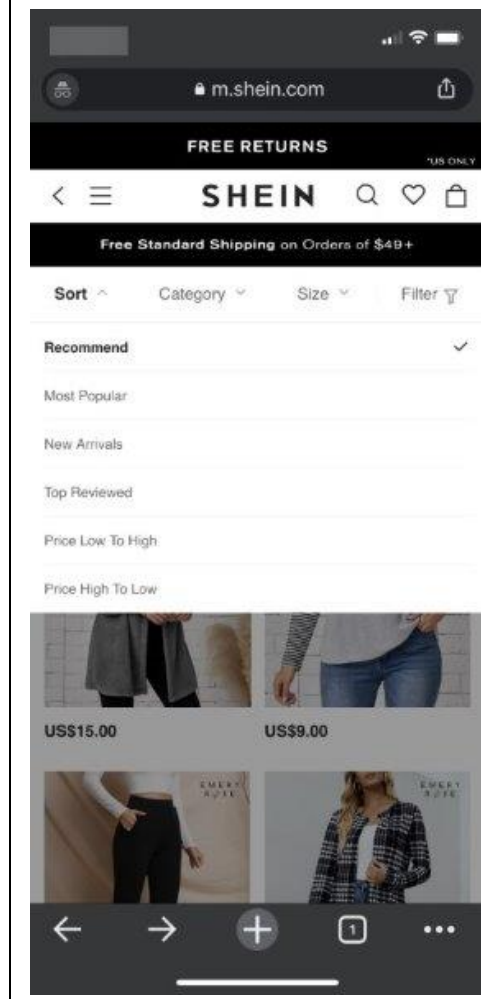
The screenshot shows the mobile app interface for Shein.com. At the top, there is a navigation bar with the SHEIN logo and icons for home, search, heart, and shopping bag. Below the navigation bar, there is a promotional banner for the SHEIN APP. The main content area shows a 'Size' filter section with buttons for various sizes: one-size, XXS, XS, S, M, L, XL, XXL, XXXL, 0XL, 1XL, 2XL, 3XL, and 4XL. The 'Size' filter is currently set to 'one-size'.

72 hours. It was unclear whether the account would not be created, or whether the company's offer for "100 points" would expire if the link was not clicked in time. Because the researcher was unsure of the designer's intention behind the time limit, and whether incentives would be removed after the time limit, the researcher considered this to be a gray area.



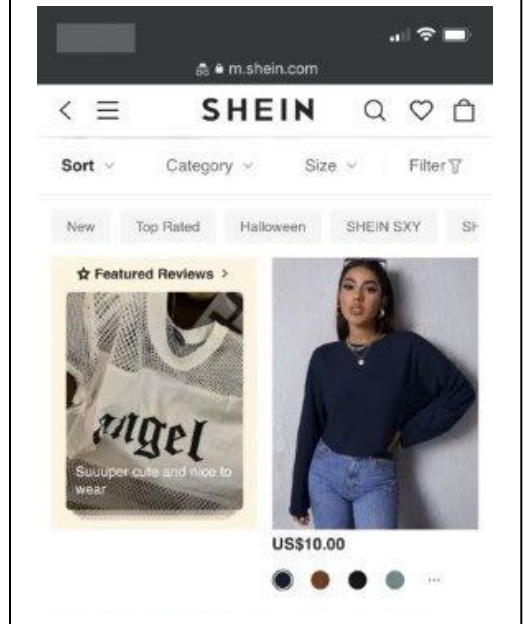
4.5.1.6 Decision Staging.

The ability to sort and filter on different attributes of clothing (see Figure 31, above) offered a way to narrow the field of possible choices; additionally, clothing in the selected category was sorted by the "Recommend" attribute by default.

Figure 33 (4.5.1.6)*Shein.com "Recommend" Default***4.5.1.7 Partitioning of Options.**

Within the selected clothing category, options were partitioned to emphasize the clothing items available for purchase; the most visual space was dedicated to large images of clothing, while sorting and filtering options were visually separate in small print above the images.

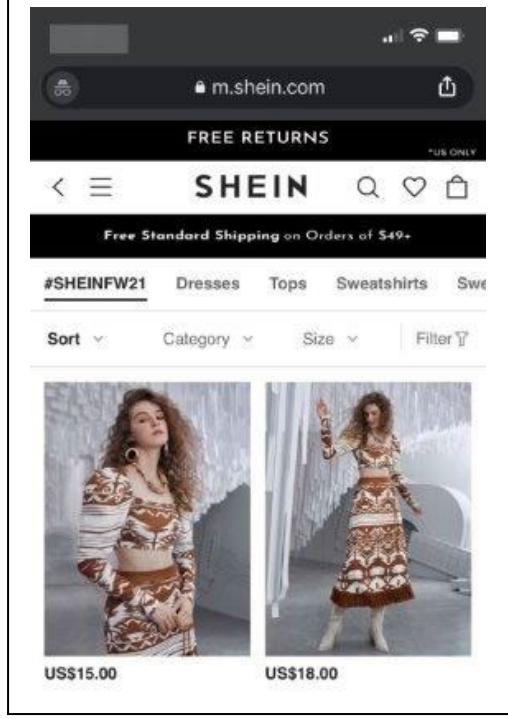
Figure 34 (4.5.1.7)
Shein.com Partitioning



4.5.1.8 Attribute Parsimony and Labeling.

Within the selected clothing category, the only text attribute visible by default was the price of the item. This implied that apart from image, price was the most important attribute for users deciding which item to choose to read more about. It was also clear to the researcher that users could choose to view more attributes, like size and category.

Figure 35 (4.5.1.8)
Shein.com Price Attribute

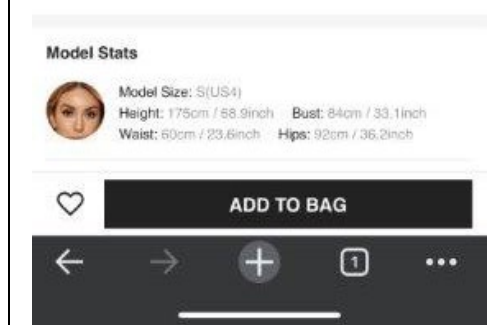


4.5.1.9 Translate and Rescale for Better Evaluability (Translate Information).

Like Bloomwholesale.com, Shein.com translated the size of the clothing item shown. In addition to size labels and measurements, the site provided “Model Stats” with all the measurements of the person modelling the clothing including their height and weight to help the user evaluate how the item would look.

Figure 36 (4.5.1.9)

Shein.com Translated Size

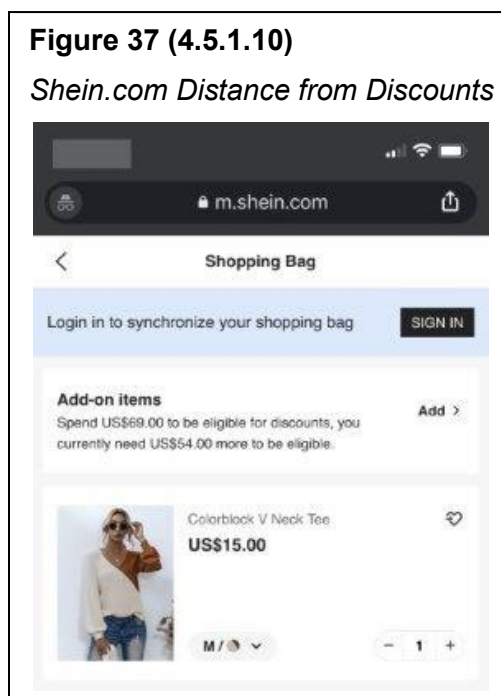


4.5.1.10 Make Information Visible.

Within the Shopping Bag, the “Add-on Items” section clearly stated how much more money the researcher would need to spend to be eligible for certain discounts.

Figure 37 (4.5.1.10)

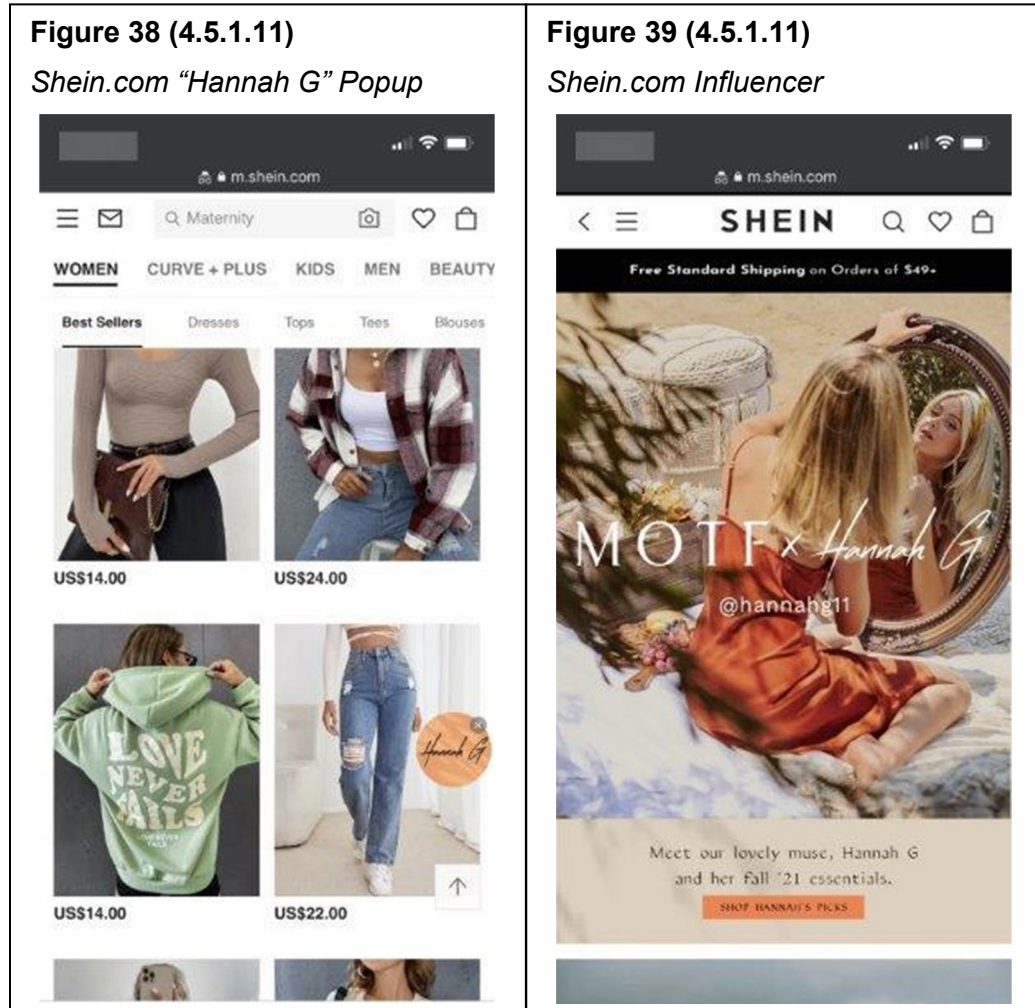
Shein.com Distance from Discounts



4.5.1.11 Provide Social Reference Point.

While browsing the Women category, the researcher noticed a circular popup containing the stylized label “Hannah G.” She clicked the popup and landed on a page that appeared to feature a specific social media influencer; the page featured images of

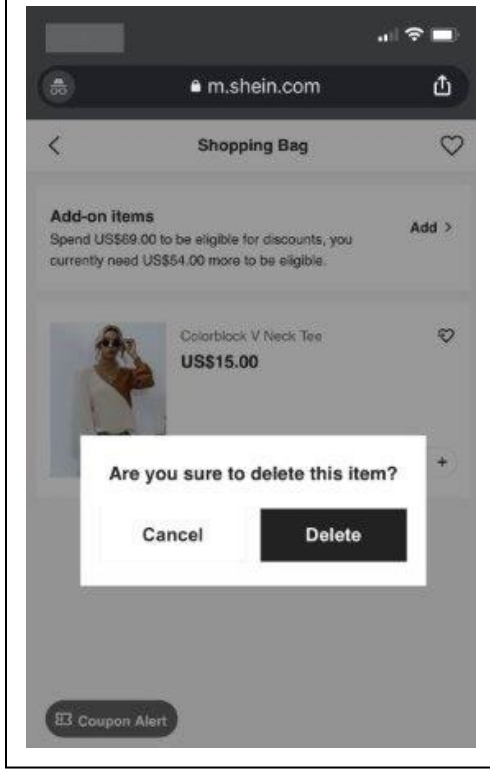
the influencer along with her social media handle and encouraged shopping a collection of items curated by this influencer. This was an example of leveraging the influence of a well-known individual to impact decision-making (Münscher et al., 2016).



4.5.1.12 Change Option-Related Effort.

After selecting the option to remove an item from the Shopping Bag, the researcher received a message asking her to confirm that she would like to remove the item. This added friction in a supportive way that would make it more difficult for a user to accidentally remove an item from the cart.

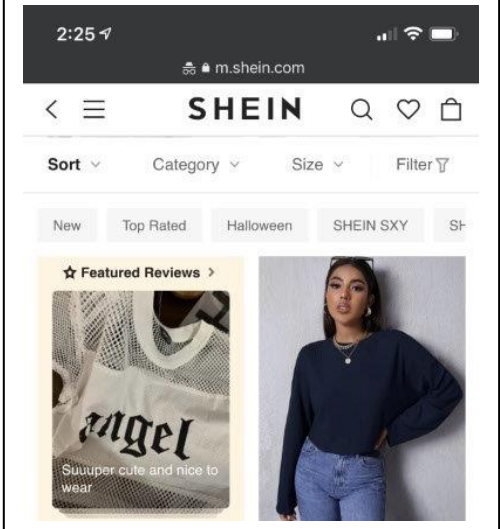
Figure 40 (4.5.1.12)
Shein.com "Remove Reminder"



4.5.1.13 Change Range or Composition of Options.

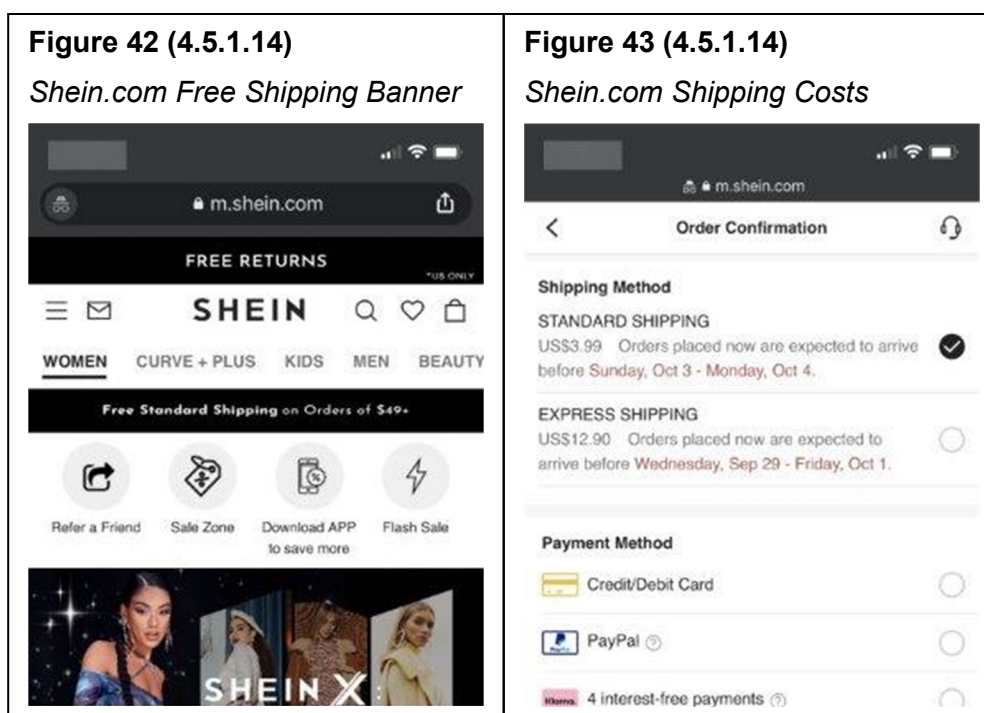
Some clothing items belonged to a collection called "Featured Reviews;" the researcher did not know why some reviews were featured over others but the option to view items that had been specifically endorsed over others attracted attention.

Figure 41 (4.5.1.13)
Shein.com Featured Reviews



4.5.1.14 Change Option Consequences.

Shein.com offered free standard shipping on orders over \$49. After proceeding to the Order Confirmation page, the researcher noted that the cost of standard shipping was \$3.99. Free shipping was a small benefit associated with the decision to spend at least \$49. Because low shipping cost was not revealed until late in the checkout process, meaning that users would not have the ability to fully evaluate how beneficial free shipping would be while shopping, the researcher considered this particular option consequence to be in a gray area.



4.5.1.15 Provide Reminders.

Once again, email reminders refocused the researcher's attention on Shein.com. In this case, since the researcher was confirming account registration via email while analyzing the site, she paid more attention to the emails than she might have otherwise, noting that the emails contained coupon codes as well as access to a certain number of points for confirming the account. Because the emails added extra effort to and

distracted from the checkout process, the researcher considered that these reminders were in a gray area.

4.5.1.16 Facilitate Commitment.

If a user is focused on self-commitment by restricting their budget, they would be supported through the ability to filter their options by price range.

4.6 Shein.com

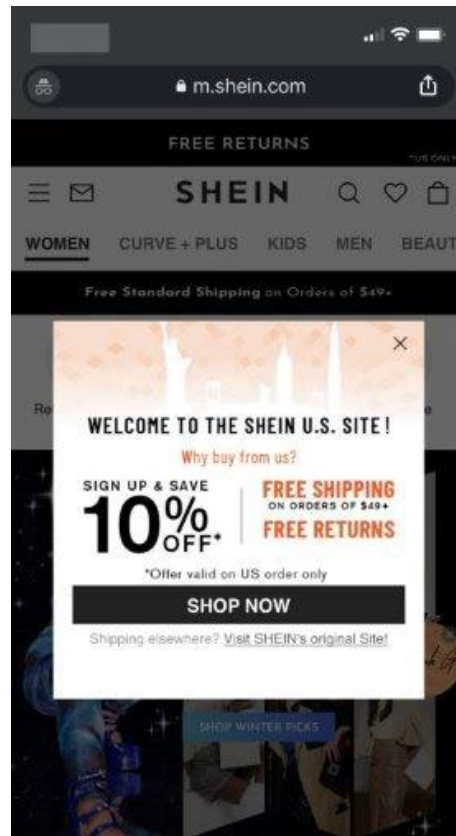
4.6.1 Dark Patterns

4.6.1.1 Nagging.

When the researcher landed on the homepage, she was immediately interrupted by a popup encouraging her to sign up to save 10%. After closing this initial popup, the researcher continued to receive similar sign-up prompts.

Figure 44 (4.6.1.1)

Shein.com Popup



Additionally, the circular Hannah G. popup previously mentioned, which led to a social reference point (see Figure 38, above), moved around the page and followed the researcher's navigation; this type of animation was distracting, and the researcher considered it to be an interruption.

4.6.1.2 *Obstruction.*

As mentioned, the researcher tried to avoid claiming a coupon when she landed on the homepage. At one point later, attempting to claim the coupon led to a registration page that required account registration, which the researcher closed out of in favor of continuing to shop. Later during the checkout process, the researcher again encountered the same sign-up and registration page. While requiring sign-up was an example of forced enrollment, this interaction also felt like roach motel-style obstruction because of the repeated guidance toward sign-up paired with the inability to get out of signing up.

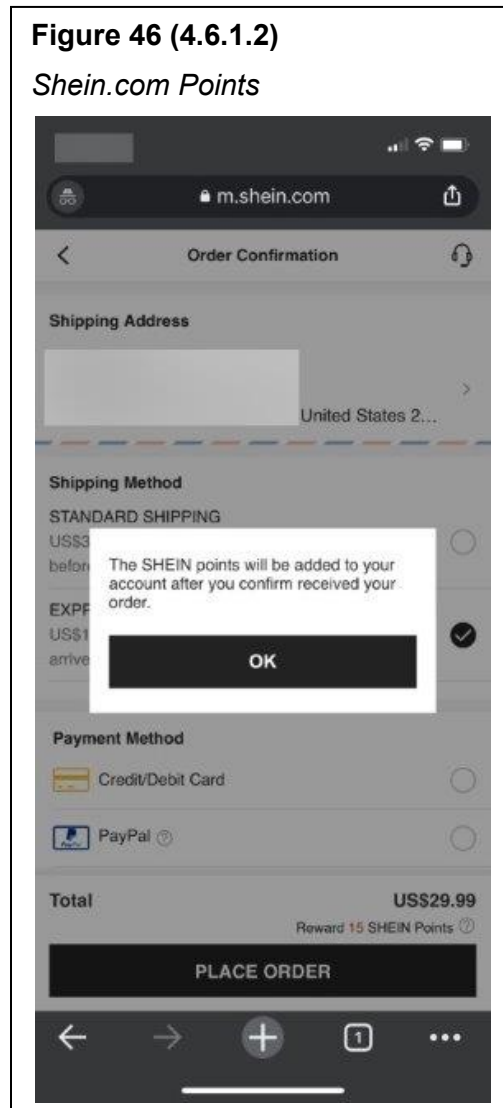
Figure 45 (4.6.1.2)

Shein.com Account Registration

The screenshot displays the mobile version of the Shein.com registration page. At the top, there's a browser address bar showing 'm.shein.com'. Below it, the SHEIN US logo is centered. Navigation options 'SIGN IN' and 'REGISTER' are visible, with 'REGISTER' being the active one. A promotional banner for '10% OFF NEW ORDERS' is present. A dropdown menu shows 'Country/Region: United States'. A note below the dropdown states: 'You are now registering into SHEIN-US, please switch country if you want to ship outside the United States.' There are input fields for 'EMAIL ADDRESS' and 'PASSWORD'. A checkbox is labeled 'I agree to the Privacy & Cookie Policy and Terms & Conditions'. A large black 'REGISTER' button is at the bottom. Below the button, it says 'Or Join With' followed by Facebook and Google icons.

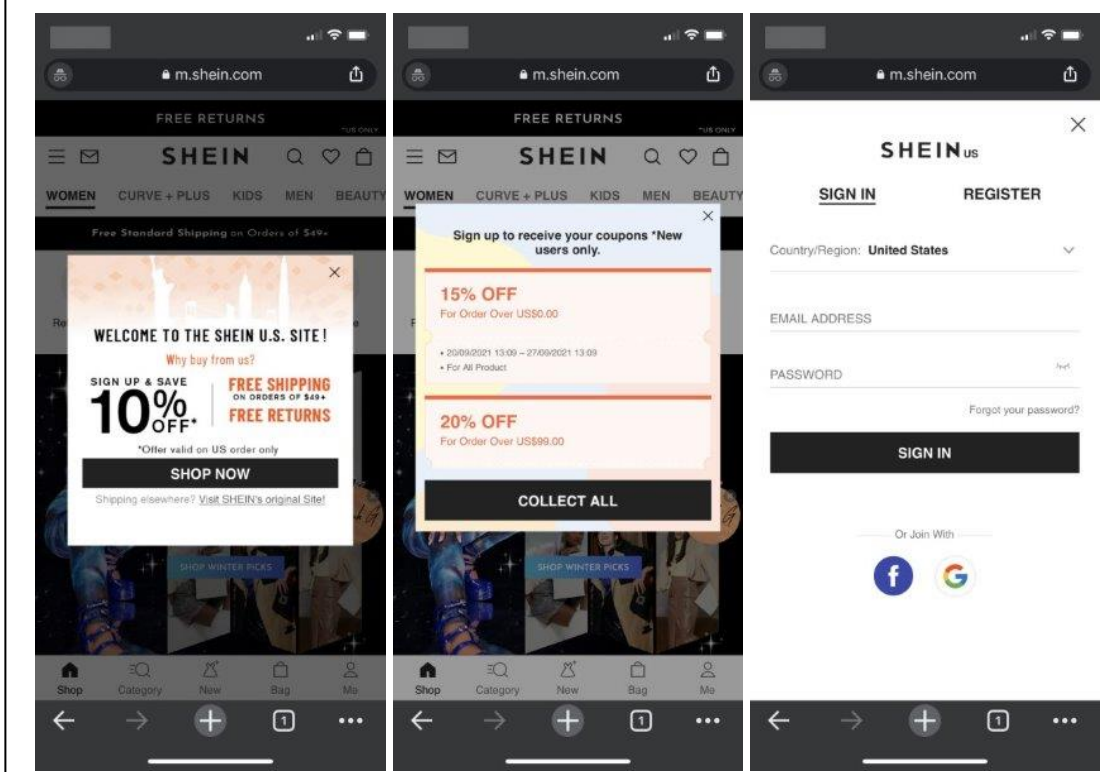
Additionally, placing an order on Shein.com was associated with earning points. What the points might be used for was unclear. Earning points for a purchase is not equivalent to purchasing virtual points directly, which would be a form of the “Intermediate Currency” dark pattern described by Gray et al. (2018). But it is worth considering whether people think about purchases associated with earning points differently than purchases that are not associated with earning such points, since the

intermediate currency pattern is intended to disconnect people from monetary value (Gray et al., 2018).



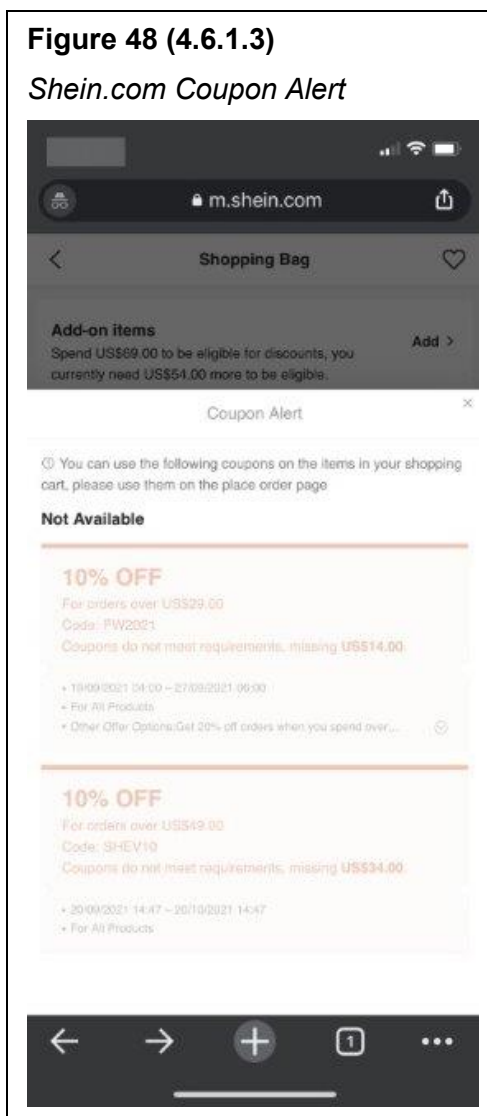
4.6.1.3 Sneaking.

In terms of a “Bait and Switch,” or a result that contradicted an action the researcher took, when the researcher initially encountered the popup requesting that she sign up to receive a coupon, she clicked the “Shop Now” button displayed in the popup; she expected the button to lead her to the homepage. Instead of being allowed to continue shopping, selecting “Shop Now” actually directed the researcher to a separate page that led to the coupon sign-up process. “Shop Now” actually meant “Sign Up Now.”

Figure 47 (4.6.1.3)*Shein.com “Shop Now” Interaction*

Note. From left to right, three screens representing the “Shop Now” interaction.

As a further example, despite the information making it clear that the researcher needed to spend an additional \$54 to be eligible for discounts, the fact that coupons were not applied during the checkout process felt like another example of bait and switch. After so much emphasis being placed on the coupons and being given the option to collect the coupons, a coupon alert displayed during the checkout process indicated that the researcher’s order was not eligible for two 10% off coupons. Confusingly, this message was shown with text indicating that the researcher should use the coupons on the next page.



4.6.1.4 Interface Interference.

With respect to hidden information, information about the points program (see Figure 46, above) was not available. The researcher could not find a description of how many points would be earned based on dollar value spent, or what the points could be used for. The idea of earning points for something that a user was already planning to do would likely be appealing. This could lead users to spend more money than they had planned to in order to earn more points; the implication was that points could be earned and then redeemed for products or discounts.

4.6.1.5 Forced Action.

As previously mentioned, the researcher observed an example of forced enrollment when she was required to create an account to go through the checkout process and receive coupons. Additionally, registering for an account required acceptance of the company's "Privacy & Cookie Policy" and "Terms & Conditions;" there did not appear to be any way to change any settings related to cookies (see Figure 45, above).

4.6.1.6 Urgency.

As noted with respect to limited time windows, account creation triggered a notification that the researcher would have a time period of 72 hours to confirm her account. The basis for the 72-hour expiration was unclear but could have been used to speed up decision-making by creating a sense that the points offered to the researcher for confirming her account would expire.

4.6.1.7 Misdirection.

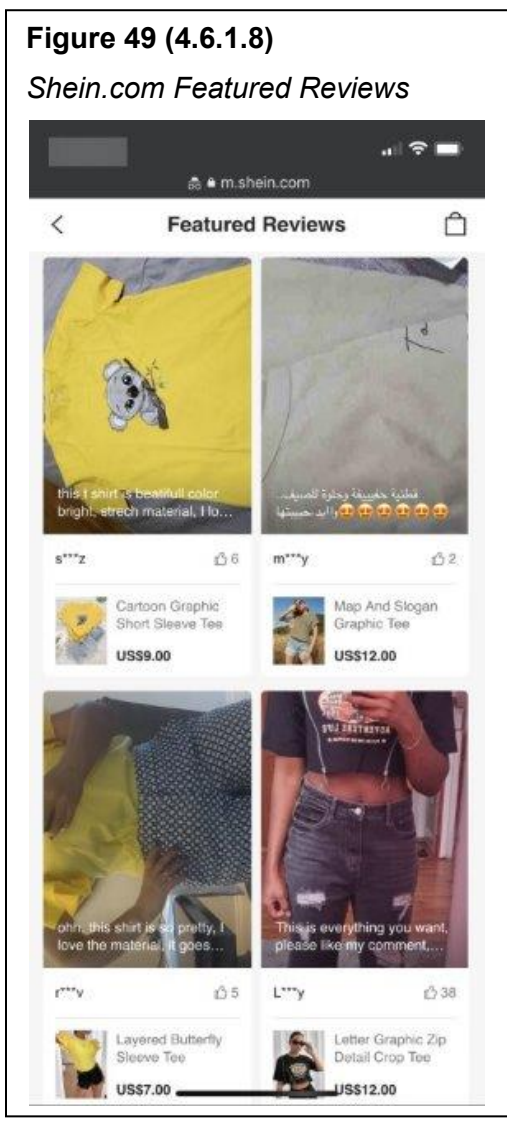
Like Bloomwholesale.com, the researcher did not observe examples of blatant confirmshaming or pressured selling as described by Mathur et al. (2019). Instead, the researcher observed that within the Women section, items were sorted by the "Recommend" attribute. Since it was unclear why these items were recommended, this could have been a subtle form of pressured selling to guide users toward more expensive options, which the researcher believed would fall in a gray area.

4.6.1.8 Social Proof.

As previously noted with respect to the composition of options, Shein.com included a section of "Featured Reviews." Based on the availability of photos in this section, it seemed that these reviews were submitted by actual users; however, it is possible that the featured reviews were manufactured by people other than actual users, in which case they would meet the criteria for testimonials of uncertain origin. The

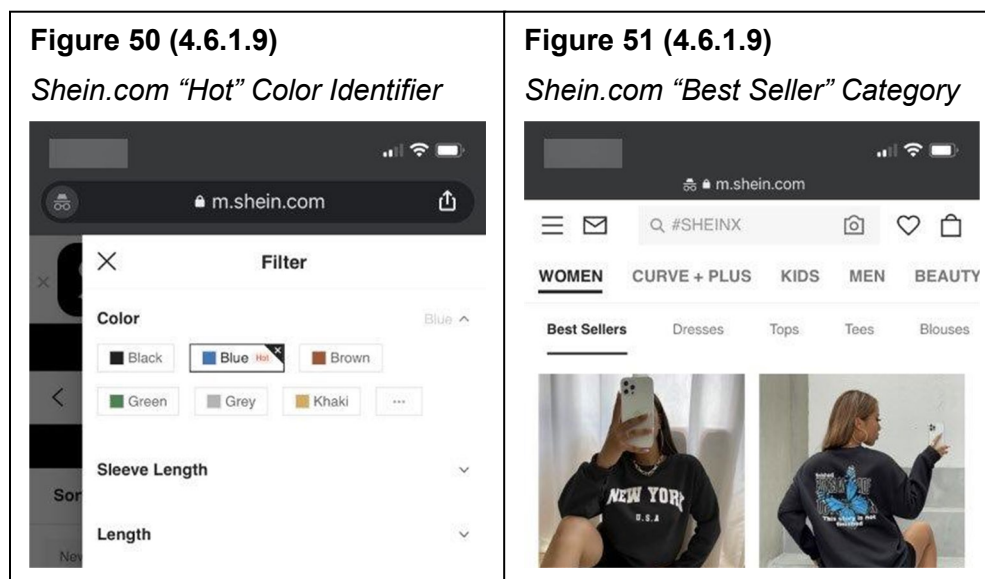
researcher briefly attempted to copy the text of one review to determine if it had been submitted on multiple sites, consistent with methods used by Mathur et al. (2019) to investigate the origins of uncertain testimonials; unfortunately, Shein.com prevented the text from being copied, which has been observed as a form of obstruction (Brignull, n.d.; Gray et al., 2018), and the researcher did not attempt to further verify the reviews. Because of the uncertainty, the researcher believed that the featured reviews fell into a gray area.

Figure 49 (4.6.1.8)
Shein.com Featured Reviews



4.6.1.9 Scarcity.

Like previous sites, Shein.com emphasized the behavior of their site's users (social proof) and potential scarcity in subtle ways by showing the "Best Sellers" sub-category within Women category as the default view. Additionally, the color blue was distinguished from other colors within the "Filter" tool with a "Hot" identifier. As previously noted, if items are trending or best sellers, it is reasonable to assume that there may be limited quantities remaining, and the researcher viewed these types of subtle patterns as falling in a gray area.

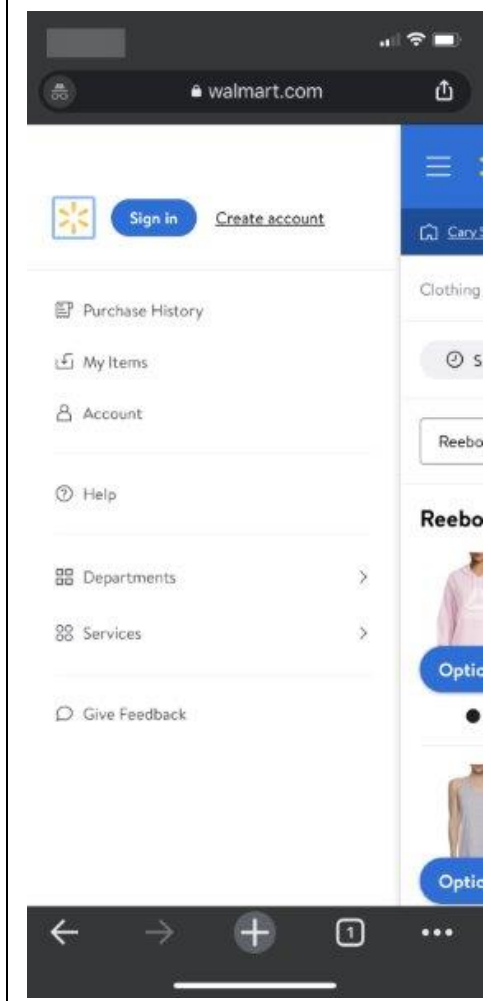


4.7 Walmart.com

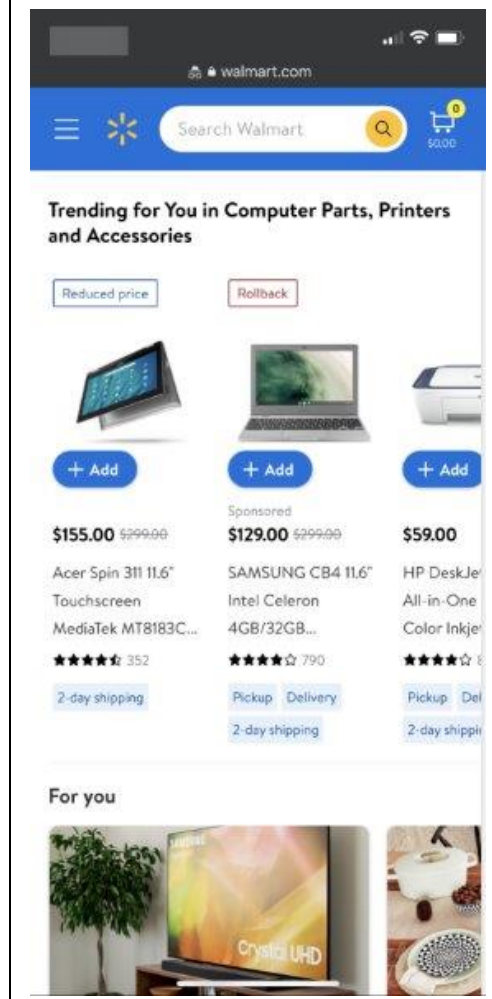
4.7.1 Supportive Choice Architecture

4.7.1.1 Reducing Alternatives.

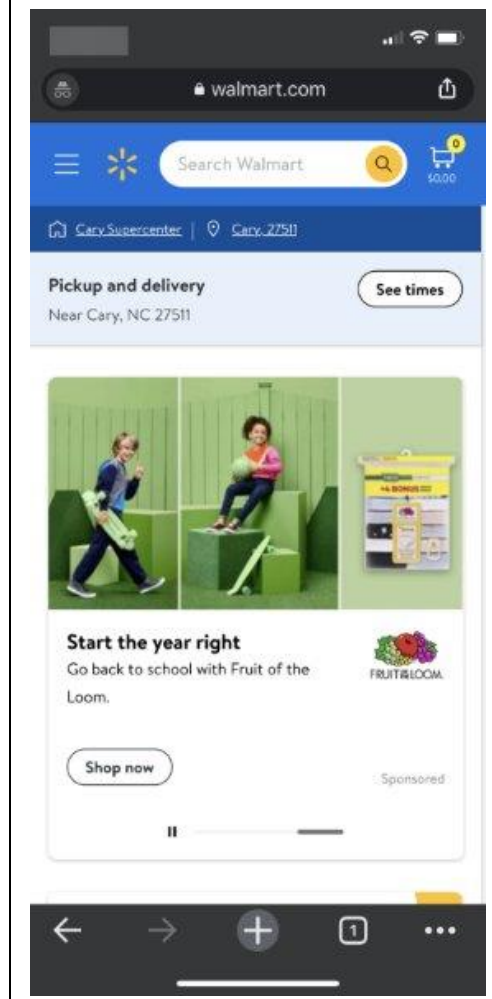
Like previous sites, the left-side navigation menu presented just seven visible categories, and it was clear to the researcher that at least some of these categories ("Departments" and "Services") could be expanded if desired.

Figure 52 (4.7.1.1)*Walmart.com Navigation Menu***4.7.1.2 Technology and Decision Aids.**

The researcher observed several sections on the homepage that appeared to offer personalized recommendations, including “Trending for You in Computer Parts, Printers, and Accessories.”

Figure 53 (4.7.1.2)*Walmart.com Recommendations***4.7.1.3 Defaults (Change Choice Defaults).**

When the researcher landed on the homepage, she noticed that Walmart.com defaulted her to a specific physical Walmart store selection, which could simplify the process of finding a nearby store if needed.

Figure 54 (4.7.1.3)*Walmart.com Default Location***4.7.1.4 Focus on Satisficing.**

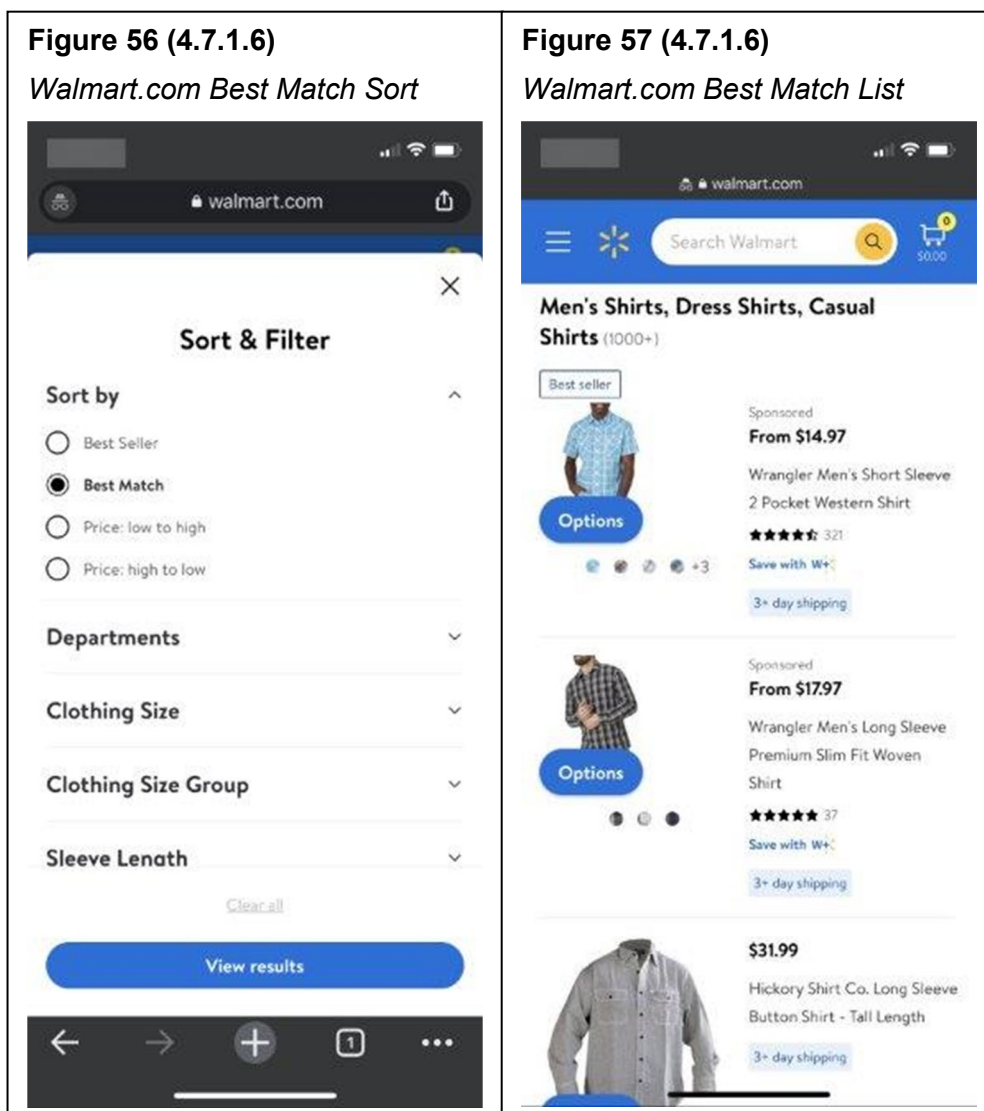
While viewing a clothing item, the researcher noticed that out-of-stock items were crossed out, while in stock items were readily visible. The out-of-stock color was also positioned in the middle of the horizontally scrollable list rather than at the beginning, which may have been a design choice to take advantage of primacy effects, in which the first items in a list are more likely to be chosen (Münscher et al., 2016). If a shirt is available in a second-best color, that may be enough to meet a user's need.

Figure 55 (4.7.1.4)**Walmart.com Item Availability****4.7.1.5 Limited Time Windows.**

The researcher did not observe an emphasis on limited time windows.

4.7.1.6 Decision Staging.

Like previous sites, Walmart.com offered the ability to sort and filter on different attributes of clothing, which provided a way to narrow the field of possible choices. Notably, the decision was staged in terms of sorting clothing items by “Best Match,” which may have been intended to help return relevant search results. The researcher was unable to tell the difference in the resulting lists of products when trying out the “Best Match” and “Best Selling” sort options; since the action of the default sort was unclear, she considered this decision staging to fall in a gray area.

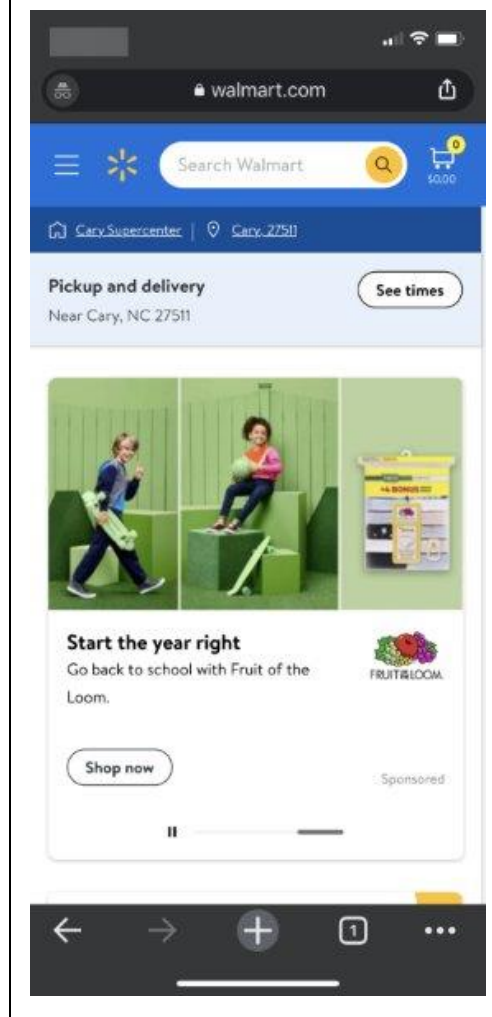


4.7.1.7 Partitioning of Options.

In the researcher's view, the homepage was partitioned into three main sections: the top section was dedicated to searching or browsing for an item, the middle section was dedicated to shopping from a specific store, and the section below occupying the most visual space featured a brand-specific advertisement. While users may have a goal in mind, the presence of additional options to shop within a specific store or brand may impact their shopping decisions (Münscher et al., 2016).

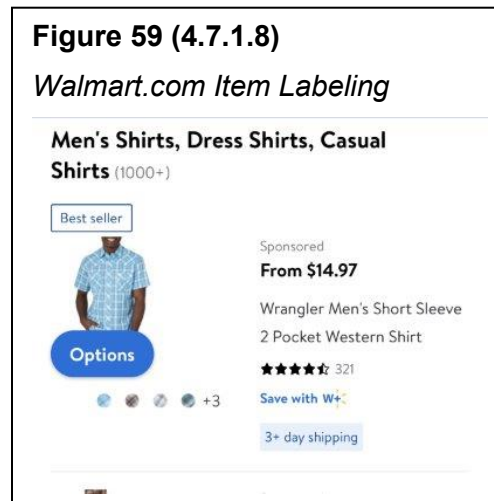
Figure 58 (4.7.1.7)

Walmart.com Partitioning



4.7.1.8 Attribute Parsimony and Labeling.

While Shein.com prioritized just the item price within the selected clothing category, Walmart.com took a different approach. Within the Men's Shirts category, Walmart.com displayed seven attributes for each piece of clothing; labels (such as "Best Seller" and/or "Sponsored"), image, color options, price, item name, average review, and shipping speed. Displaying attributes in this way may have made the most salient attributes visible to users without deciding on their behalf which attribute would be most important.



4.7.1.9 Translate and Rescale for Better Evaluability (Translate Information).

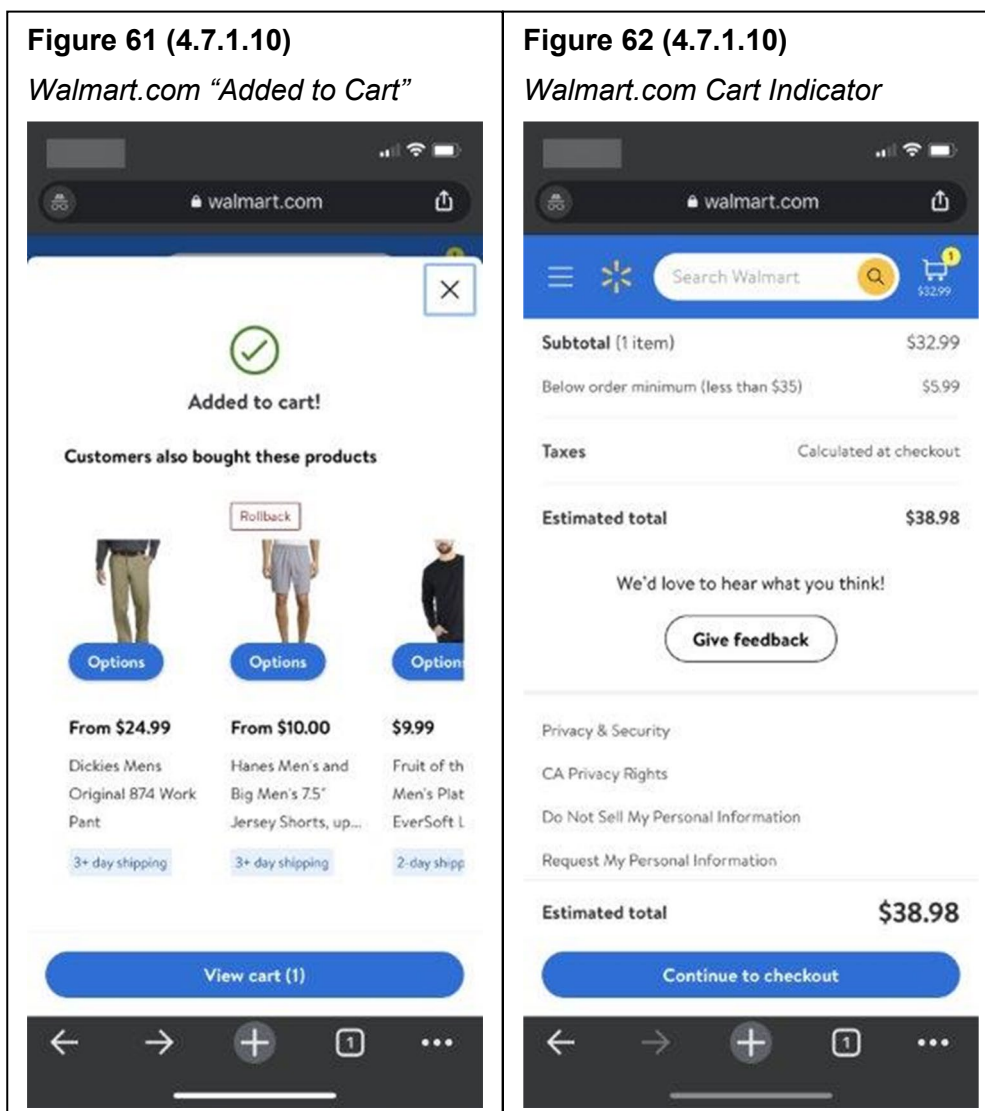
Johnson et al. (2012) note that an important part of translating information is making the relationship between an attribute and its consequences clear. In describing its Walmart+ membership program, Walmart.com stated that members should save about \$84 and \$816 per year on gas and groceries, respectively; this directly linked the decision to participate in the membership program to the benefit of estimated savings.

Figure 60 (4.7.1.9)*Walmart.com Dollar Value Savings*

The image is a screenshot of the Walmart.com mobile app interface. At the top, there is a black status bar with a greyed-out address bar, signal strength, Wi-Fi, and battery icons. Below the status bar, the URL 'walmart.com' is displayed. The main content area has a blue background with the Walmart logo at the top. The first section features a large white '\$84' with 'per year²' underneath. Below this, text reads: 'That's how much money you'll save on gas with member prices on fuel at Walmart, Murphy, & Sam's Club stations.' A small footnote below states: '²Savings based on 140 gallons per month per family & 16 miles consumed per gallon.' The second section features a large white '\$816' with 'per year³' underneath. Below this, text reads: 'That's how much money you'll save by getting your weekly groceries with free delivery from your store.' A small footnote below states: '³Savings based on 2 deliveries per week vs. non-member \$795 fee.' At the bottom, there is a yellow button with the text 'Start 15-day free trial'.

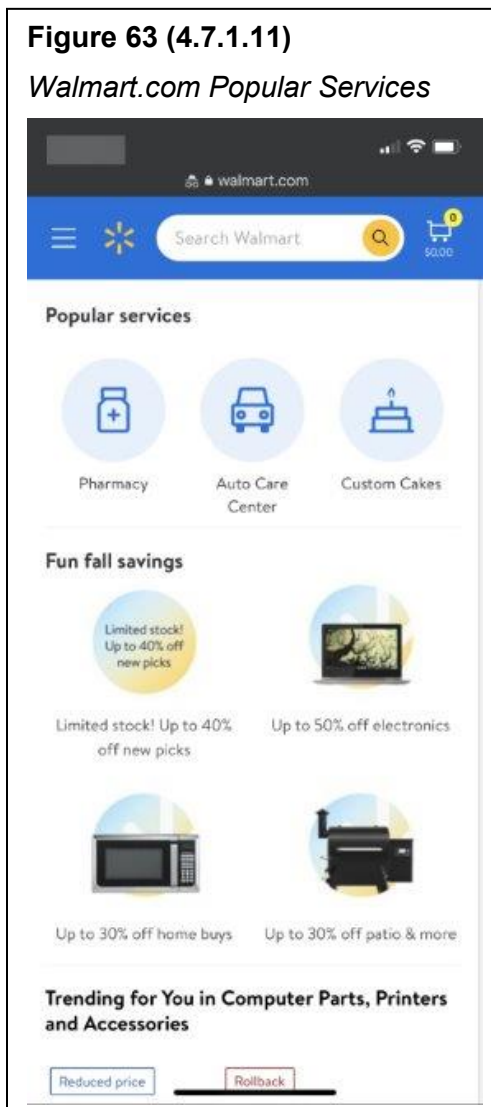
4.7.1.10 Make Information Visible.

The researcher observed that when she added an item to the cart, she received visual confirmation that one item was in the cart and had the option to choose “View cart” to proceed to the checkout process. The cart icon in the upper right provided persistent feedback on the number and cost of the items in the cart.



4.7.1.11 Provide Social Reference Point.

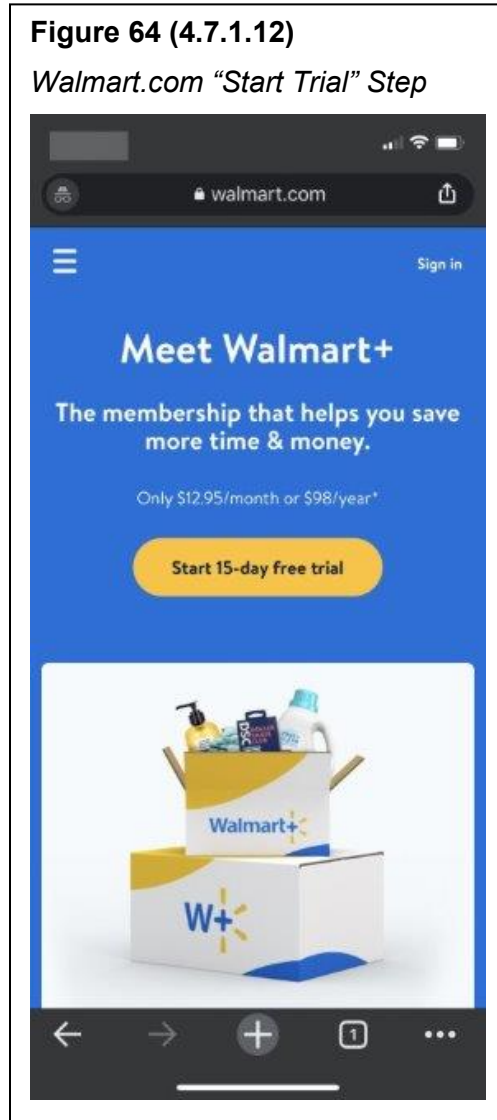
The “Popular Services” section on the homepage drew attention to what other Walmart.com users were doing. Additionally, customer reviews were featured prominently within categories and on individual product pages.



4.7.1.12 Change Option-Related Effort.

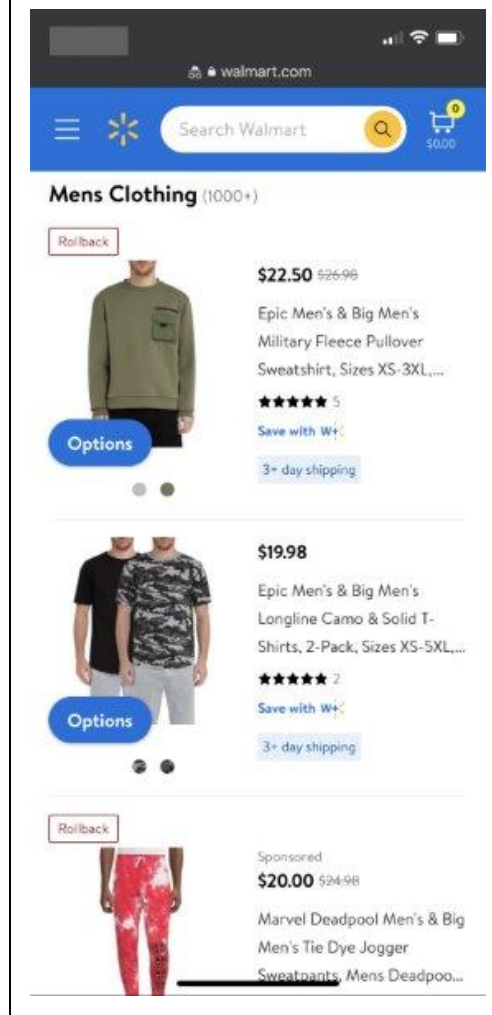
The researcher noticed that users would need to take active steps to start a trial of Walmart+. Additionally, like Shein.com, after choosing the option the empty her cart, the researcher received a message asking her to confirm that she would like to leave checkout. Both these design patterns added friction in supportive ways; the first would

likely make it more difficult to accidentally sign up for a subscription service, while the second would make it more difficult for a user to accidentally remove an item from their cart.

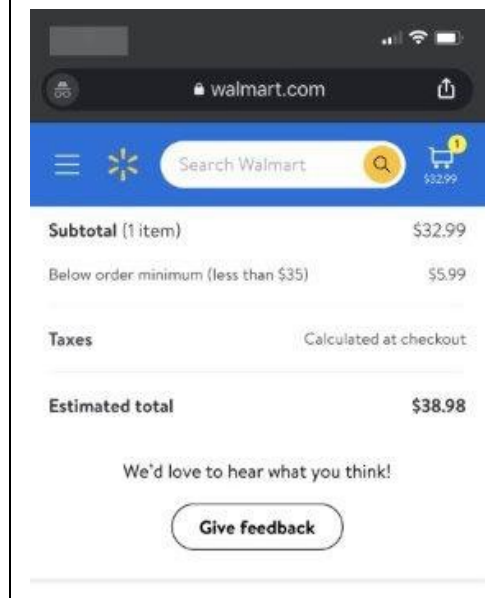


4.7.1.13 Change Range or Composition of Options.

Clothing items were distinguished from each other with specific labels including "Rollback" for special sale items and/or shipping speed labels to emphasize items that would be delivered faster than alternatives.

Figure 65 (4.7.1.13)*Walmart.com Item Labels***4.7.1.14 Change Option Consequences.**

On the subtotal page, the researcher noticed an additional cost as the consequence associated with spending below \$35. This encouraged adding at least one more item to the cart to meet the order minimum. The researcher assumed that this was a shipping fee based on her experience using other sites, but there was no explanation of the order minimum immediately available. The researcher considered this example of option consequences to be a gray area since there was so little explanation of the additional cost. Further comments are provided with respect to sneaking below.

Figure 66 (4.7.1.14)*Walmart.com Order Minimum***4.7.1.15 Provide Reminders.**

While viewing the Men's Shirts category, the researcher observed that the stylized label "Save with W+" was repeated for each item (see Figures 59 and 65, above). This served as a visual reminder that the Walmart+ subscription was available for sign-up and offered special savings. The line between reminders and nagging is unclear, and since the researcher has commented further below on potentially dark patterns used to promote W+, the researcher considers that these added reminders fall in a gray area.


4.7.1.16 Facilitate Commitment.

The researcher used the available guest checkout option and noticed a message during the address entry process that stated that if she left without placing an order, Walmart.com would store her information for 72 hours in case she wanted to complete the order later. The researcher viewed this as a form of support for self-commitment as described by Münscher et al. (2016); if a person planned to come back and complete the order in the next three days, Walmart.com would support that plan. This stood in

contrast to the researcher's experience on Overstock.com, when she realized that her information had been saved after receiving a promotional email. The researcher viewed this particular design pattern as a best practice; Walmart.com made their information-saving practices visible while supporting users' potential need to revisit the site later.

Figure 67 (4.7.1.16)

Walmart.com Info Storing Advisory



The image shows a mobile browser interface for Walmart.com. At the top, the address bar displays 'walmart.com'. Below it is a modal titled 'Add Address' with a close button (X). The form contains the following fields:

- Last name*
- Street address*
- Apt, suite, etc. (optional)
- City* (Cary)
- State* (NC)
- Zip code* (27511)
- Phone number*

Below the form is a blue 'Continue' button. At the bottom, a warning message with an information icon states: 'If you leave before placing your order, we'll store your information for 72 hours, in case you want to complete your order later.'

4.8 Walmart.com

4.8.1 Dark Patterns

4.8.1.1 Nagging.

The researcher's actions were not unexpectedly interrupted or redirected while using Walmart.com and she did not receive any post-interaction emails.

4.8.1.2 Obstruction.

The researcher did not observe any obstructive design patterns.

4.8.1.3 Sneaking.

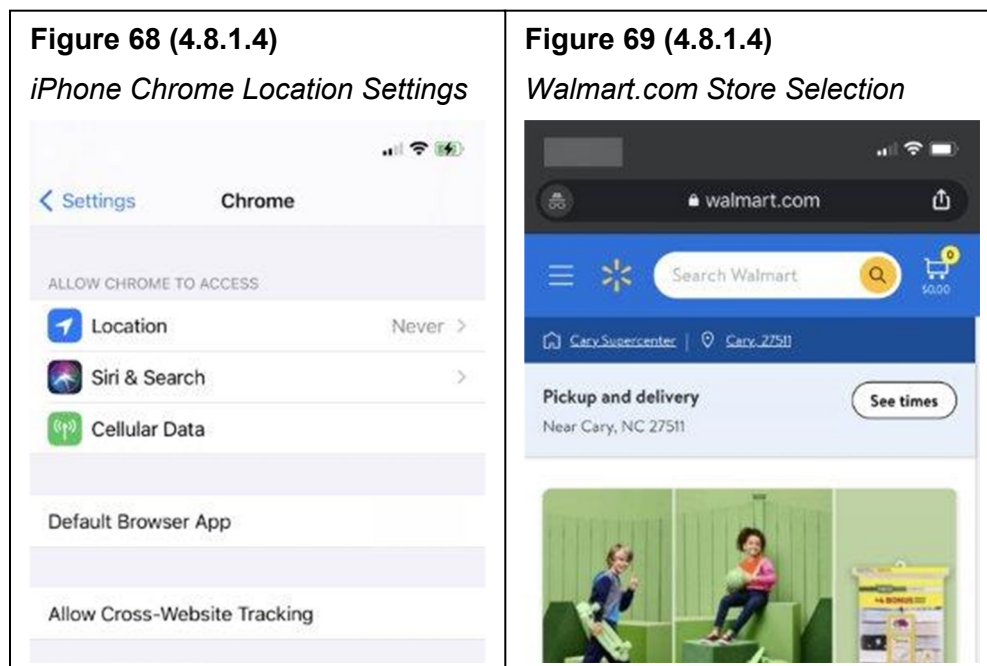
The researcher observed two examples of sneaking dark patterns. The Walmart+ membership program (see Figure 64, above) showed elements of the hidden subscription pattern. The site clearly displayed the monthly subscription costs, but the free trial was heavily emphasized. Information about whether a credit card was required to sign up for the free trial and whether it would be billed automatically after the initial trial period would have only been accessible after creating an account. Not providing this information up front could constitute interface interference in the form of hidden information. The researcher suspected that many users would unintentionally begin paying recurring membership fees after signing up for a free trial.

The researcher also noticed hidden costs. As mentioned as part of the "Change Option Consequences" design pattern, \$5.99 was added to the price after adding an item that cost less than \$35 to the cart (see Figure 66, above); the unexpected addition of this cost constituted sneaking.

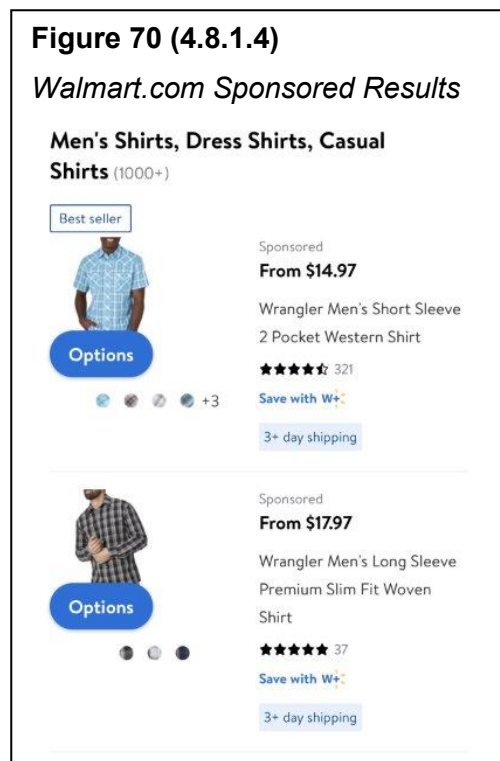
4.8.1.4 Interface Interference.

As discussed in relation to defaults, Walmart.com defaulted the researcher to a specific physical Walmart store selection. While this could be supportive, Walmart.com was using tools to locate the researcher while she used incognito mode as well as

device settings meant to prohibit the browser from using her location, which could violate users' privacy.



As mentioned in the discussion of decision staging, the researcher noted the presence of sponsored results shown in the Men's Shirts category. The top two results were barely visually distinguished from the other results in the category by the presence of "Sponsored" in fine light gray print. Their presence at the top of the list of results took advantage of primacy while giving the impression that these two sponsored items were the most popular items in the category. It is possible that these two items were best sellers, but since they were virtually indistinguishable



from the other items in their category, this design pattern constituted disguised ads.

4.8.1.5 *Forced Action.*

The discussion of Sneaking mentioned the potential for hidden subscription costs as part of Walmart+. The fact that the researcher could not access more detailed terms of the program without creating an account constituted forced enrollment.

4.8.1.6 *Urgency.*

The researcher did not observe an emphasis on urgency.

4.8.1.7 *Misdirection.*

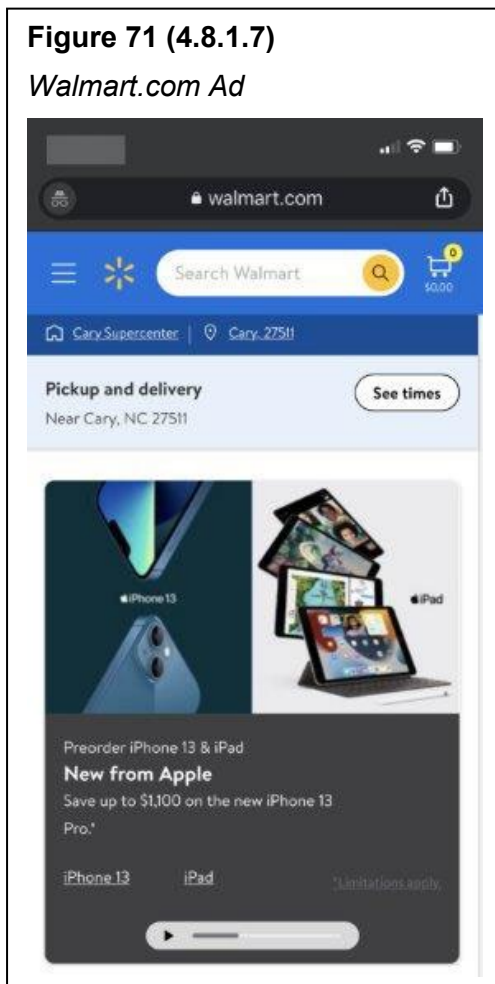
The researcher noted a potential subtle form of pressured selling in the presence of sponsored content at the top of the homepage that displayed an ad for the newest iPhone. While ads are not inherently dark, this particular ad raised questions for the researcher about whether the tendency of apparel shopping sites to guide users toward new items is analogous to guiding users toward the most expensive options.

4.8.1.8 *Social Proof.*

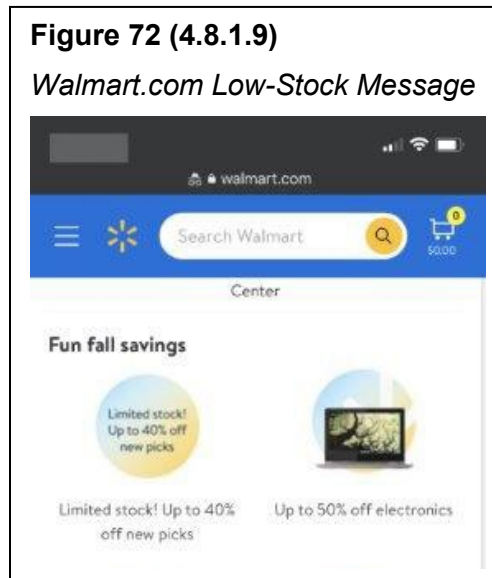
The researcher did not observe any explicit examples of social proof. Subtle examples are discussed below.

4.8.1.9 *Scarcity.*

On the homepage in a section called “Fun fall savings,” the researcher observed a sale section that included a “Limited stock!” message. This was not associated with a



particular product and did not indicate any specific remaining quantities, so was likely intended to encourage people to make quick purchases.



Like previous sites, Walmart.com also emphasized the behavior of their site's users (social proof) and potential scarcity in subtle ways by using a "Best Seller" label to distinguish certain products, and the researcher viewed this subtle emphasis as falling in a gray area.

4.9 Uniqlo.com

4.9.1 Supportive Choice Architecture

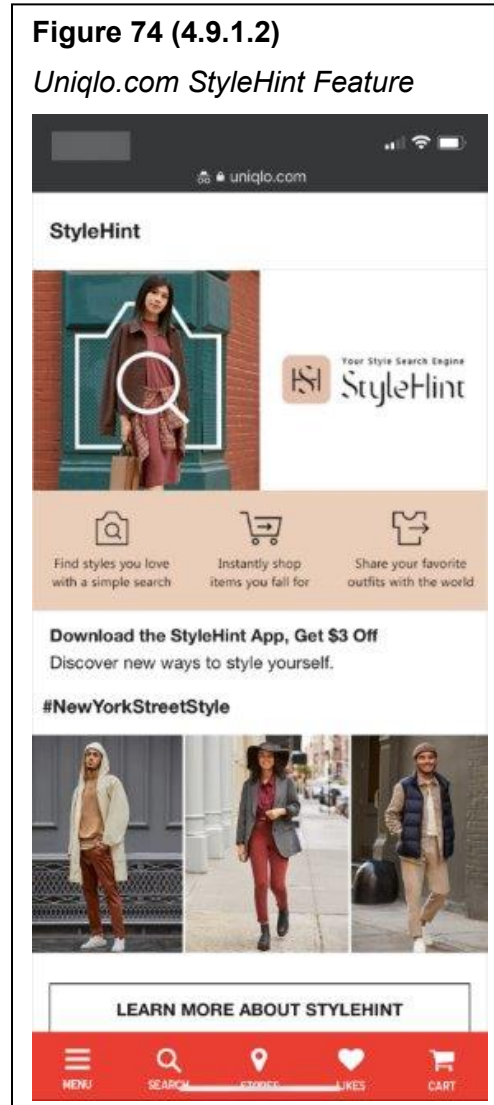
4.9.1.1 Reducing Alternatives.

The red horizontal menu displayed five options, which was consistent with the number of alternatives suggested by Johnson et al. (2012) as striking a balance between encouraging consideration and preventing overwhelm (p. 490).



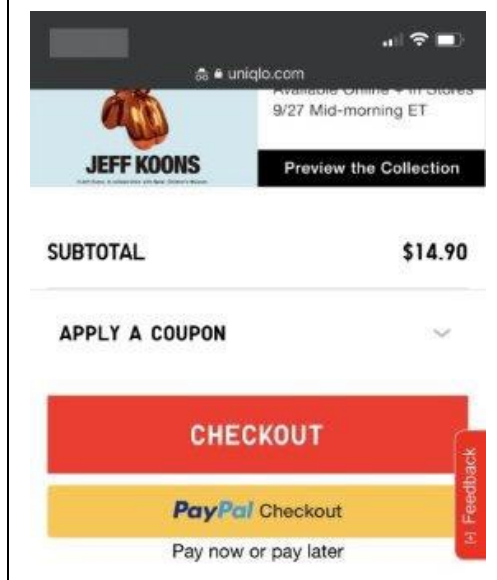
4.9.1.2 Technology and Decision Aids.

The StyleHint feature on the homepage was portrayed as a way to get personalized style advice and “find styles you love with a simple search.”



4.9.1.3 Defaults (Change Choice Defaults).

With respect to coupons, the researcher’s attention was drawn to the additional cognitive effort required to obtain, remember, and enter coupon codes. On Uniqlo.com and other sites, the default state was to leave coupon code fields blank and rely on users to fill in any codes that they may have; this was an example of a forced choice.

Figure 75 (4.9.1.3)*Uniqlo.com Coupon Default***4.9.1.4 Focus on Satisficing.**

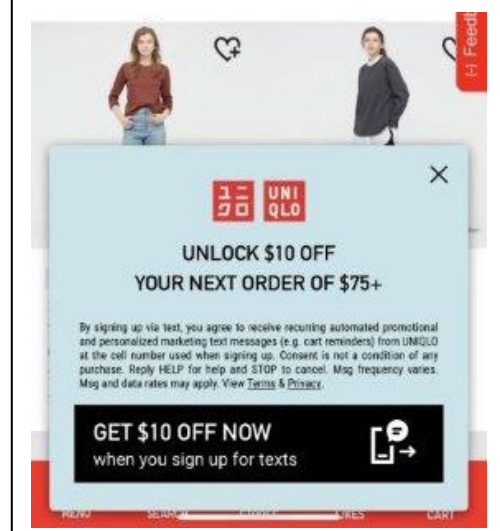
While viewing a clothing item, the researcher noticed that like Walmart.com, Uniqlo.com displayed out-of-stock colors as crossed out, while in stock items were visible as squares with no marks. If size were the most important attribute to a user, any available color might meet their needs.

4.9.1.5 Limited Time Windows.

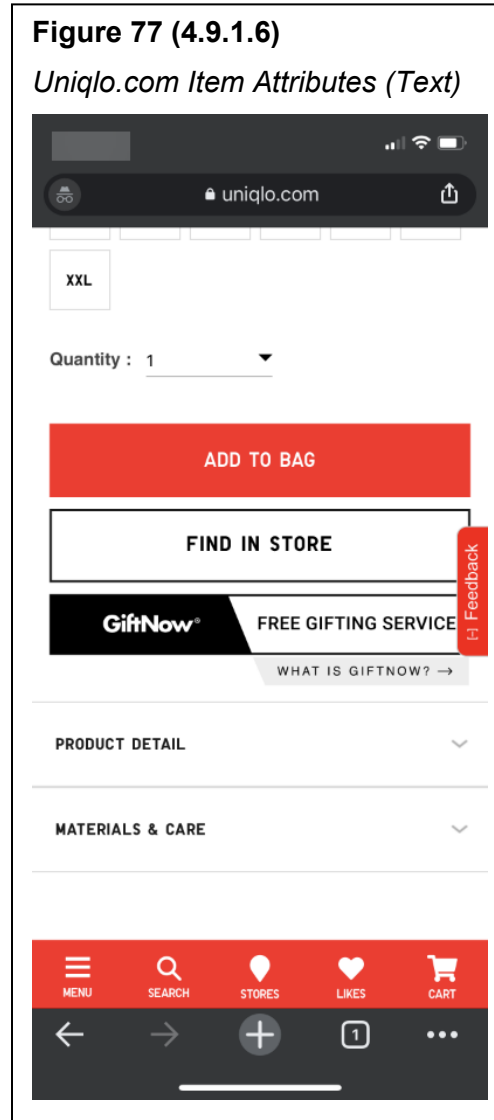
The researcher noticed a popup that included the option to "Get \$10 Off Now" in exchange for signing up for promotional text messages. The "Now" language emphasized making a choice in the present moment.

4.9.1.6 Decision Staging.

Uniqlo described just two attributes of the selected clothing item within the item details: "Product Detail" and "Materials & Care." The

Figure 76 (4.9.1.5)*Uniqlo.com "NOW" Language*

text within those sections could be expanded, but was not visible by default, pointing to Uniqlo's strategy of simplifying decision-making by focusing on images, reviews, and price.



4.9.1.7 Partitioning of Options.

The fact that the text within the Product Detail and Materials & Care sections was partitioned away from the larger images and that the text was collapsed conveyed that the text details were the least important attributes.

Figure 78 (4.9.1.7)*Uniqlo.com Item Image Priority***4.9.1.8 Attribute Parsimony and Labeling.**

The selected clothing category could be filtered on four attributes prioritized by Uniqlo: category, color, size, and price.



4.9.1.9 Translate and Rescale for Better Evaluability (Translate Information).

Uniqlo simplified the sizing process by providing a tool called MySize Assist. This would allow users to enter personal details including height, weight, and body shape, and then translate that information into the applicable size.

Figure 80 (4.9.1.9)*Uniqlo.com MySize Assist Step 1*

uniqlo.com

YOUR MEASUREMENTS ✕

HEIGHT cm in

5	ft	5	in
---	----	---	----

WEIGHT kg lbs

1	5	5
---	---	---

CONTINUE >

[Privacy](#)

Figure 81 (4.9.1.9)*Uniqlo.com MySize Assist Step 2*

uniqlo.com

YOUR BELLY SHAPE ✕

Flatter **Average** **Curvier**

CONTINUE >

[Privacy](#)

4.9.1.10 Make Information Visible.

After the researcher added an item to the cart, the site displayed text as well as a graphic to show how much more the researcher would have to spend to receive free shipping.

4.9.1.11 Provide Social Reference Point.

Within the “Topics” section on the homepage, Uniqlo referred to “one of the greatest contemporary artists,” associating the decision to purchase with a respected figure.

Figure 82 (4.9.1.10)

Uniqlo.com MySize Shipping Tracker

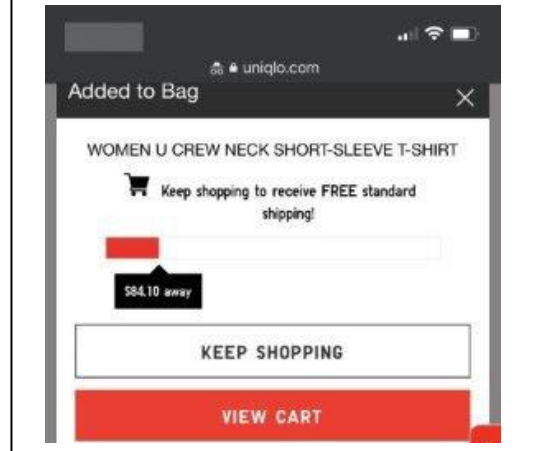
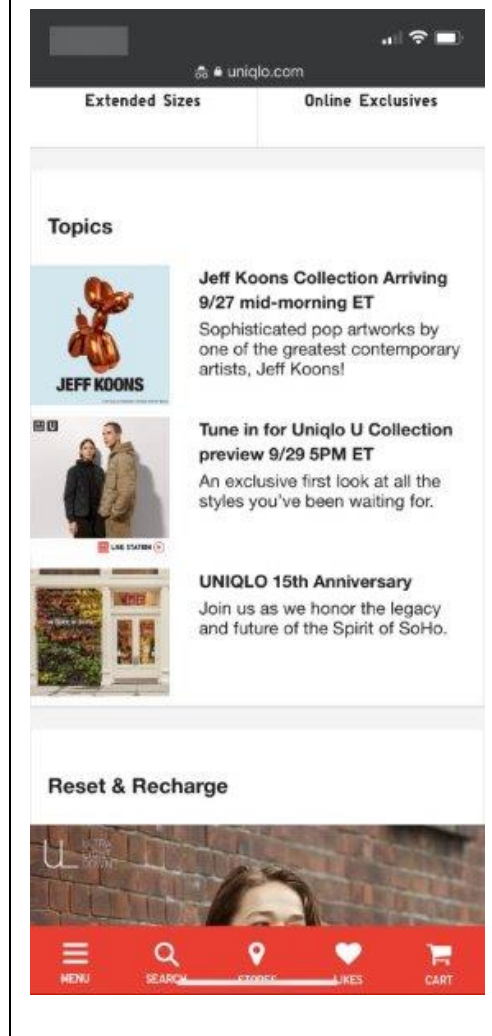


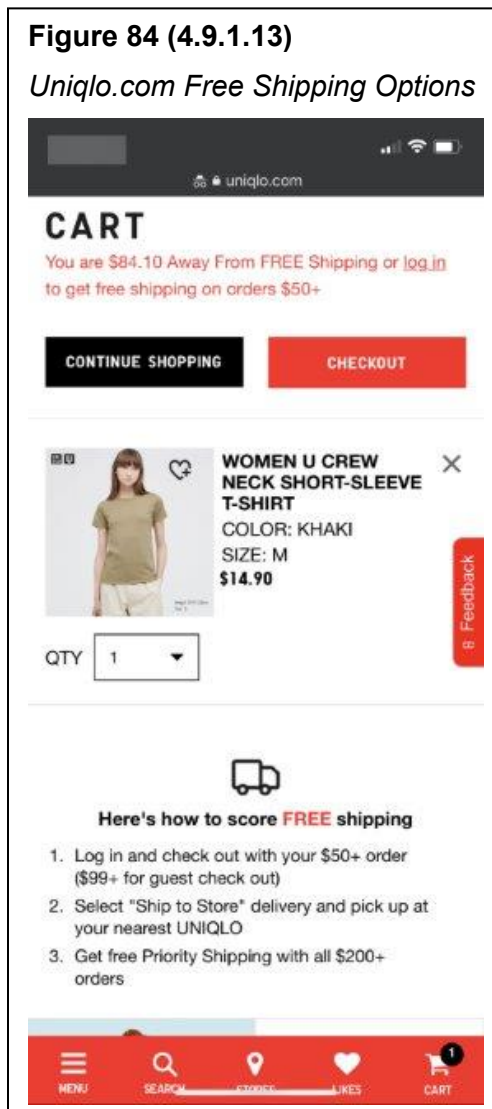
Figure 83 (4.9.1.11)*Uniqlo.com Opinion Leader***4.9.1.12 Change Option-Related Effort.**

After the researcher selected the option to view the cart, Uniqlo offered the option to pay later (see Figure 75, above), which would decrease financial effort on the part of the user.

4.9.1.13 Change Range or Composition of Options.

Within the cart, Uniqlo displayed three ways to get free shipping. The first item in the list, which had the advantage of primacy, suggested that the researcher log in and spend \$50 or more; Uniqlo noted as part of this option that guest checkout required

spending \$99 or more to get free shipping. The less attractive options two and three involved either effort to travel to a physical location or spending \$200 or more, making the first option the most attractive and the most easily visible.



4.9.1.14 Change Option Consequences.

On the homepage, the option to download the StyleHint app was associated with the small benefit of a \$3 discount (see Figure 74, above). Because the StyleHint app was associated with several dark patterns as discussed in more detail below, the researcher considered that this additional incentive to download the app fell into a gray area.

4.9.1.15 Provide Reminders.

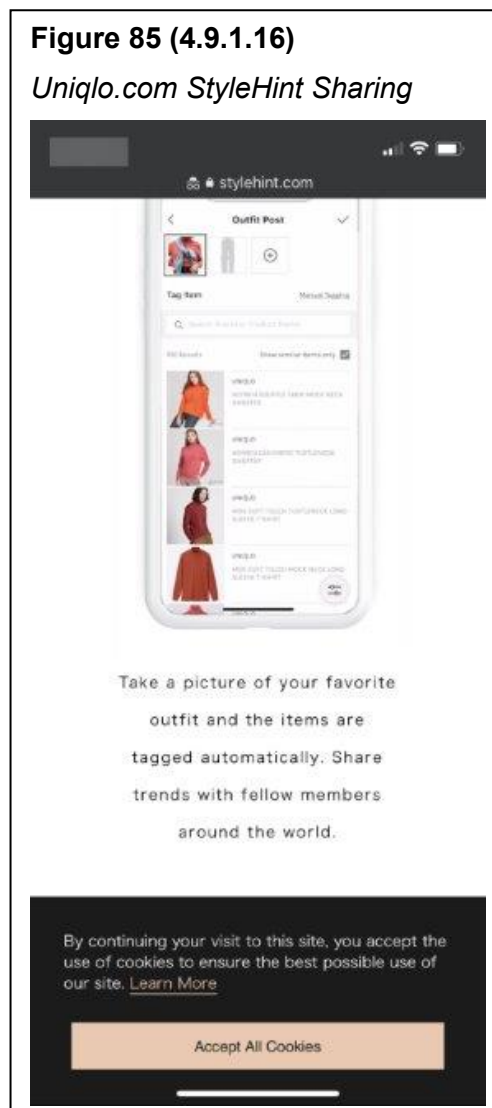
Additionally, like Overstock.com, Uniqlo.com sent out reminder emails advising that the item the researcher had added to the cart might still be available. As mentioned previously, the line between reminding and nagging can be easily crossed, leading the researcher to consider that this fell into a gray area.

4.9.1.16 Facilitate Commitment.

The StyleHint tool provided a way for users to publicly share their favorite outfits and potentially appear as fashion role models for other interested users, a form of public commitment as described by Münscher et al. (2016); however, because of concerns about the StyleHint app discussed in more detail below, the researcher considered this sharing to fall into a gray area.

Figure 85 (4.9.1.16)

Uniqlo.com StyleHint Sharing

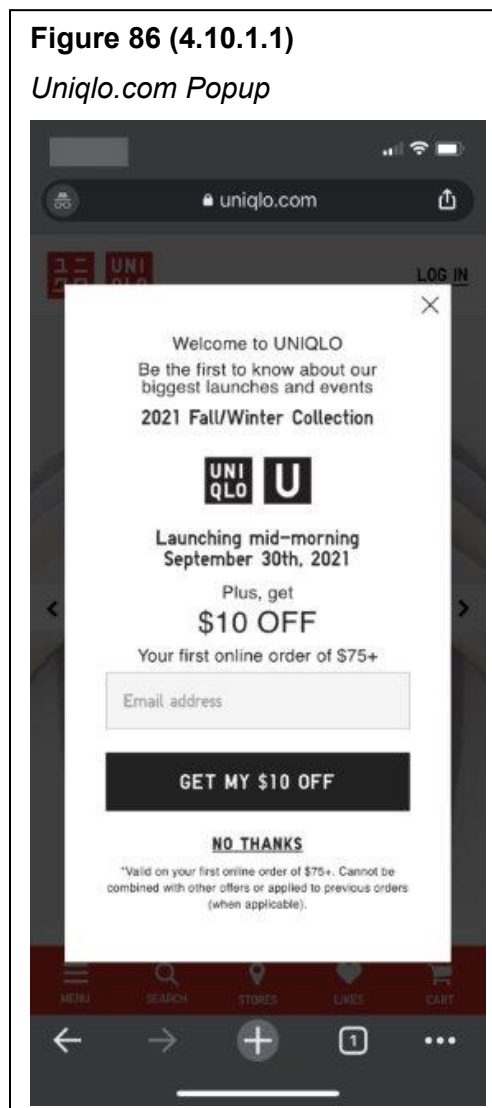


4.10 Uniqlo.com

4.10.1 Dark Patterns

4.10.1.1 Nagging.

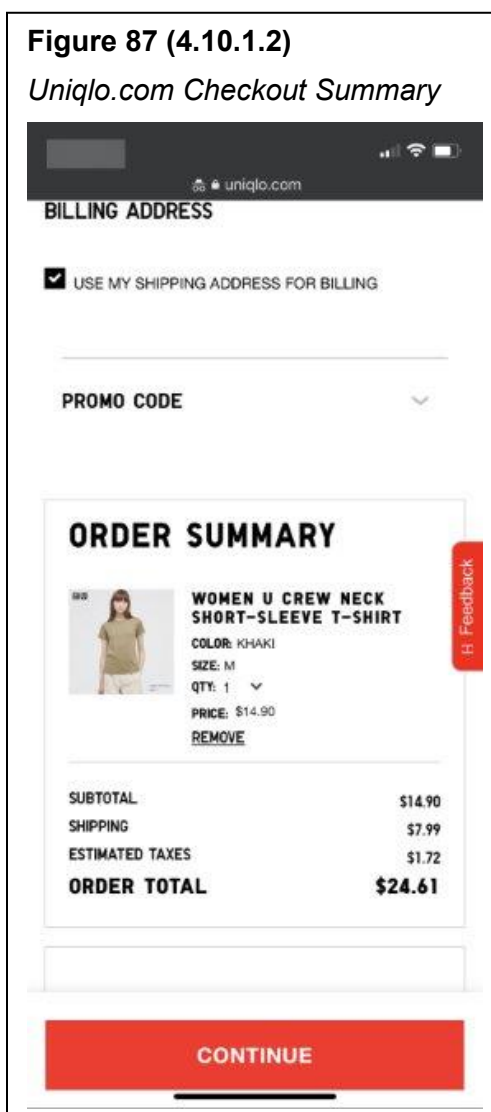
When the researcher landed on Uniqlo's homepage, she was distracted by a popup requesting her email address. After closing the popup, she was interrupted later by another popup encouraging her to sign up to receive promotional text messages.



Additionally, as mentioned, the researcher received a follow-up email about the abandoned purchase despite using the guest checkout option.

4.10.1.2 Obstruction.

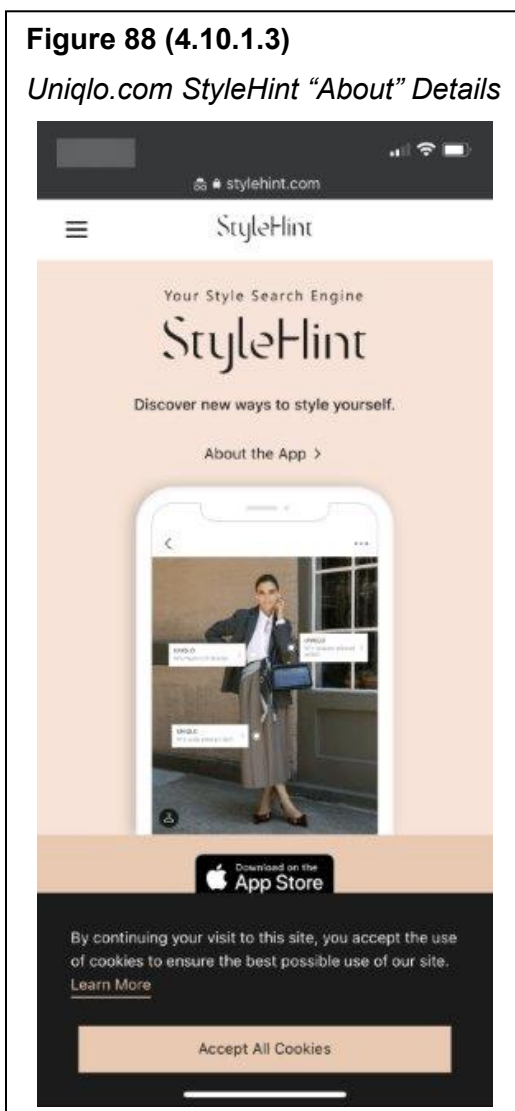
Like Overstock.com it seemed more difficult than it should have been to make order changes during Uniqlo's checkout process. There was an order summary on the payment screen, but no obvious way to edit the order – specifically, the shipping option – other than using the browser's back button. Because there were still options to edit the quantity and size within the Order Summary, the researcher considered this a gray area.



4.10.1.3 Sneaking.

In the researcher's judgment, StyleHint had some bait and switch characteristics. It was described as a style search engine on the homepage (see Figure 74, above), as

previously discussed, but closer examination showed that StyleHint was a mobile app. Text below the StyleHint image referred to a StyleHint app, but that text seemed separate from the description of StyleHint that was positioned above. It was unclear that StyleHint was entirely separate from Uniqlo's mobile site until the researcher clicked the StyleHint banner, which opened a separate page containing an "About the App" heading.

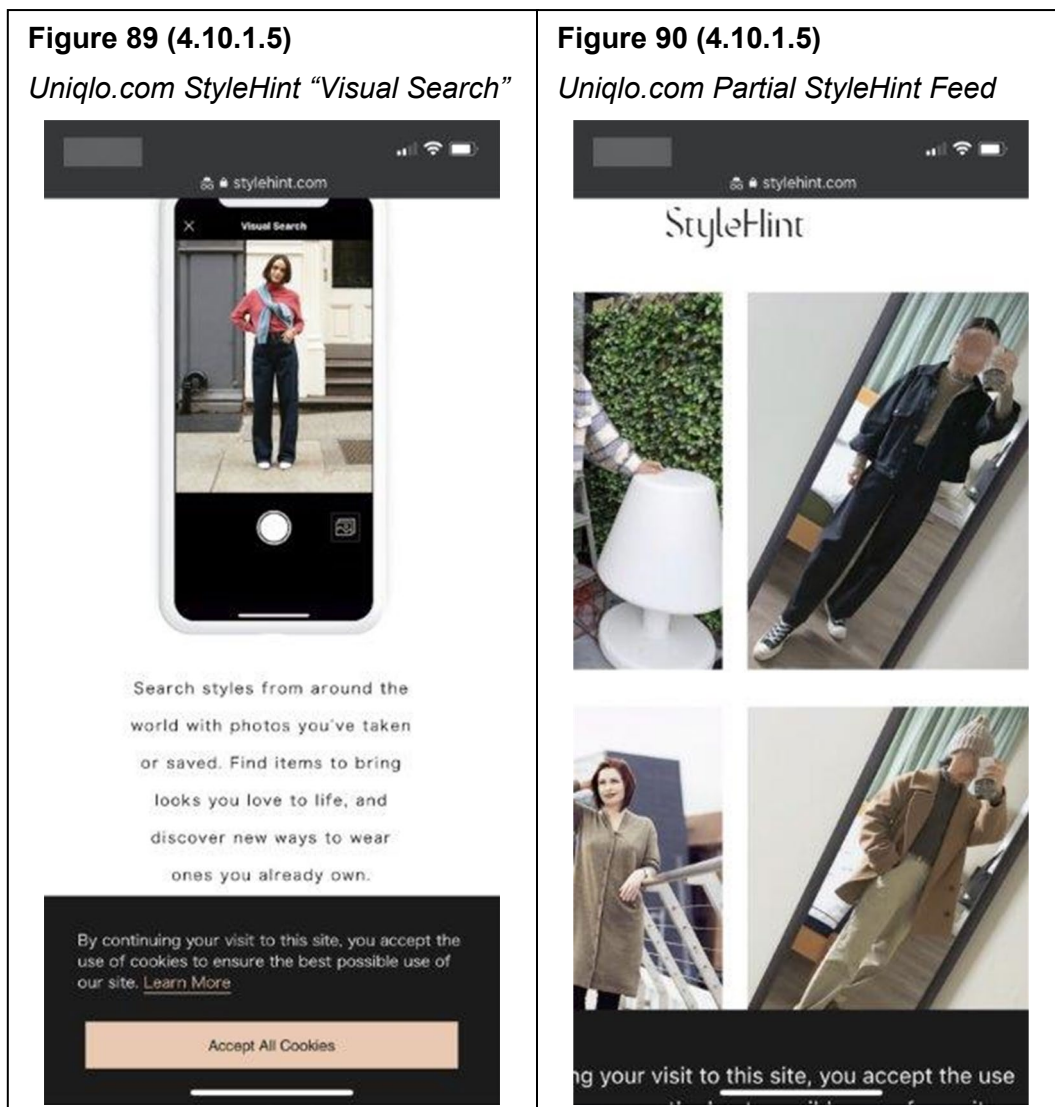


4.10.1.4 Interface Interference.

The researcher observed aesthetic manipulation in the previously mentioned \$10 off coupon. "Get \$10 Off Now" was given visual priority over the fine print requiring the user to provide their phone number (see Figure 76, above).

4.10.1.5 Forced Action.

The StyleHint app would require a separate analysis to evaluate more thoroughly; however, based on Uniqlo's description, users may be sharing personal information without fully understanding the implications, which would constitute privacy Zuckering. It seemed that StyleHint users upload photos of their favorite items to find similar items sold by Uniqlo. This raised questions for the researcher about privacy and ownership, including whether all the people in the public photos were aware that their photo had been taken, and whether Uniqlo would claim ownership and the ability to sell these photos to third parties.



4.10.1.6 Urgency.

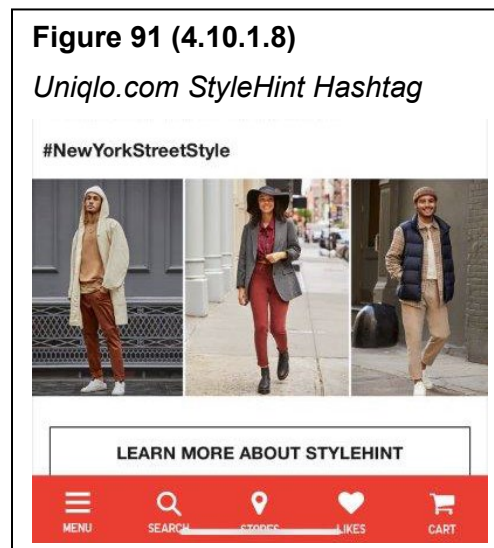
The researcher did not observe an emphasis on urgency.

4.10.1.7 Misdirection.

Like previous sites, the researcher did not observe examples of blatant confirmshaming or pressured selling as described by Mathur et al. (2019). The researcher noted the presence of an “Essential” t-shirt category but was unsure of what made an item “essential,” highlighting the difficulty of identifying pressured selling techniques in digital environments, and leading the researcher to consider this a gray area.

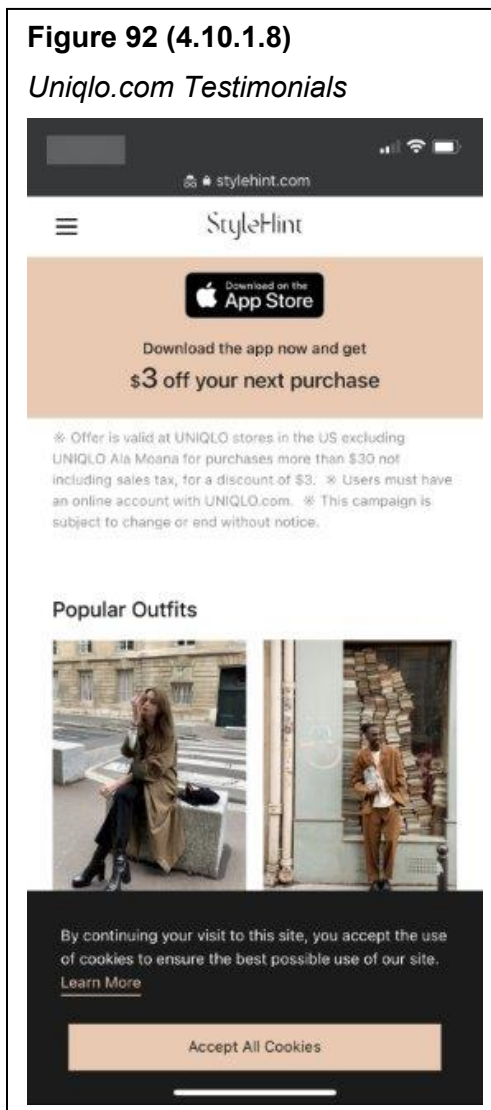
4.10.1.8 Social Proof.

Uniqlo appeared to showcase the behavior of their users mainly through StyleHint. Trending social hashtags were shown below the StyleHint description on the homepage.



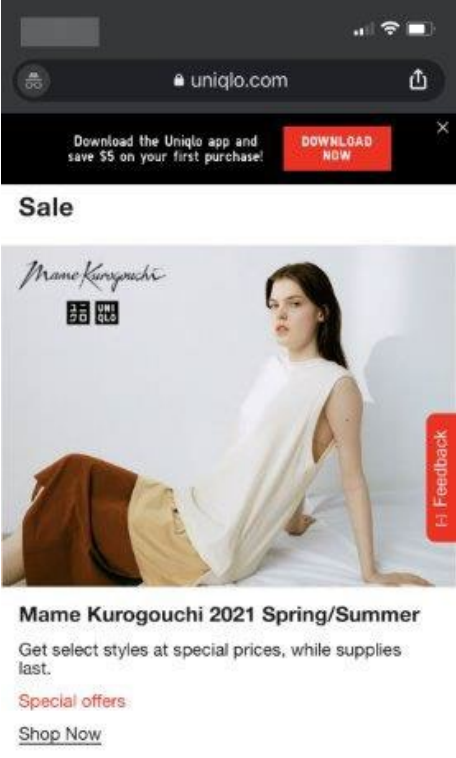
Reading about the app led to a “Popular Outfits” section that ostensibly showed photos of outfits uploaded by other users. With regard to testimonials of uncertain origin,

it was unclear to the researcher whether all the people featured on Uniqlo's site were compensated or whether they were app users unaffiliated with the company.



4.10.1.9 Scarcity.

An advertisement for a sale contained the terms “while supplies last;” but while the intent may have been to encourage purchasing through implying low stock, this message did not seem particularly dark or manipulative to the researcher. Unlike the language on Walmart.com, for example, there was no exclamation claiming that stock was low. Since supplies may not have actually been limited, the researcher considered this a gray area.

Figure 93 (4.10.1.9)*Uniqlo.com Low Stock Message*

The screenshot shows a mobile browser interface. At the top, the address bar displays 'uniqlo.com'. Below the address bar is a promotional banner for the Uniqlo app, with the text 'Download the Uniqlo app and save \$5 on your first purchase!' and a red 'DOWNLOAD NOW' button. The main content area features a 'Sale' heading, followed by a photograph of a woman in a white sleeveless top and a brown skirt, sitting on a white surface. The 'Mame Kurogouchi' logo is visible in the top left of the image, and a 'Feedback' button is on the right. Below the image, the text reads 'Mame Kurogouchi 2021 Spring/Summer', 'Get select styles at special prices, while supplies last.', 'Special offers', and a 'Shop Now' link.

Download the Uniqlo app and save \$5 on your first purchase! **DOWNLOAD NOW**

Sale

Mame Kurogouchi

Mame Kurogouchi 2021 Spring/Summer

Get select styles at special prices, while supplies last.

[Special offers](#)

[Shop Now](#)

Feedback

4.11 Zara.com

4.11.1 Supportive Choice Architecture

4.11.1.1 Reducing Alternatives.

The options on the homepage were minimal, with two text labels (“Man” and “Kids”) shown alongside icons indicating the options could be scrolled horizontally, and a left-side menu that could be expanded.

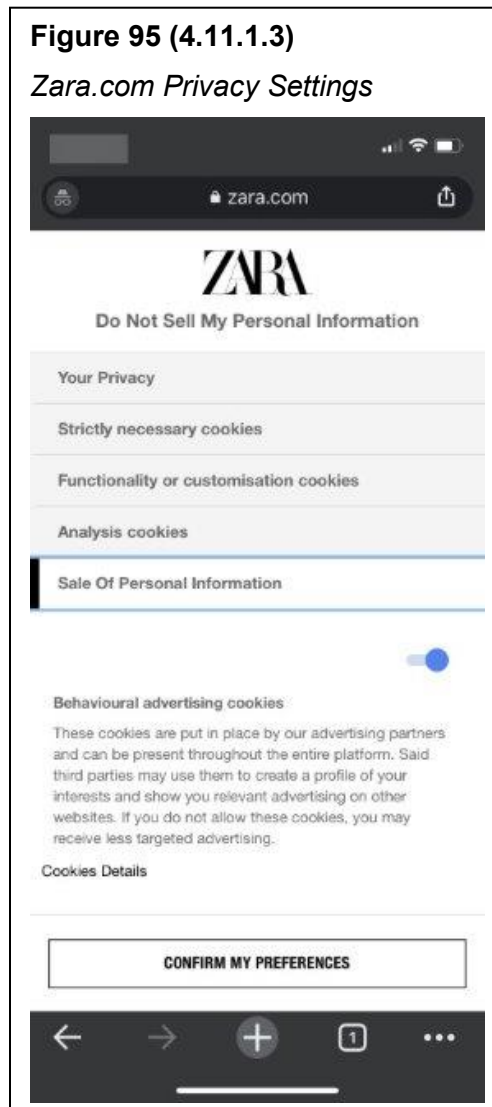


4.11.1.2 Technology and Decision Aids.

Within the description of the selected item, Zara displayed a “You May Also Like” section that suggested similar items.

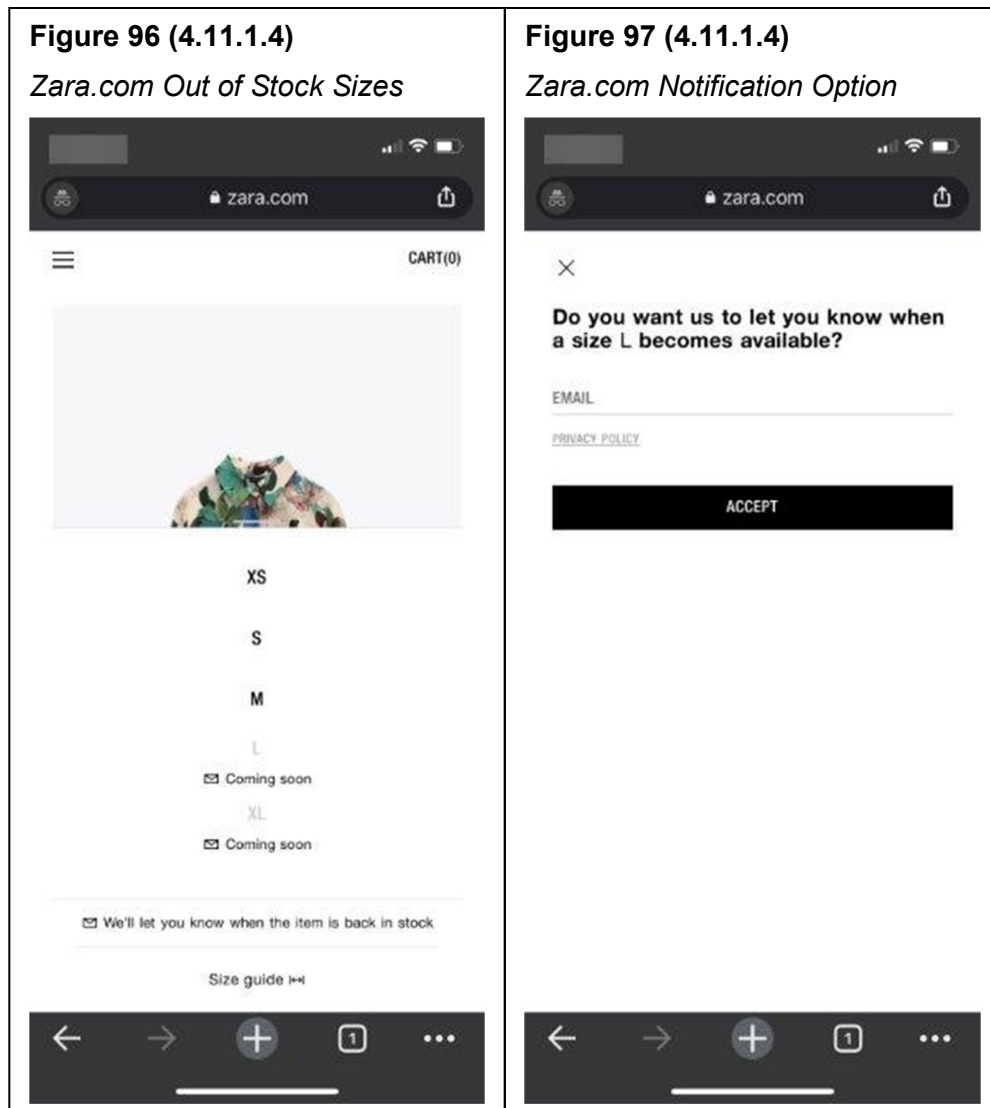
4.11.1.3 Defaults (Change Choice Defaults).

The settings within “Do Not Sell My Personal Information” opted users into the sale of personal information by default, which did not seem supportive; while a default option would allow the user to quickly move onto their shopping goal, user privacy would not be prioritized, leading the researcher to classify this as a gray area.



4.11.1.4 Focus on Satisficing.

Rather than suggest alternative colors for an out-of-stock item, Zara suggested that the researcher could sign up to be notified when a particular item was back in stock.



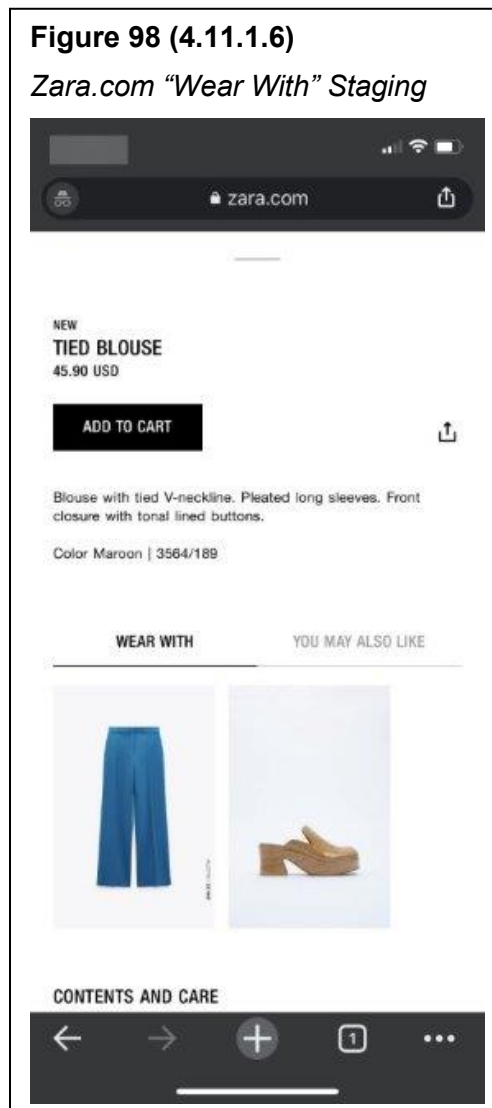
Alternative options were shown in case the researcher wanted to choose a different option, but the design drew attention to the fact that some options were unavailable. This did not support satisficing, but in the researcher's judgment, represented a best practice in terms of helping the user achieve their specific goals.

4.11.1.5 Limited Time Windows.

The researcher did not observe an emphasis on limited time windows.

4.11.1.6 Decision Staging.

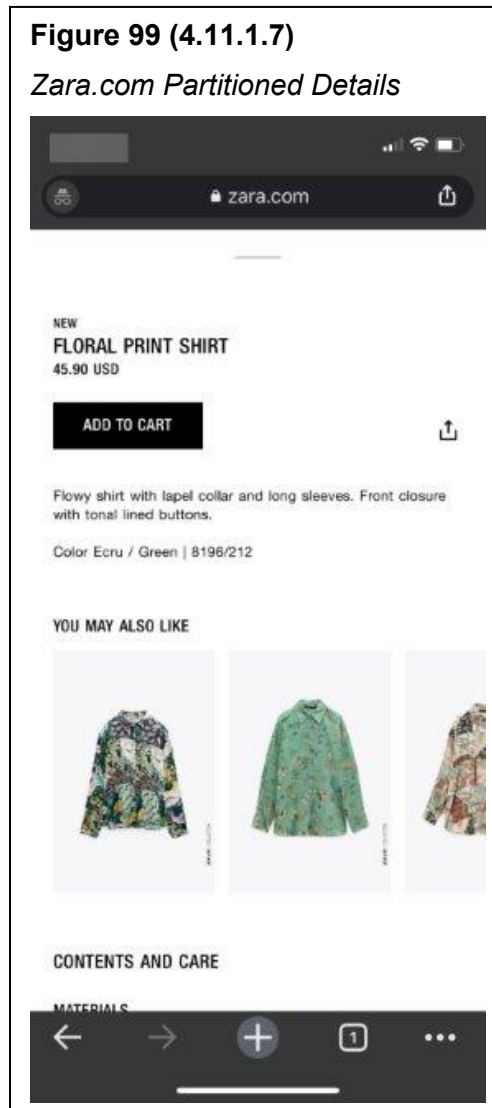
The decision to purchase was encouraged by the presence of the “Wear With” section on the individual item page. This placed the item in a context, simplifying a potentially complicated process of putting together an outfit.



4.11.1.7 Partitioning of Options.

The item image was partitioned from the remaining product details; swiping revealed the text descriptions of the image. Further, the key details and “Add to Cart”

option were separated from the less important “Contents and Care” and “Materials” sections by the “You May Also Like” section.








4.11.1.8 Attribute Parsimony and Labeling.

Within the “Care” section, key aspects of the clothing care process were labelled using iconography commonly found on physical clothing tags.

Figure 100 (4.11.1.8)**Zara.com Care Attributes****CARE**

Caring for your clothes is caring for the environment.

Lower temperature washes and delicate spin cycles are gentler on garment, helping to maintain the color, shape and structure of the fabric. At the same time it reduces energy consumption that is used in care processes.

-  Machine wash max. 30°C/86°F delicate cycle
-  Do not use bleach / whitener
-  Iron maximum 110°C/230°F
-  Tetrachloroethylene Dry Clean
-  Do not tumble dry

Check in-store availability

Shipping, Exchanges and Returns

Chat

**4.11.1.9 Translate and Rescale for Better Evaluability (Translate Information).**

The size guide was translated by overlaying an image of a model with measurement information applicable to the selected size.

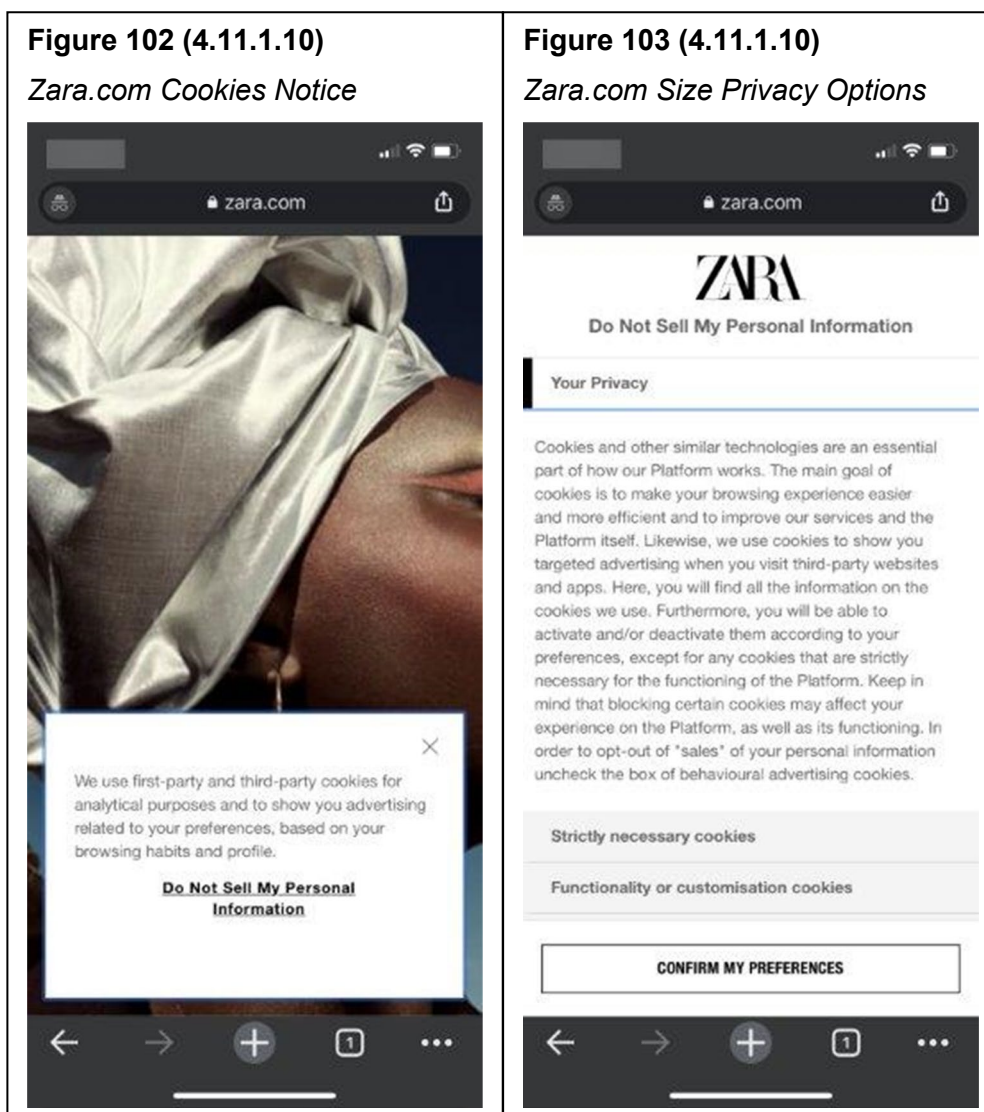
Figure 101 (4.11.1.9)**Zara.com Size in Measurements****SIZE GUIDE****SHIRT**

* The listed measurements refer to body measurements.

M

4.11.1.10 **Make Information Visible.**

The language related to cookies shown upon entering the site made Zara's data collection processes clear. Clicking "Do Not Sell My Personal Information" led to a section that clearly explained the practices and offered options for disabling all but strictly necessary cookies. This type of visibility made privacy options more visible than most of the other sites analyzed.

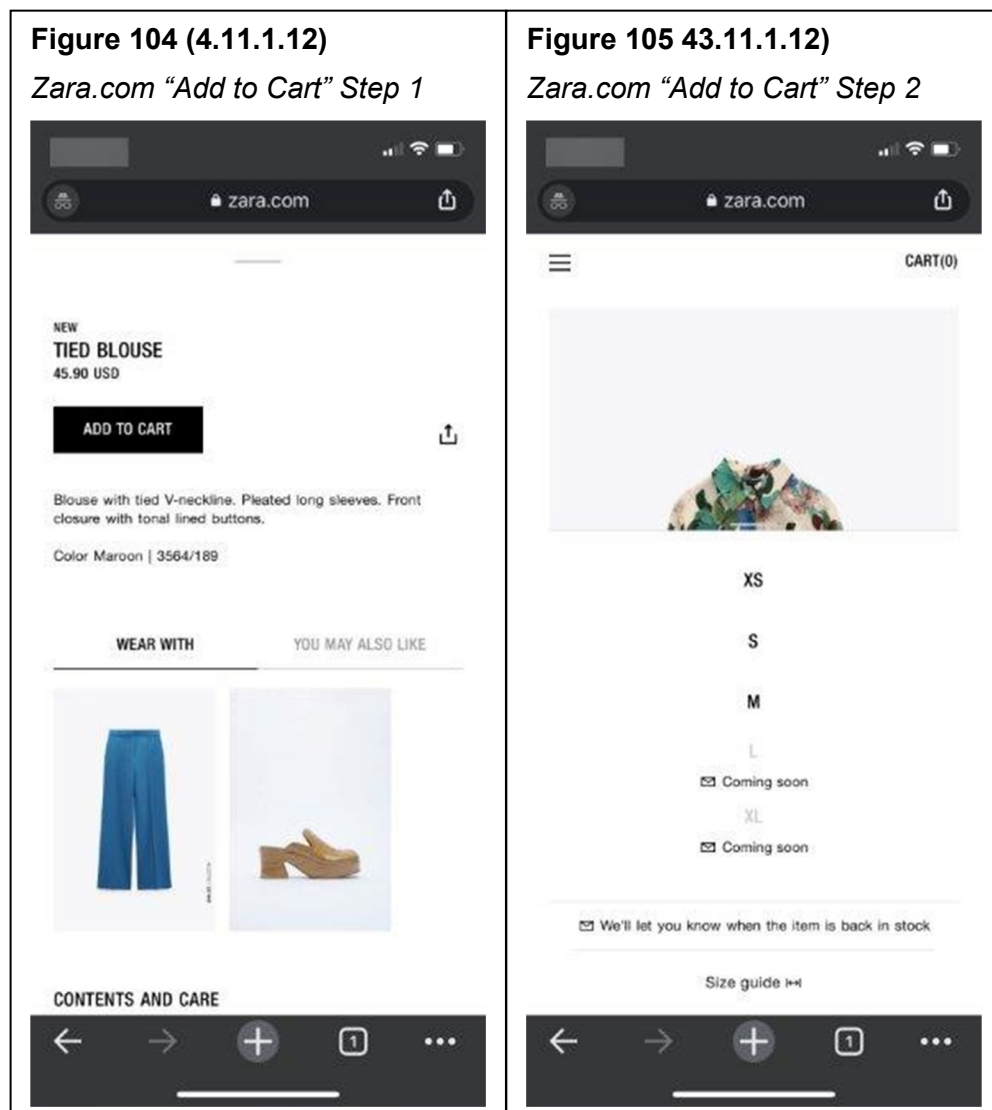


4.11.1.11 *Provide Social Reference Point.*

In the researcher's judgment, Zara lacked obvious social references; there were no reviews or similar references to other users' behavior.

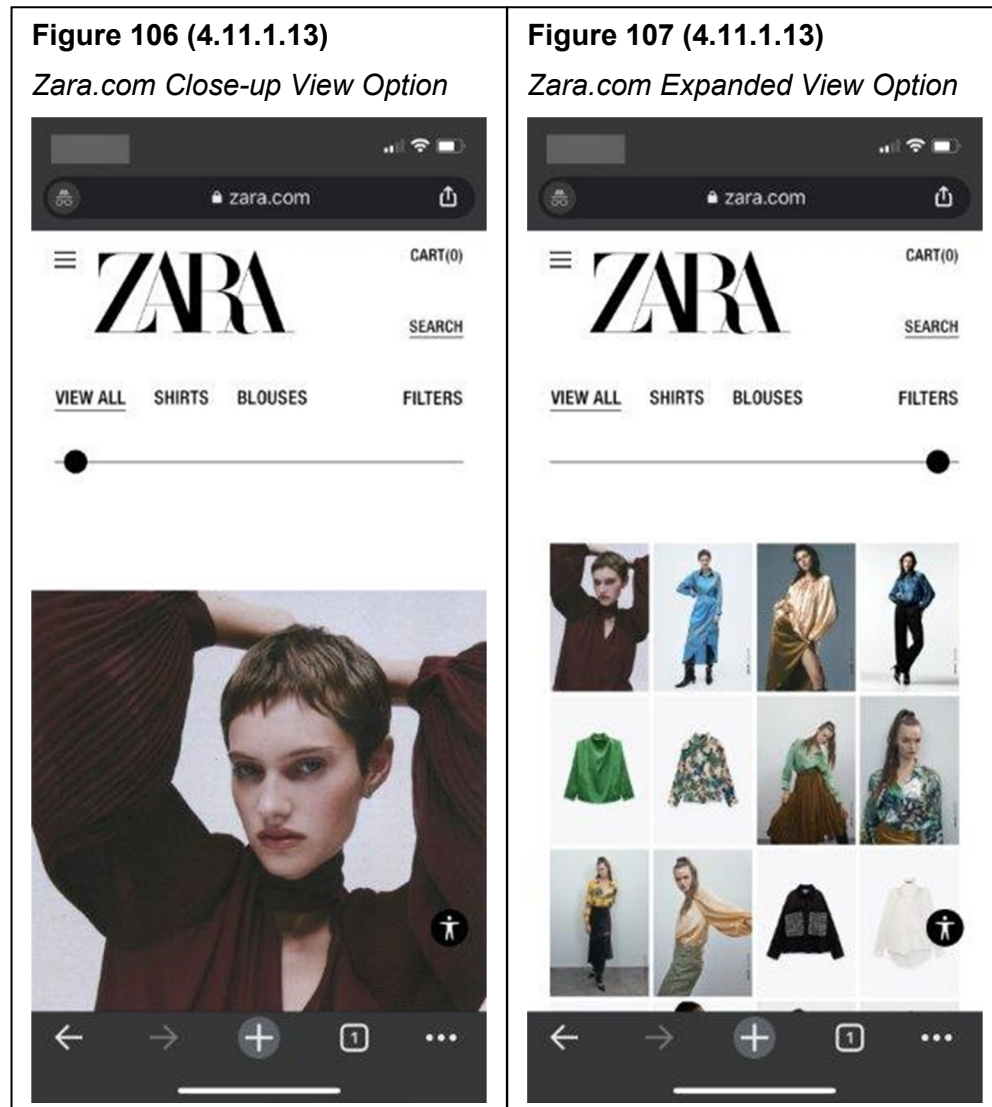
4.11.1.12 *Change Option-Related Effort.*

Adding an item to the cart was possibly streamlined by featuring just the "Add to Cart" button on the item description page. Availability of different sizes was shown after choosing to add the item to the cart.



4.11.1.13 *Change Range or Composition of Options.*

The slider within the clothing category allowed the size of the image to be adjusted, so that the item could be viewed by itself or alongside alternatives.



4.11.1.14 *Change Option Consequences.*

Free shipping was available for orders over \$50, providing a small (\$4.95) benefit for spending at least \$50. Since the free shipping was only available under limited conditions that users may not have otherwise chosen, the researcher considered this option consequence to fall in a gray area.

4.11.1.15 *Provide Reminders.*

After a period of inactivity, the researcher received a prompt to start a chat for assistance, which refocused attention on the shopping process. The first time she received the prompt, she experienced it as supportive.



4.11.1.16 *Facilitate Commitment.*

The share icon next to “Add to Cart” (see Figure 104, above) facilitated sharing the item by text or another social platform.

4.12 Zara.com

4.12.1 Dark Patterns

4.12.1.1 Nagging.

Landing on the homepage prompted a popup attempting to redirect the researcher to the app.



In addition, the researcher was interrupted multiple times by the chat popup (see Figure 108, above), which was likely prompted by a period of perceived inactivity. The repeated interruptions constituted nagging.

4.12.1.2 Obstruction.

Like previous sites, it seemed more difficult than it should have been to make order changes during the checkout process, with the browser's back button being the most obvious way to make edits. There was a visible "Cart" option before checking out as a guest, but that option was replaced by a tiny left-facing arrow during checkout. It was difficult to say whether this pattern was intended to "trap" users into making a purchase, so the researcher determined that it fell into a gray area.

4.12.1.3 Sneaking.

While the researcher was not misled by the shipping costs, in her view, they would be considered hidden costs in some cases. The researcher's selected item cost less than \$50 so was ineligible for free shipping. After adding the item to the cart and choosing the "Ship to an Address" option, a message explained that only full-priced items were eligible for free shipping. For anyone spending \$50 or more on items that had been reduced in price, the shipping costs would have been hidden until they chose a shipping method.

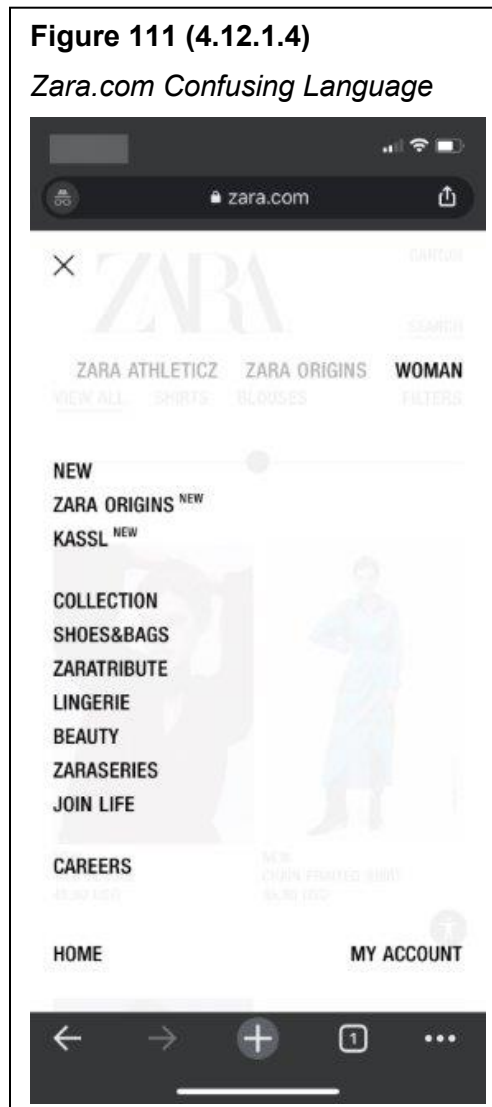


4.12.1.4 Interface Interference.

With respect to the default cookie options previously discussed, even though the information was made visible, the preselection in favor of data sharing was in Zara's best

interests rather than the user. Clicking “Confirm My Preferences” without expanding each option would opt users into all data sharing, including sale of personal information (see Figure 95, above).

Additionally, in the researcher’s view, Zara’s use of brand-specific language was intentionally confusing and qualified as interface interference. The terms used in the left-hand navigation menu seemed to invite exploratory clicks rather than support users’ goals. The researcher’s goal of finding a shirt, which she pursued on multiple sites, was surprisingly difficult to accomplish using Zara’s navigation due to confusing terminology.



4.12.1.5 Forced Action.

The researcher did not observe examples of forced action.

4.12.1.6 Urgency.

The researcher did not observe examples of urgency.

4.12.1.7 Misdirection.

Like previous sites, the researcher did not observe examples of blatant confirmshaming or pressured selling as described by Mathur et al. (2019). Zara appeared to visually guide users toward new items by displaying a “New” label, which as previously mentioned could be a subtle pressured selling technique; because the researcher could not be certain of the motivation behind this design, she considered that it fell into a gray area.



4.12.1.8 Social Proof.

The researcher observed the subtle examples of social proof mentioned below.

4.12.1.9 Scarcity.

The researcher did not observe any explicit examples of scarcity.

Like other sites, Zara.com emphasized the behavior of their site’s users (social proof) and potential scarcity in a subtle way by showing the “Best Sellers” category near the top of the list of collection options within the left-hand navigation menu, which the researcher viewed as falling into a gray area.

Figure 113 (4.12.1.9)
Zara.com "Best Sellers" Category



4.13 Express.com

4.13.1 Supportive Choice Architecture

4.13.1.1 Reducing Alternatives.

There were only five icons representing navigation options across the top menu, including the Express logo.

4.13.1.2 Technology and Decision Aids.

Within the description of the selected item, the “Other guys are wearing” section appeared to serve the same purpose as “You May Also Like” sections on other sites by recommending similar products. Because it referred to the behavior of other site users, it also served as a social reference point.

Figure 114 (4.13.1.1)

Express.com Menu Icons

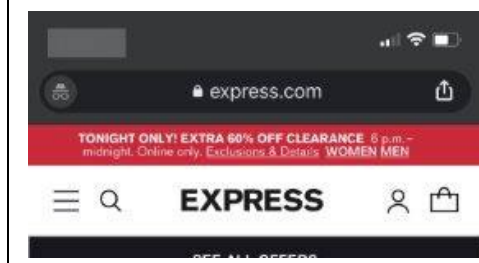
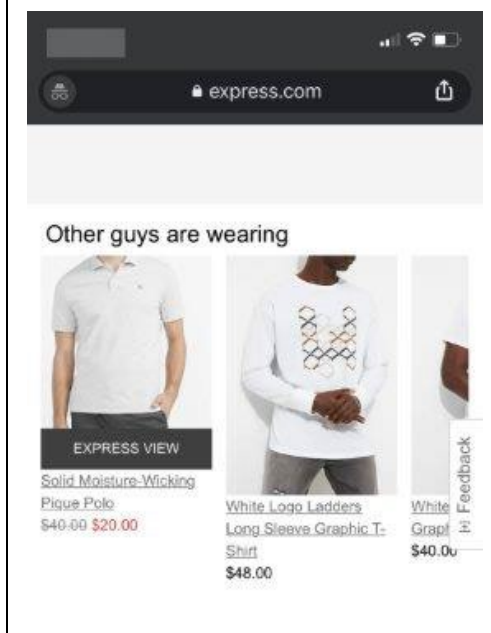


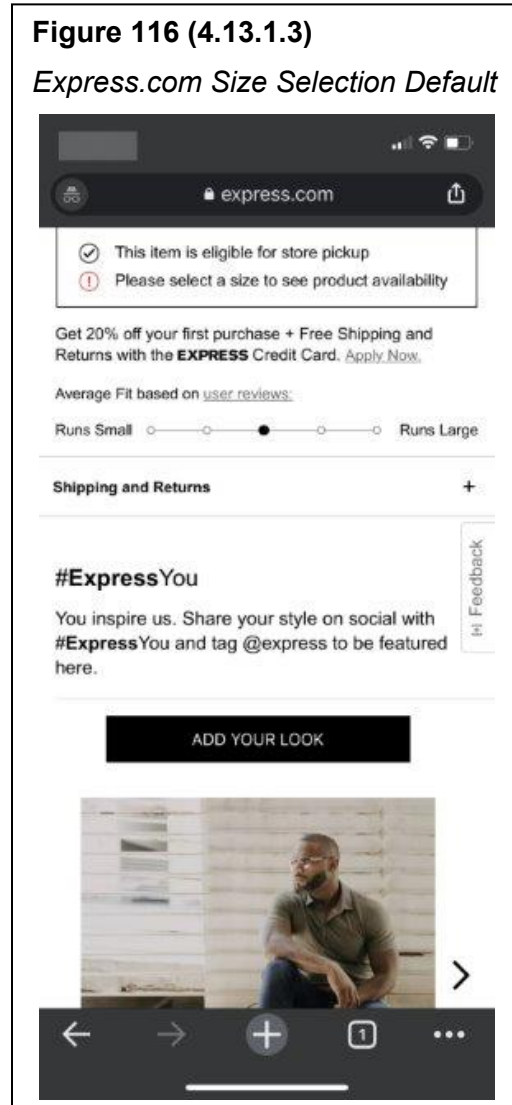
Figure 115 (4.13.1.2)

Express.com “Other Guys are Wearing”



4.13.1.3 Defaults (Change Choice Defaults).

In an example of forced choice, Express.com tried to check for in-store availability, but product availability could not be shown unless size was selected.



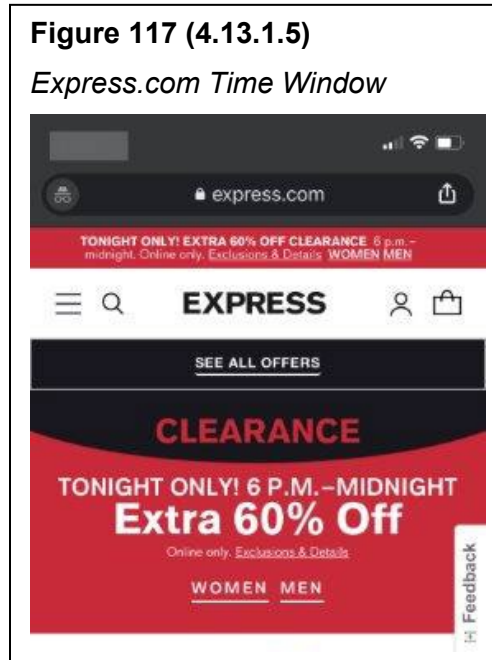
4.13.1.4 Focus on Satisficing.

The “Other guys are wearing” section discussed above (see Figure 115, above) provided a range of alternative options that could meet a user’s needs.

4.13.1.5 Limited Time Windows.

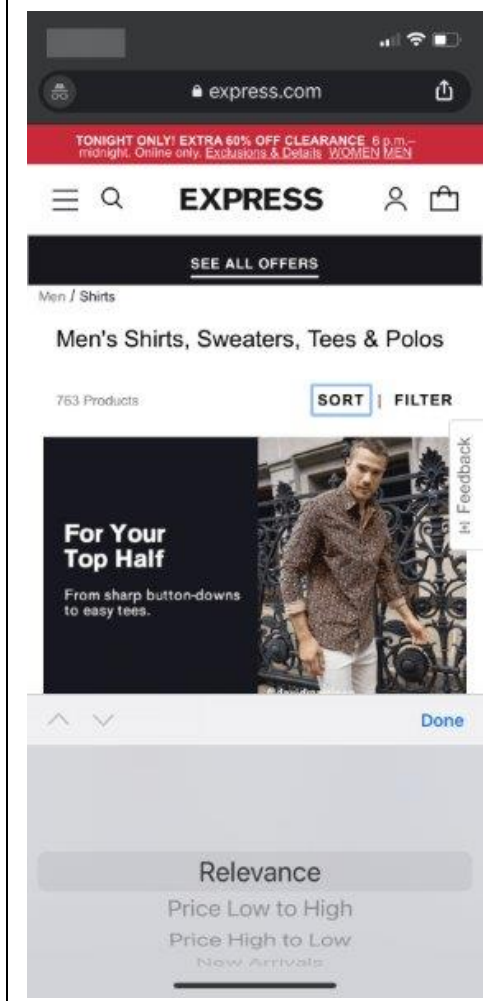
On the homepage, the top banner and a large image stated "Tonight Only! Extra 60% Off Clearance 6 p.m. – midnight." While limited time windows are described by

Johnson et al. (2012) as a tool to help users overcome procrastination, in this online shopping context, it was difficult to see limited time windows as anything other than a dark pattern focused on urgency. The researcher considered this as falling into a gray area, and the urgency pattern is discussed in more detail below.

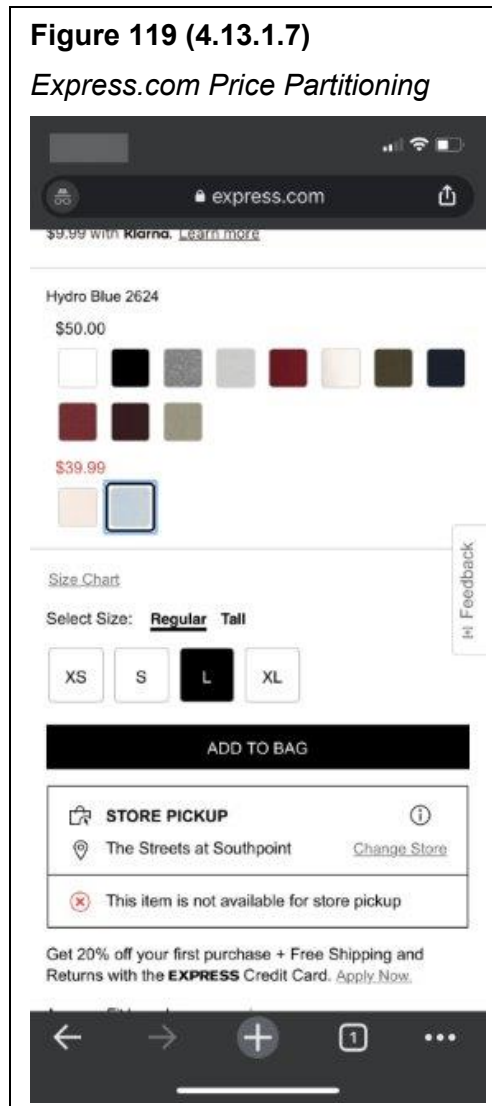


4.13.1.6 Decision Staging.

Within the Men's Shirts category, items were sorted by the Relevance attribute, which may have been intended to return relevant search results.

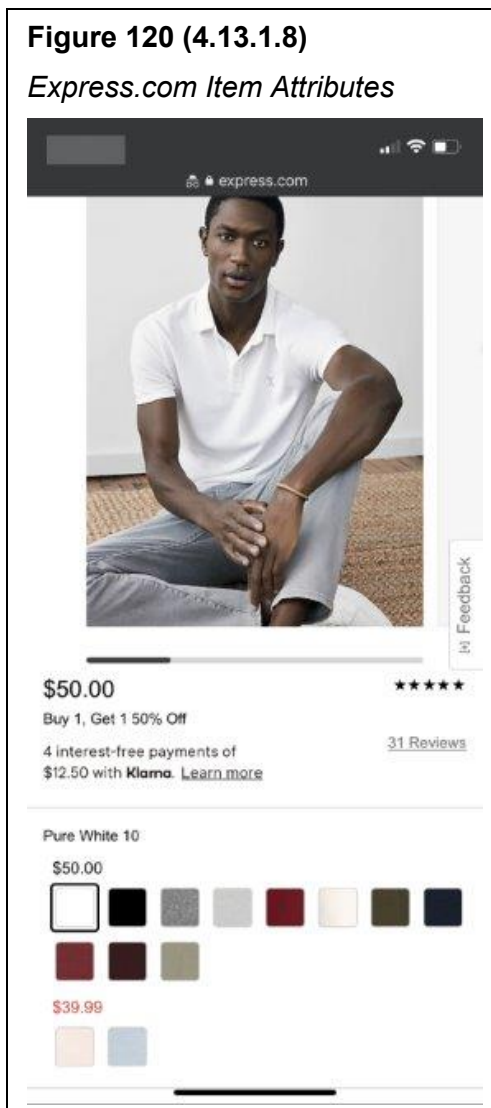
Figure 118 (4.13.1.6)*Express.com "Relevance" Sort***4.13.1.7 Partitioning of Options.**

After the researcher selected a clothing item, she noticed that full-priced items were partitioned from sale-priced items. Full-priced items were emphasized over sale items; there were more full-priced options available, which would likely encourage more consideration than the limited number of sale options, and full-priced items were positioned above sale-priced items, leveraging primacy. In the researcher's view, the visual separation of these two options would help users focus on the attributes important to them, such as color range (full-priced options) or affordability (sale-priced items).



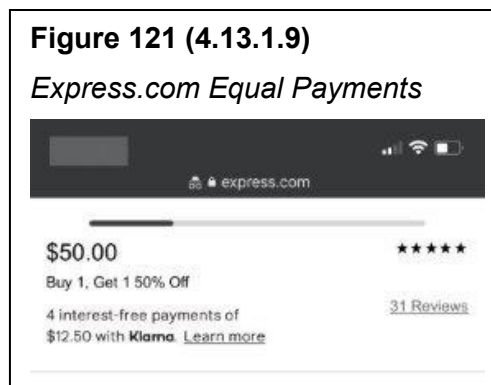
4.13.1.8 Attribute Parsimony and Labeling.

Within the clothing item description, Express displayed key aspects of the clothing first. The attributes available at a glance were clothing appearance, cost, and testimonials; a large image was visible first, followed by price and payment information on the left, which was positioned across from a visual summary of reviews on the right.



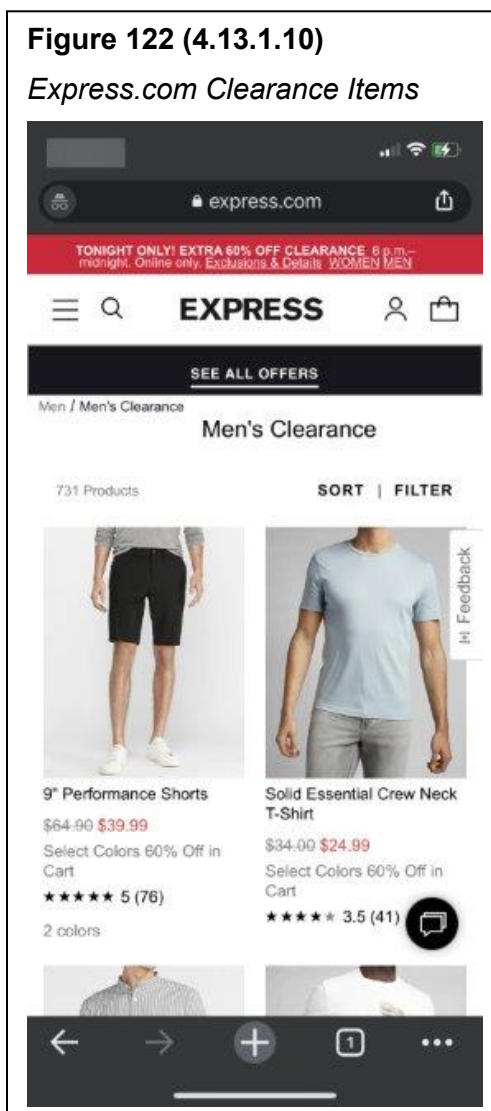
4.13.1.9 Translate and Rescale for Better Evaluability (Translate Information).

Within the cost attributes, Express.com translated the full cost into four equal interest-free payments available as part of the Klarna option.



4.13.1.10 *Make Information Visible.*

All the clearance items were accessible from within the Men's category by clicking one link, leading to one view that made all Men's Clearance items visible at the same time.



4.13.1.11 *Provide Social Reference Point.*

As mentioned above, because the “Other guys are wearing” section (Figure 115) referred to the behavior of other site users, it served as a social reference point as well as a decision aid.

4.13.1.12 **Change Option-Related Effort.**

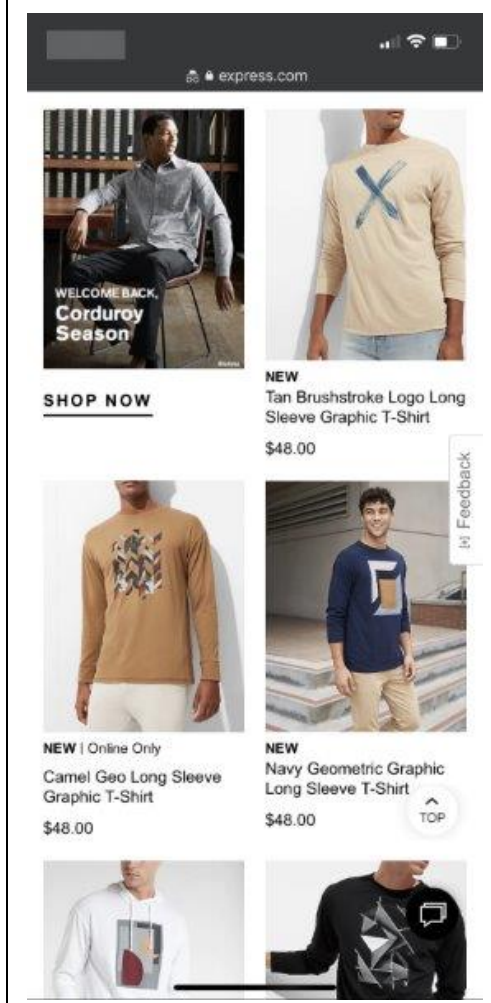
In addition to translating the full cost into separate payment amounts, providing the Klarna option (see Figure 121, above) made the purchasing decision easier by reducing the amount that would be due immediately.

4.13.1.13 **Change Range or Composition of Options.**

Within the “Shirts” category, collections of items were featured next to individual items. For example, shirts were collected into sub-groups including flannel shirts, as well as a sub-category called “Welcome Back, Corduroy Season.”

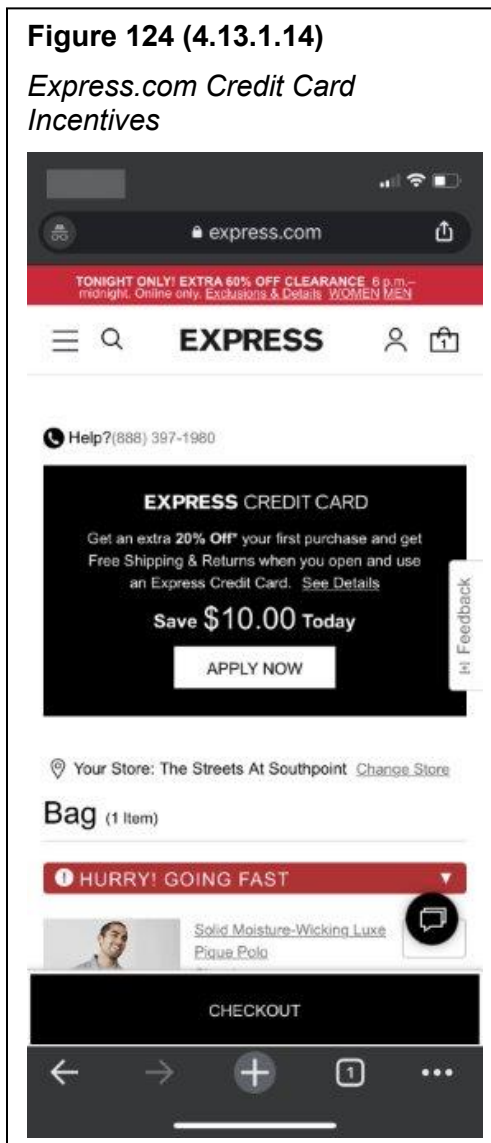
Figure 123 (4.13.1.13)

Express.com Seasonal Sub-Category



4.13.1.14 **Change Option Consequences.**

The decision to sign up for a credit card was encouraged by associating it with benefits including a 20% discount and free shipping.



Similarly, signing up for the Express Insider program was associated with earning “points and rewards” (see Figure 128, below).

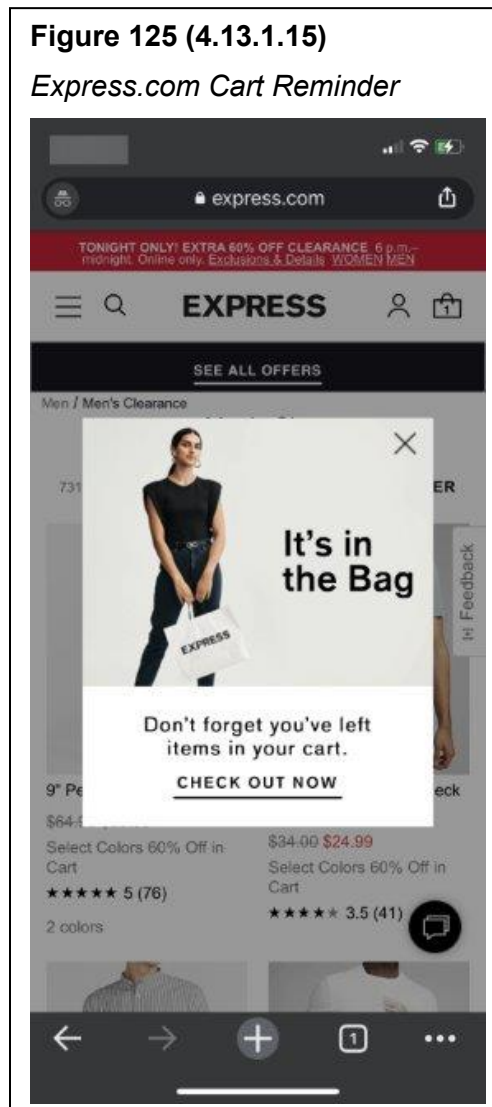
Because these small incentives were offered in exchange for signing up for a credit card or similar programs that have dark pattern features as discussed in more

detail below, the researcher considered that these option consequences were in a gray area.

4.13.1.15 **Provide Reminders.**

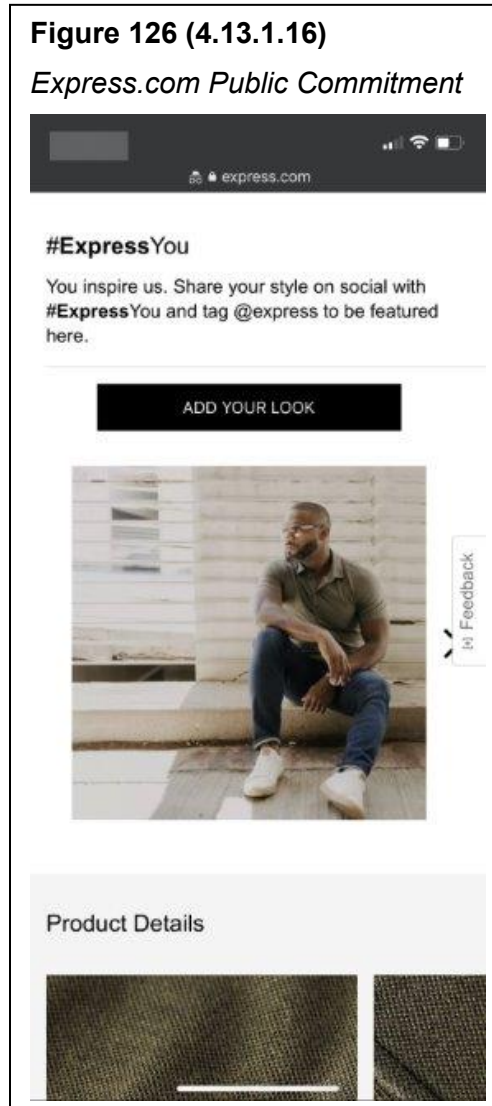
Like Zara.com, a chat popup within the checkout and credit card application pages prompted the researcher to start a chat to ask questions, which drew the researcher's attention and was a positive experience at first.

Additionally, when the researcher navigated to the clearance items, she received a reminder that she had left items in the cart, which was likely intended to encourage users to complete their purchase.



4.13.1.16 *Facilitate Commitment.*

Express.com encouraged public commitment to their brand by asking users to post images of their outfits using the #ExpressYou hashtag to be featured on the Express homepage.

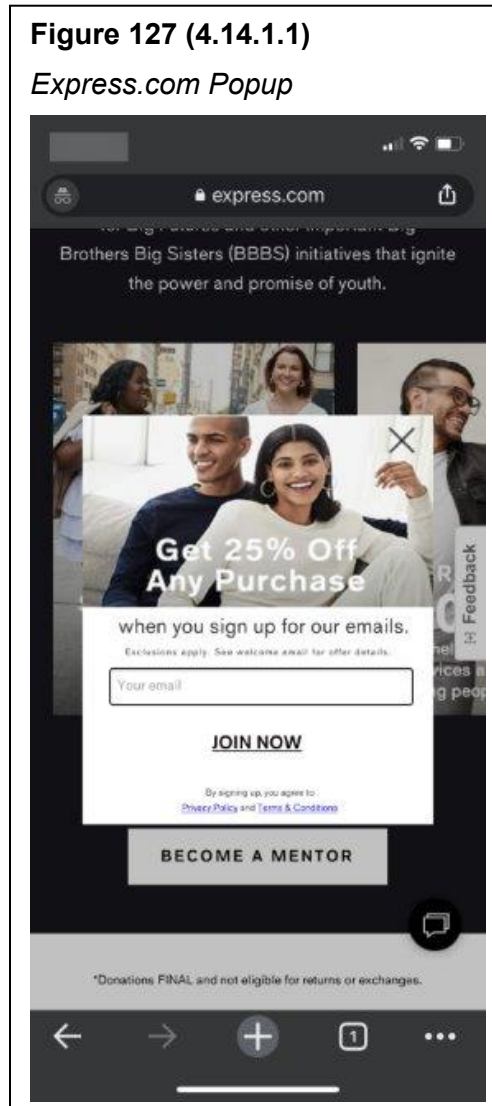


4.14 Express.com

4.14.1 Dark Patterns

4.14.1.1 Nagging.

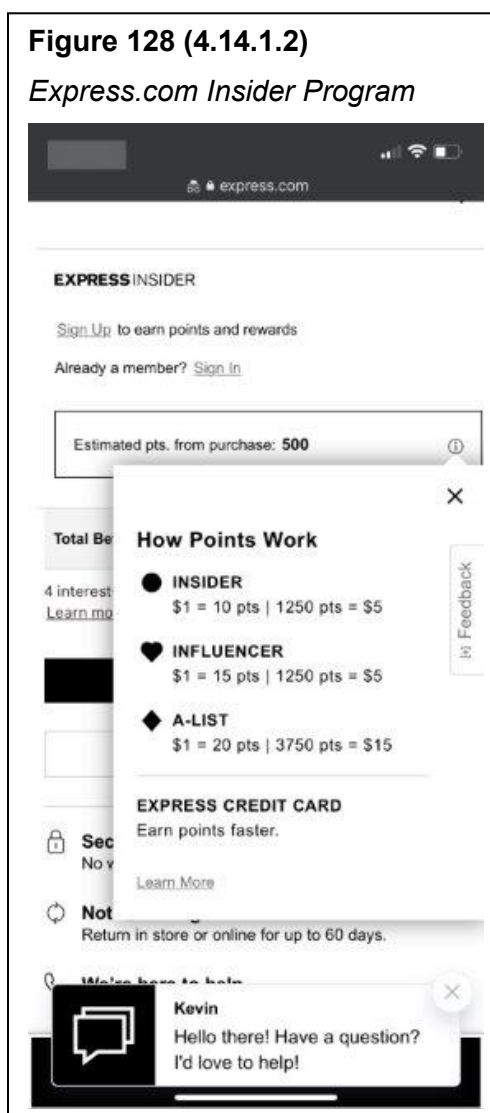
The researcher was interrupted multiple times by a popup requesting her email address in exchange for a 25% off coupon.



4.14.1.2 Obstruction.

The Express Insider program had some characteristics of intermediate currency, like the points program offered by Shein.com. The checkout page indicated that the

researcher would earn 500 Express Insider points by completing the purchase, but the actual value of those points was unclear to the researcher. Clicking the information icon opened a message that showed three different types of points, each associated with different values: \$1 translated to 10 Insider points, 15 Influencer points, and \$20 A-list points. This explanation added to the researcher's confusion.



After briefly reviewing a longer description of Express Insider, the researcher deduced that Influencer and A-list points could be earned by Express credit card users, perhaps by using the credit card for varying purchase amounts. In the researcher's view, associating credit card spending with earning reward points could at least partly

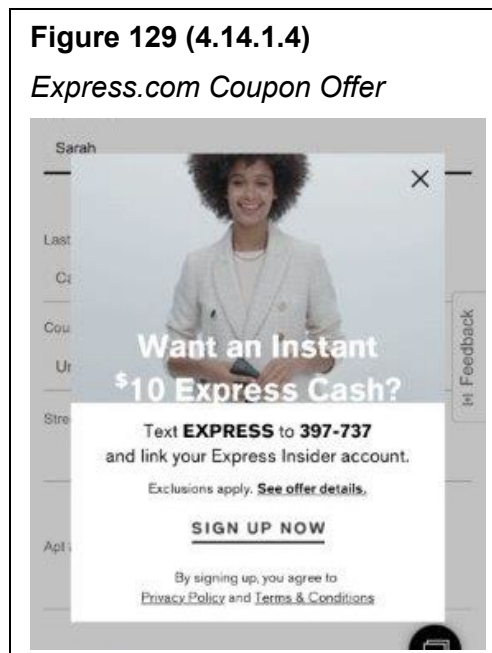
disconnect people from the reality that credit card spending increases debt, leading her to classify this as obstruction.

4.14.1.3 Sneaking.

As another way of looking at the Express credit card and reward program, the researcher believes that finance charges for late payments could represent hidden costs associated with signing up for an Express credit card and using it to earn points.

4.14.1.4 Interface Interference.

The researcher observed aesthetic manipulation in the form of a distracting offer for a coupon that appeared within the cart. In addition to being an interruption (nagging), the design distracted from the checkout process. Visually, it emphasized receiving \$10 Express Cash with large print. The fact that the researcher would have needed to sign up for an Express Insider account and then send a specific text message was underemphasized through the position and size of the text.

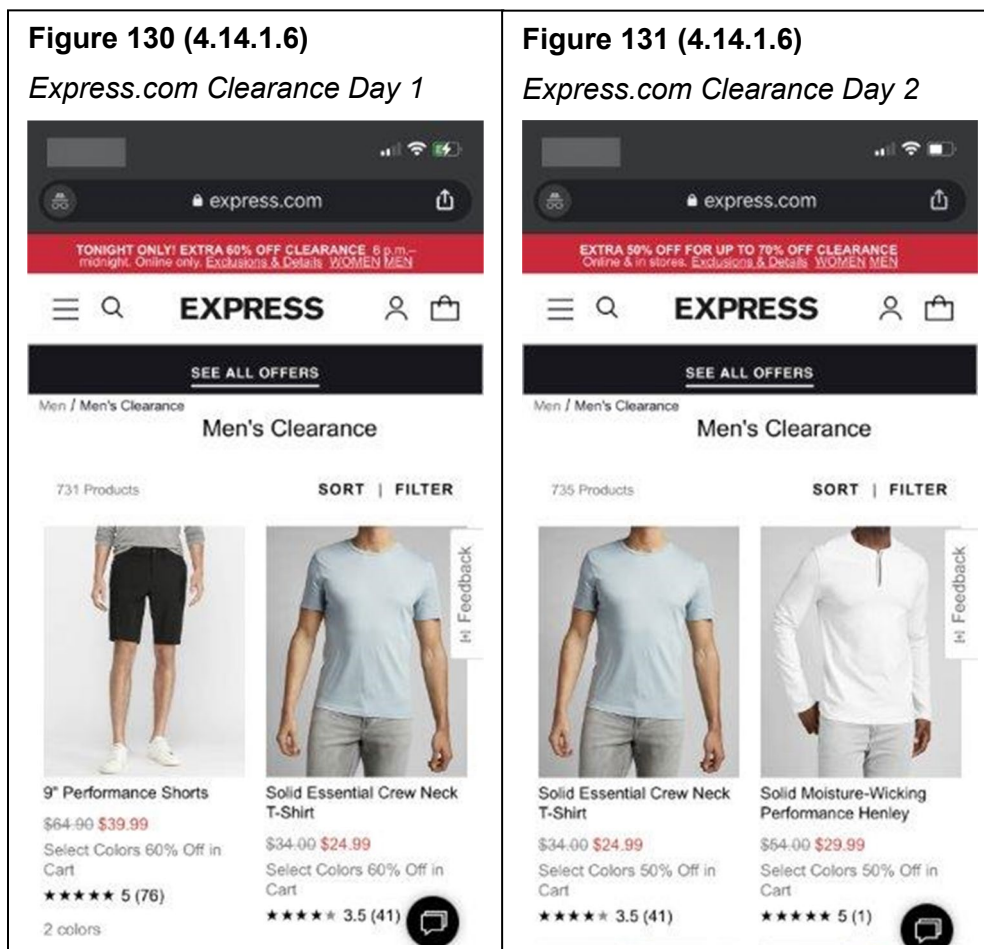


4.14.1.5 Forced Action.

As shown above, to earn Express Cash, the researcher would have had to provide her personal information as part of an account sign-up process. In turn, signing up would have required consent to the site's "Privacy Policy" and "Terms & Conditions."

4.14.1.6 Urgency.

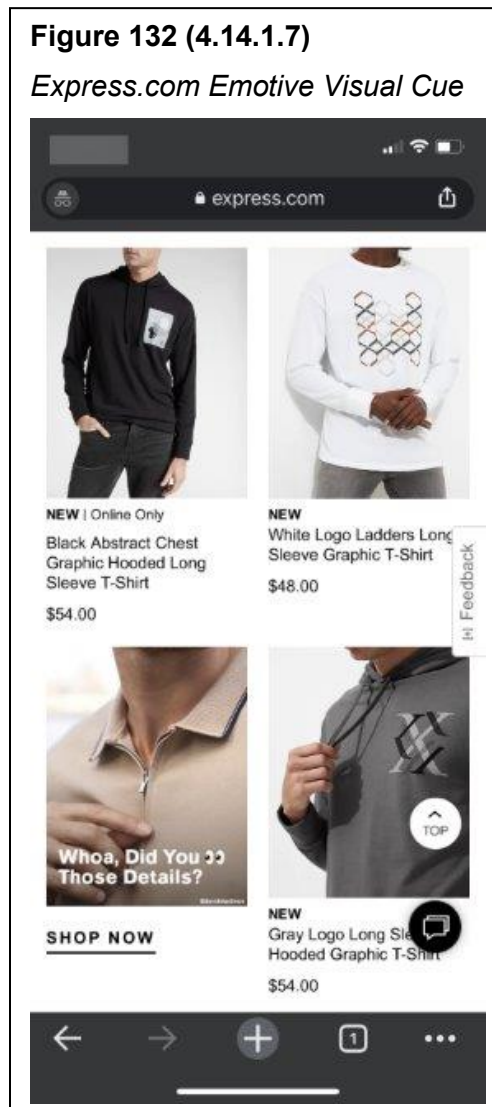
At the time of the analysis, Express.com was advertising a clearance sale, which was shown as taking place from 6:00 until midnight, creating a perception that prices would increase after the sale ended. To check whether this was the case, the researcher returned to the site the next day, and saw that the clearance banner had been updated from "Extra 60% Off" to "Extra 50% Off For Up to 70% Off Clearance;" the wording was confusing, but it did not appear that prices had increased. The researcher noted that one



shirt she had taken a screenshot of the previous day was exactly the same price (see Figures 130 and 131, above).

4.14.1.7 *Misdirection.*

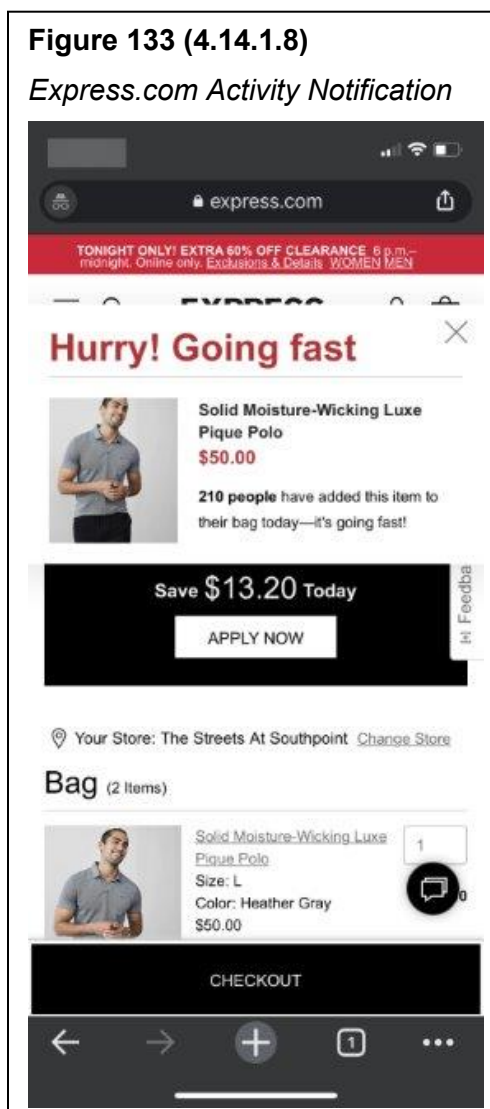
Like Bloomwholesale.com, the researcher observed subtle use of emojis, which could influence some decision-makers by pairing text with emotive visual cues. Within the Shirts category, the persuasive message and image "Whoa, Did You [see] Those Details?" seemed intended to invite users to shop within this category, but like the example seen on Shein.com, this design did not seem intended to manipulate or confuse.



Additionally, as previously discussed, adding a “New” identifier may be a subtle form of pressured selling, and Express.com distinguished certain items this way within the Men’s Shirts category. Because these techniques were not blatantly dark, the researcher considered that they fell into a gray area.

4.14.1.8 Social Proof.

After the researcher added a shirt to the cart, Express.com showed a popup indicating that 210 people had viewed the item that day; this used the behavior of others to demonstrate demand.



4.14.1.9 Scarcity.

The researcher noted that the language in the popup shown above (Figure 133) conveyed low stock with the message “Hurry! Going fast” in the absence of any indication of how many shirts were still available.

Within the Clearance section, the researcher had the impression that stock was low when she selected an item and received the message that it was sold out.

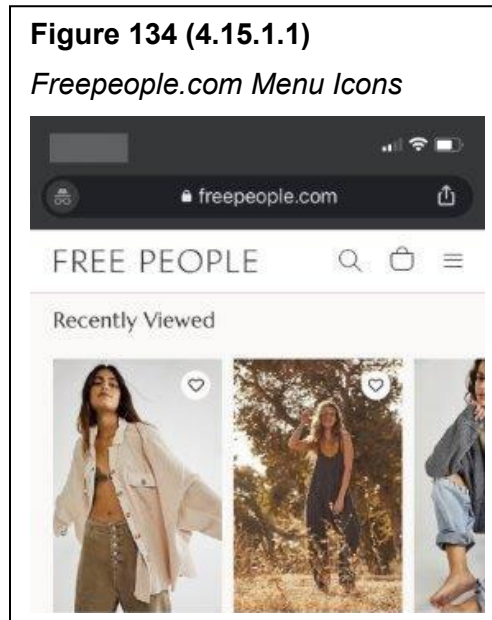
Notably, unlike other sites, the researcher did not observe subtle emphasis on the behavior of others or potential scarcity through showing “Best Seller” labels or categories.

4.15 Freepeople.com

4.15.1 Supportive Choice Architecture

4.15.1.1 Reducing Alternatives.

The top horizontal menu was limited to four navigation icons.

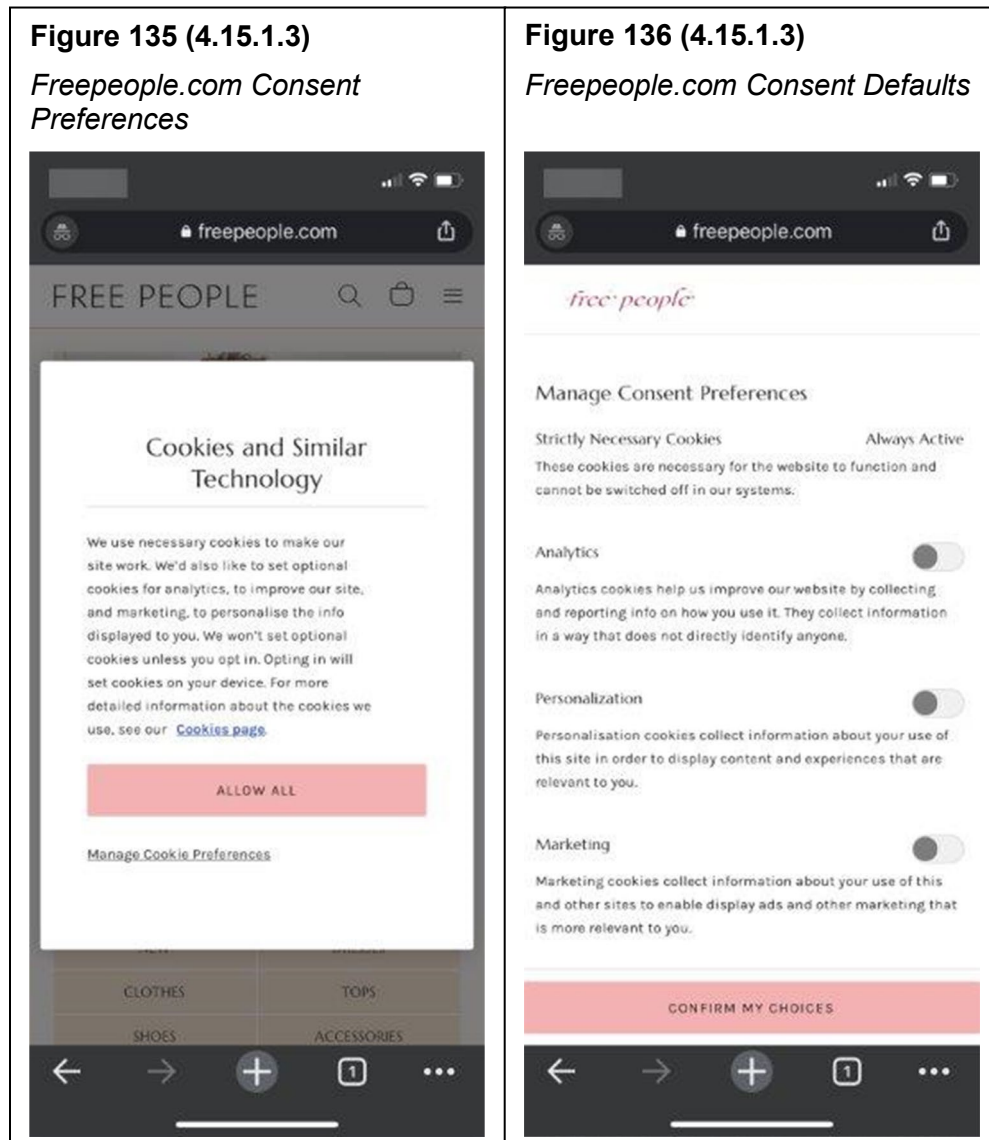


4.15.1.2 Technology and Decision Aids.

The researcher did not observe product suggestions or technology and decision aids like those observed on other sites. There was a menu option called “Brands We Love,” which suggested specific brands, but those brands may have been featured due to sponsorship arrangements and seemed unlikely to aid decision-making in the context of a user looking for help making a decision about their selected item.

4.15.1.3 Defaults (Change Choice Defaults).

After selecting “Manage Cookie Preferences” within the “Cookies and Similar Technology” popup, the consent preferences were set to inactive by default for all options other than Strictly Necessary Cookies.



4.15.1.4 Focus on Satisficing.

Like Zara.com, when the researcher selected an out-of-stock size, Freepeople.com offered to notify the researcher if the item was restocked. Alternative options were still shown, and the design put some emphasis on satisficing by

encouraging the researcher to “Please select an in-stock size.” The design also did not seek to distract the user from the fact that her selection was unavailable; instead, the researcher was offered the option to postpone the purchase in favor of waiting for a restock. In the researcher’s view, this represented a best practice in terms of balancing satisficing with helping the user achieve their specific goals.

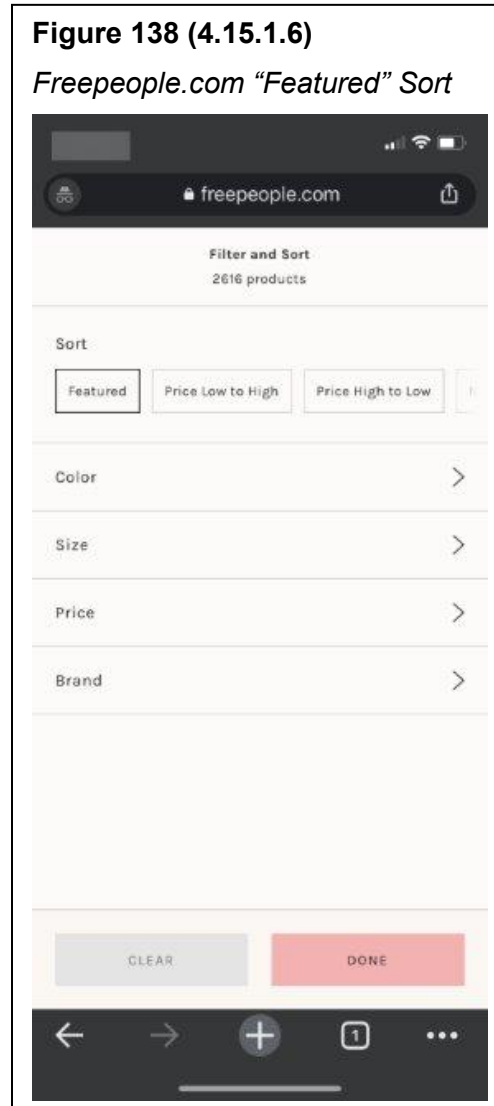


4.15.1.5 Limited Time Windows.

The researcher did not observe examples of focus on limited time windows.

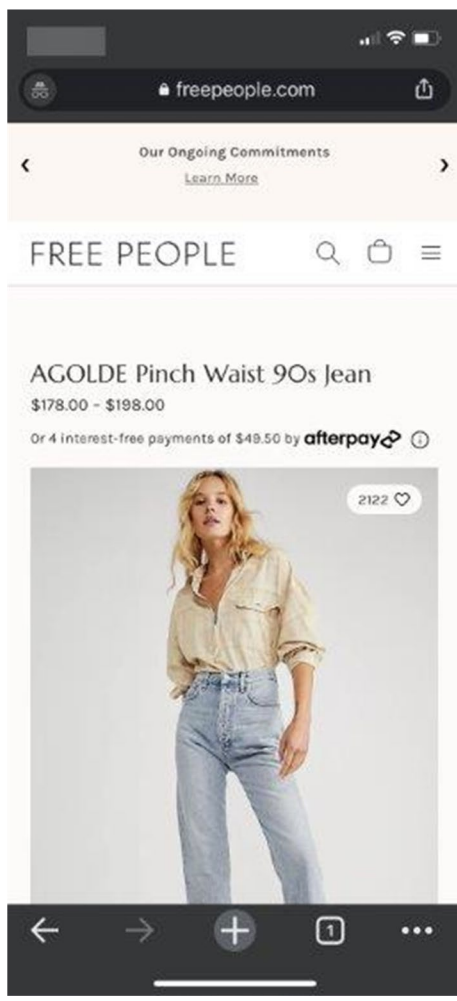
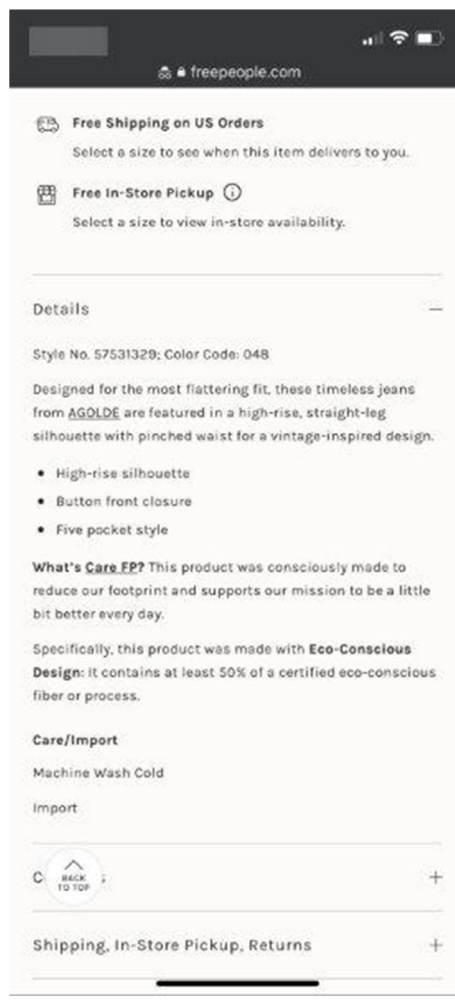
4.15.1.6 Decision Staging.

Items within the selected clothing category were sorted by the “Featured” attribute by default; the definition of a Featured item was unclear, leading the researcher to classify this as a gray area.

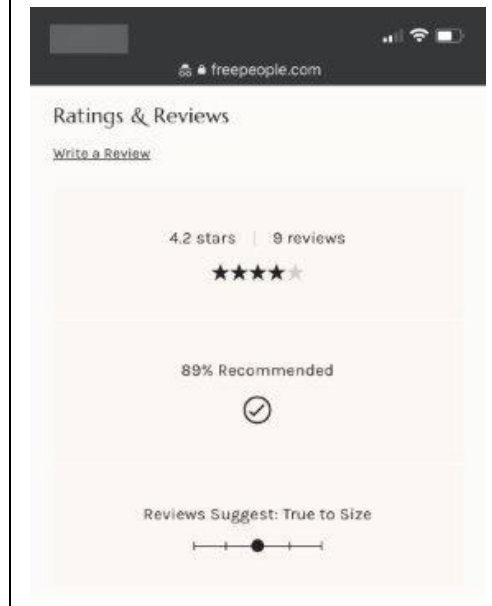


4.15.1.7 Partitioning of Options.

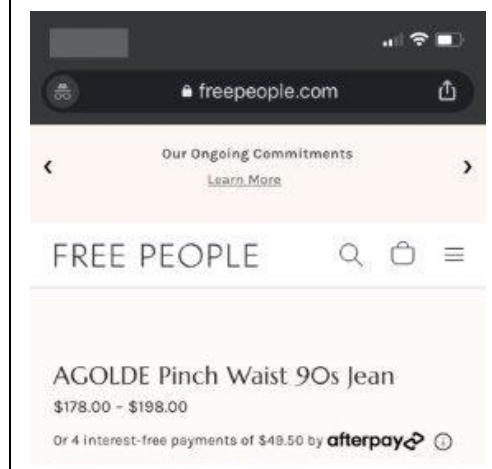
The item name, price, and representative image were positioned together, while text details were partitioned separately further down the page. The details were initially collapsed, indicating less visual emphasis, but could be expanded.

Figure 139 (4.15.1.7)*Freepeople.com Item Partitioning***Figure 140 (4.15.1.7)***Freepeople.com Detail Partitioning***4.15.1.8 Attribute Parsimony and Labeling.**

Key attributes of “Ratings & Reviews” were represented with minimal text paired with simple yet clear icons, simplifying the process of interpreting reviews.

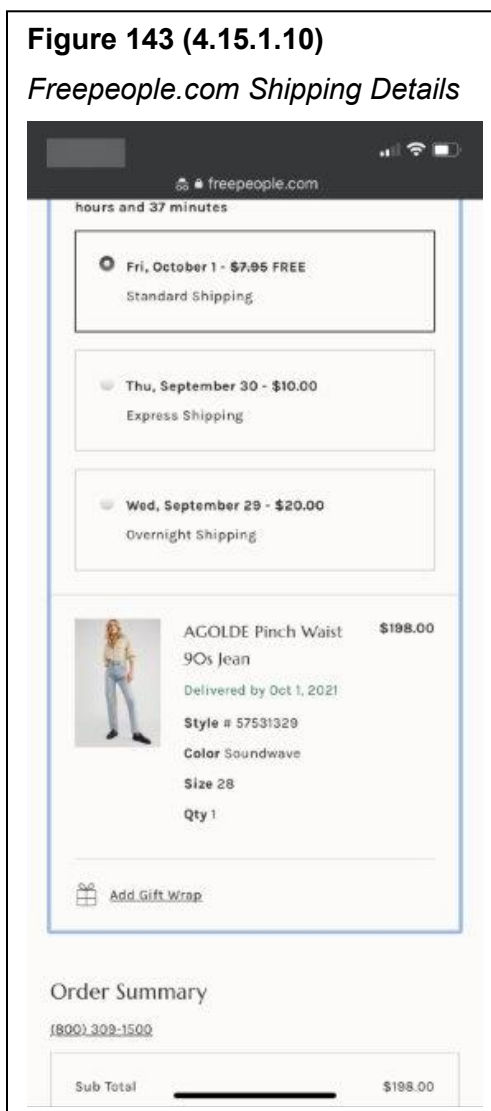
Figure 141 (4.15.1.8)*Freepeople.com Ratings & Reviews “Summary”***4.15.1.9 Translate and Rescale for Better Evaluability (Translate Information).**

Like the Klarna option seen on other sites, the Afterpay option offered by Freepeople.com translated the full cost into four equal interest-free payments

Figure 142 (4.15.1.9)*Freepeople.com Afterpay Option*

4.15.1.10 **Make Information Visible.**

The shipping information shown during the checkout process provided clear information about estimated shipping time and delivery dates; this section used color to emphasize the predicted delivery timeframe for the selected item based on the available free shipping option.

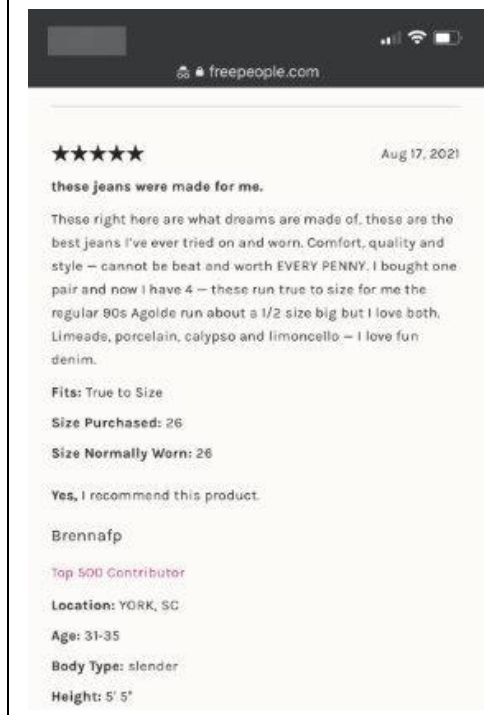


4.15.1.11 **Provide Social Reference Point.**

While viewing product reviews, the researcher observed that some reviewers had a “Top 500 Contributor” identifier that seemed to serve as an endorsement and position those reviewers as opinion leaders.

Figure 144 (4.15.1.11)

*Freepeople.com “Top 500”
Reviewer*

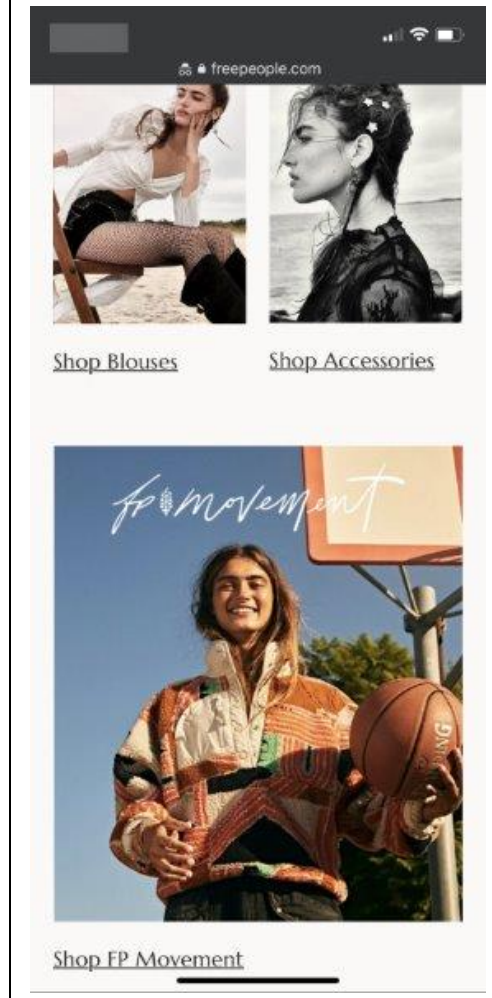


4.15.1.12 *Change Option-Related Effort.*

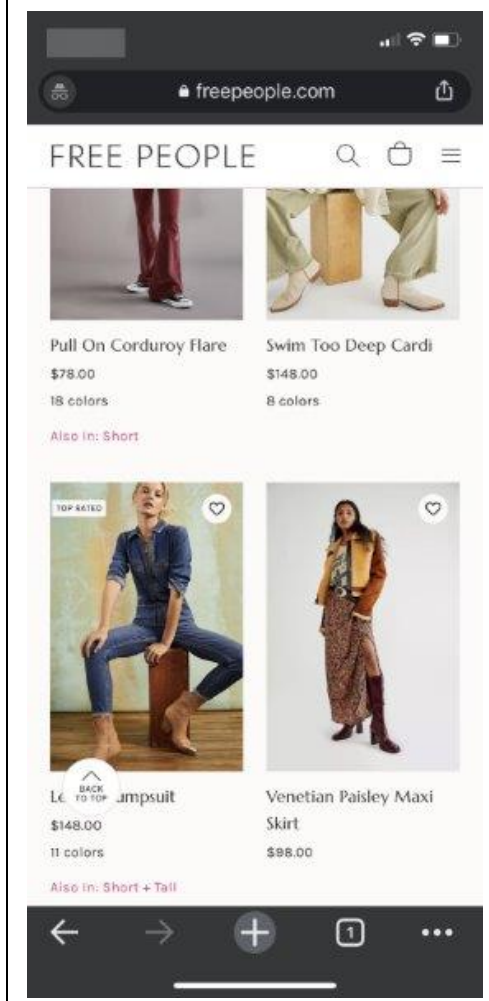
In addition to translating the full cost into separate payment amounts, providing the Afterpay option made the purchasing decision easier by reducing the amount that would be due immediately.

4.15.1.13 *Change Range or Composition of Options.*

Items were sub-divided into collections to set them apart; for example, the “FP Movement” collection was featured on the homepage.

Figure 145 (4.15.1.13)*Freepeople.com Collection*

When items were available in different lengths, a red text label below the thumbnail images within the selected category visually emphasized the available options.

Figure 146 (4.15.1.13)*Freepeople.com "Length" Label***4.15.1.14 Change Option Consequences.**

A graphic on the homepage drew attention to an offer for a “free” Calm Kit; the Calm Kit gift would be a small benefit associated with the decision to spend at least \$100 on Beauty and Wellness items. Similar to other small incentives, the researcher viewed this as falling into a gray area since it was the consequence of spending a significant amount of money.

Figure 147 (4.15.1.14)*Freepeople.com Calm Kit Graphic*

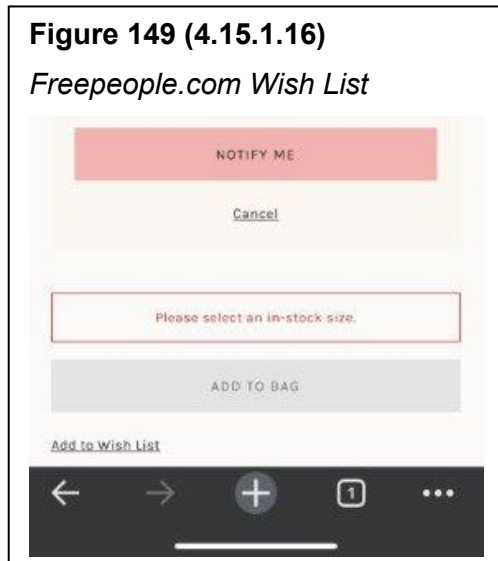
4.15.1.15 **Provide Reminders.**

Freepeople.com's shopping bag provided the option to "Save for Later" which would presumably trigger an email or similar reminder to return to the site for the saved item.



4.15.1.16 **Facilitate Commitment.**

In addition to providing social sharing options, Freepeople.com provided the option to add items to a wish list. The wish list could presumably be saved privately to support self-commitment and shared with others as part of a plan to either purchase items later or request them as gifts.

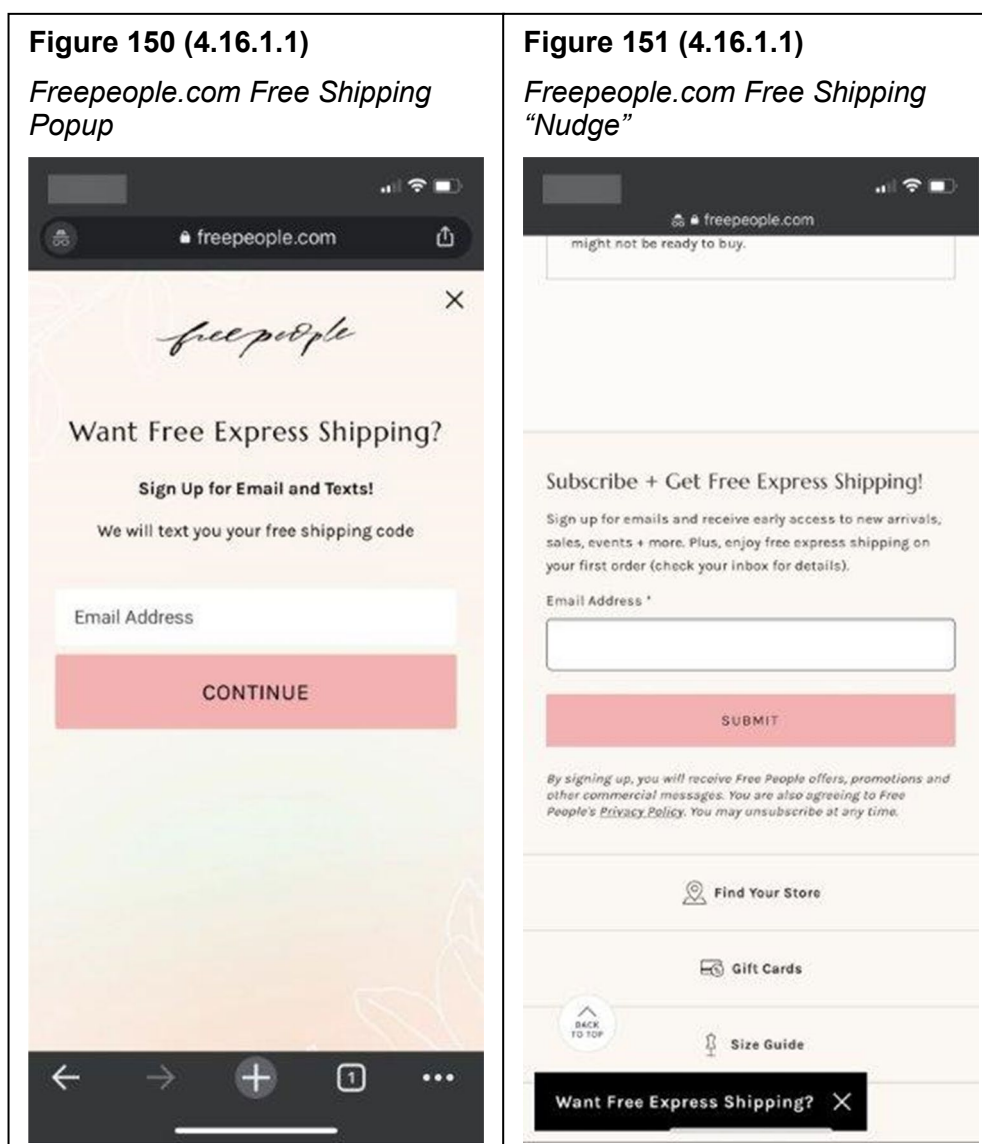


4.16 Freepeople.com

4.16.1 Dark Patterns

4.16.1.1 Nagging.

The researcher's browsing was interrupted by a popup offering free express shipping in exchange for the researcher's email address. After dismissing the popup, the researcher noticed multiple references to the same express shipping offer on other pages.

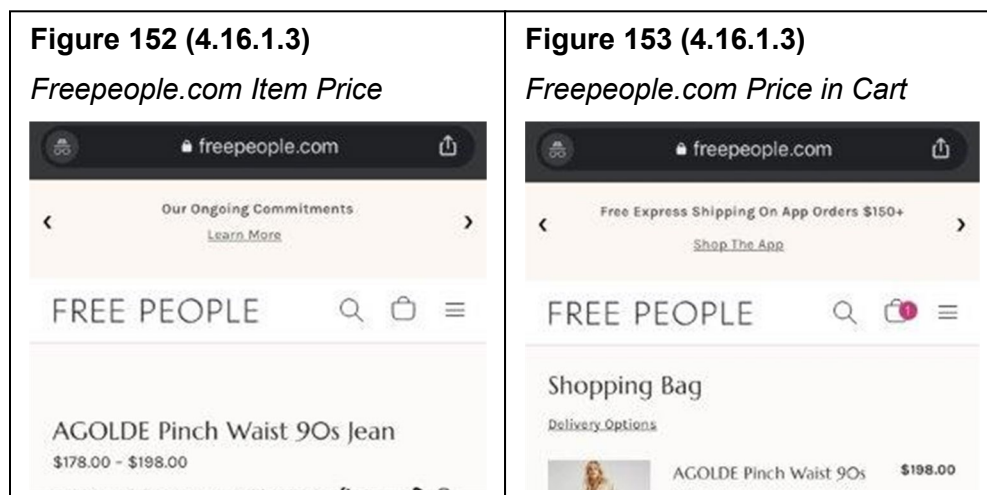


4.16.1.2 Obstruction.

The researcher did not observe examples of obstructive design patterns.

4.16.1.3 Sneaking.

The selected clothing item displayed a price range of \$178 - \$198. After adding the item to the cart, the researcher noticed that the selected item cost \$198. Since the higher price was not explained, this felt like an example of hidden costs, where the price increased unexpectedly.



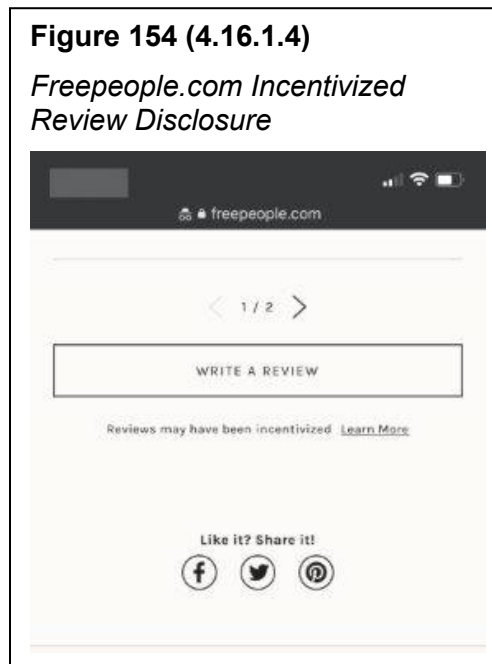
In addition, the researcher briefly investigated the Afterpay option, which she found to be a form of financing. The researcher believes that options like Afterpay and the Klarna option seen on other sites could contain hidden costs in the form of late fees or other finance charges.

4.16.1.4 Interface Interference.

When the researcher tried to investigate the kinds of items included in the “free” Calm Kit gift (see Figure 147, above) to determine the value of the gift in relation to the \$100 required receive it, she discovered that there were no details about the contents of the gift, other than that it would include 15 pieces; this was an example of hidden information.

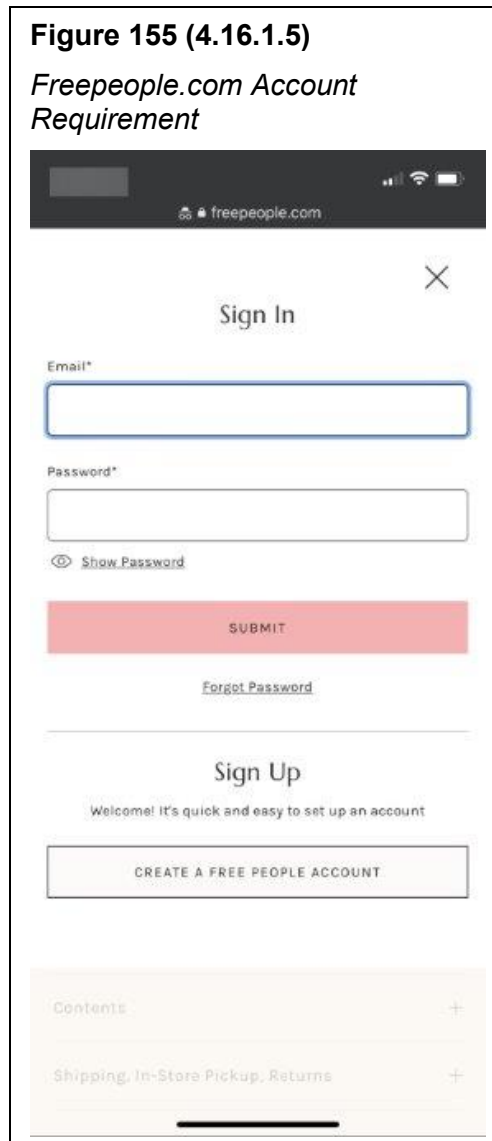
The researcher also observed an example of preselection when she chose the guest checkout option and noticed that she would be opted into Free People's email subscription by default.

Additionally, the researcher discovered that some reviewers may have been paid to provide their reviews, raising questions about whether the reviews were actually disguised ads due to the fine print disclosure that "Reviews may have been incentivized."



4.16.1.5 Forced Action.

The researcher would have been required to create an account to add any items to a wish list, an example of forced enrollment.



4.16.1.6 Urgency.

The researcher did not observe examples of design patterns focused on urgency.

4.16.1.7 Misdirection.

The researcher observed that within the “All Clothes” category, items were sorted by the “Featured” attribute. As previously mentioned, presenting featured items first could be a subtle form of pressured selling guiding users toward more expensive options, leading the researcher to consider this a gray area.

4.16.1.8 Social Proof.

Freepeople.com emphasized the behavior of their site users subtly by including a “Trending Now” section on the homepage, implying that others were purchasing the items shown, which the researcher considered to be a gray area.

4.16.1.9 Scarcity.

Like Express.com, the researcher had the impression that stock was low when she selected an item and received the message that it was out of stock. Other subtle references to scarcity included the “Back In Stock” sub-category within the “New” navigation option, implying that items in that sub-category were in high demand. The researcher considered each of these instances to fall in a gray area.

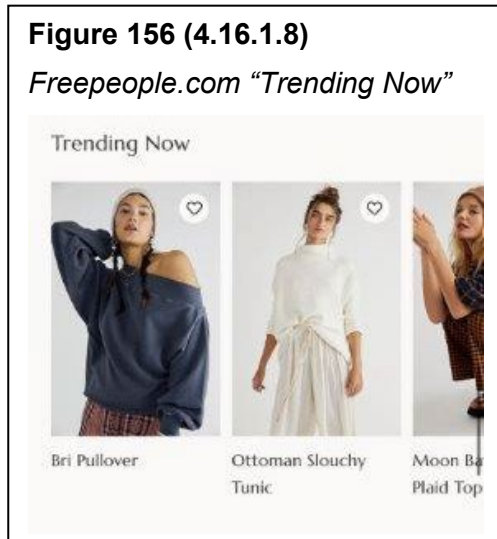
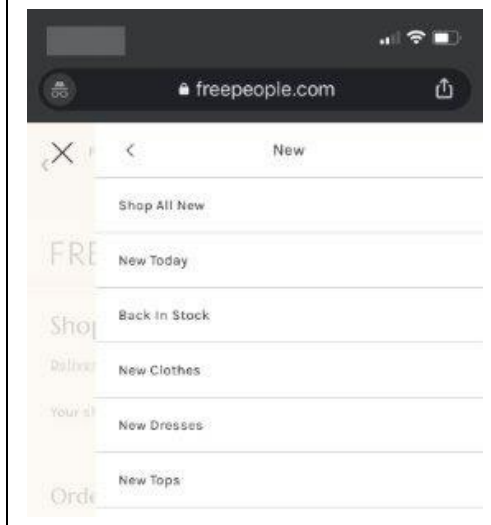


Figure 157 (4.16.1.9)

Freepeople.com “Back In Stock” Category



5 Conclusions

Based on her analysis, the researcher found that apparel-focused shopping sites tended to emphasize three types of patterns that may be variations on or additions to the heuristic guidelines adapted from the existing literature: newness, popularity, and enticement.

Snyder et al. (2008) found that novelty preference, or the tendency of humans of all ages to spend more time looking at new over familiar stimuli, “may reflect attentional biases and implicit memory to a greater degree than they do conscious, aware recognition” (p. 320). Fashion-conscious people may be interested in keeping up with the latest trends; emphasizing newness is a reasonable way to use choice architecture to appeal to these people. User-centered designers should keep in mind that peoples’ tendency to look at new items may be beyond conscious control. In some cases, drawing attention to new items may be a form of pressured selling that encourages users to purchase more expensive items, or a type of disguised ad that attracts interest through prominent placement without disclosing that the content is sponsored.

Emphasizing popularity may be a way for online apparel sites to provide a social reference point. As described by Münscher et al. (2016), people are guided by the behavior of other people. Displaying “best-selling” as an attribute and presenting best-selling items first within a sort order refers shoppers to the descriptive norm within their online context. Choice architects should keep social proof, the “dark” side of this pattern identified by Mathur et al. (2019), in mind. Showing a sponsored item at the top of a list

sorted by popularity, which the researcher observed on Walmart.com, could be variation of interface interference (disguised ad).

Münscher et al. (2016) described one form of changing option consequences as connecting desired or target behaviors to small benefits; the authors distinguished this from cost-benefit analysis with the example of a micro-incentive like entry into a lottery, which in their view would offer a small or insignificant chance of winning. What constitutes a significant benefit is debatable and likely different for each person, which Münscher et al. (2016) acknowledge. The researcher observed multiple examples of discounts, including a discount for completing a purchase, as well as free shipping offered in exchange for users' personal information. Uniqlo.com offered users \$3 to download their StyleHint app. In the researcher's view, this type of enticement has a potential dark side and may be a form of incentivized privacy Zuckering or Hidden Information as described (Gray et al., 2018). With this type of pattern, users are not tricked; they have opted into making a purchase or providing their information in exchange for some small discount or compensation. But companies' privacy policies are likely already hidden within fine print, and a small discount may facilitate users' willingness to accept the terms without knowledge of how their personal information will be used. In addition, designers and researchers should consider whether already vulnerable groups of people are more likely to be enticed by small benefits than the "middle class" users that Münscher et al. (2016, p. 518) discuss as not being significantly impacted by a five-cent incentive; if research demonstrates that vulnerable groups are influenced and impacted differently by these types of incentives, then designers need to consider the ethical implications of these types of patterns, especially those which result in the collection and sale of users' personal information to third parties.

Wagner et al. (2020) state that much research into shopping behavior has focused primarily on retailers' websites rather than including channels like mobile

devices and touchpoints like the retailer's app and mobile site. After asking participants to evaluate different attributes of a shopping site across different touchpoints, they found that participants rated traditional and mobile-optimized sites as equally useful. They added that different people may have different channel preferences and that people may prefer different touchpoints in different contexts (Wagner et al., 2020). With mobile-only internet use increasing worldwide (Handley, 2019) and increasing perceived usefulness of mobile-optimized shopping sites, it is important for choice architects to consider the wide range of contexts that mobile device users inhabit. In the researcher's view, the experience of a middle class English-speaking shopper switching from their mobile device to their laptop out of preference would be vastly different from that of a person purchasing clothing on their mobile device out of necessity. Designers and researchers should consider whether patterns like those that incentivize personal information-sharing would have a disproportionately negative impact on people with slower internet connections, smaller-than-tablet screen sizes, and scarce disposable income who may be members of the "digital underclass" discussed by Mossberger & Tolbert (2021), a group which may grow as mobile-only internet use increases.

In the researcher's view, it was useful to consider user-supportive patterns alongside dark patterns; this allowed her to consider gray areas of design that did not necessarily fall to one side as either a "bright" or "dark" pattern. Before starting her analysis, the researcher noted that the literature described defaults as supportive in terms of their ability to increase retirement savings (Thaler & Bernartzi, 2004). According to Gray et al. (2018), preselection against users' wishes can be manipulative. Never setting a default would require users to make endless choices. At the same time, if defaults obscure available options and users are unaware that they can make a different choice, individual autonomy would be undermined (Johnson et al., 2012; Mathur et al., 2021). As Johnson et al. (2012) note, when making design decisions about default

options, information architects should consider whether the reason for the default is to obscure information.

As another example of a gray area, several of the sites analyzed, including Overstock.com, appeared to obstruct the researcher's attempt to make changes to her order after a certain point. Part of the researcher's method included going back to make a change to the selected shipping option. In several cases, there was not an easily visible "edit" option built into the checkout process. At the same time, the browser's back button was always available. This could be an example of a poor design choice, depending on the designer's intention. The researcher also observed various shades of social proof, including trending deals (e.g., Overstock.com), best sellers (e.g., Shein.com), and the positioning of these "trending" and "best seller" attributes toward the top of category lists (e.g., Zara.com).

Future research should consider how choice architects can implement the tools available to them in ways that balance their goals with users' goals and needs. As previously discussed and acknowledged in the existing literature, the same design can impact different users in different ways. Esposito et al. (2017) evaluated the effects of different kinds of nudges on experimental participants. Luguri & Strahilevitz (2021) exposed experimental participants to mild and aggressive forms of dark patterns and found that even mild dark patterns increased participants' acceptance of an imaginary program compared to the control group. Additional lab studies could evaluate which kinds, or shades, of patterns are actually user-centered. For example, with respect to time limitations, future research could expose participants to different types of time-focused patterns to help determine whether time pressure can be supportive. According to Münscher et al. (2016), people are often self-aware in terms of understanding their tendency to procrastinate; techniques that support self-commitment attempt help people overcome those tendencies. Researchers could expose participants to designs that

focus on supporting self-commitment compared to designs that focus on urgency. How would participants' actions and impressions differ between conditions? Luguri & Strahilevitz (2021) suggested that mild dark patterns may be less noticeable than aggressive dark patterns. How would participants respond to being informed that they had been exposed to mild dark patterns that were intended to nudge them toward a specific decision?

Interesting questions also remain with respect to combining choice architecture techniques. Are multiple techniques more likely to influence choice? For example, Overstock.com emphasized social proof and scarcity by showing an activity notification that displayed the number of people who had viewed the clothing item (social proof) alongside scarcity (a high ranking indicated high demand). On Bloomwholesale.com, the "You May Also Like" section could encourage satisficing by displaying alternative options as well as provide a decision aid by offering personalized recommendations. Would the combination of patterns have an additive effect and encourage more purchases than a design that used just one of those patterns? The researcher will be interested to follow the evolution of choice architecture techniques designed for digital environments in the future.

Table 4: Choice Architecture Techniques Observed Across Analyzed Sites

	Choice Architecture with User-Supportive Intent													"Dark" Choice Architecture												
	Reducing Alternatives	Technology and Decision Aids	Defaults	Focus on Satisficing	Limited Time Windows	Decision Staging	Partitioning of Options	Attribute Parsimony and Labeling	Translate and Rescale for Better Evaluability	Make Information Visible	Provide Social Reference Point	Change Option-Related Effort	Change Range or Composition of Options	Change Option Consequences	Provide Reminders	Facilitate Commitment	Nagging	Obstruction	Sneaking	Interface Interference	Forced Action	Urgency	Misdirection	Social Proof	Scarcity	
Overstock.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	★	●	●	●	●	●	●	●	●	●
BloomWholesale.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Shein.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Walmart.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Uniqlo.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Zara.com	●	●	★	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Express.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Freepeople.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Chicos.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Venus.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dressbarn.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Stitchfix.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nike.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Websites Analyzed

Table 4: Choice Architecture Techniques Observed Across Analyzed Sites (Continued)

Websites Analyzed	Choice Architecture with User-Supportive Intent										"Dark" Choice Architecture														
	Reducing Alternatives	Technology and Decision Aids	Defaults	Focus on Satisficing	Limited Time Windows	Decision Staging	Partitioning of Options	Attribute Parsimony and Labeling	Translate and Rescale for Better Evaluability	Make Information Visible	Provide Social Reference Point	Change Option-Related Effort	Change Range or Composition of Options	Change Option Consequences	Provide Reminders	Facilitate Commitment	Nagging	Obstruction	Sneaking	Interface Interference	Forced Action	Urgency	Misdirection	Social Proof	Scarcity
Amazon.com	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Jopenny.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Bloomingdales.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	□	●	●	●
Loft.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●
Maurices.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	□	●	●	●	●	●	●
QVC.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nordstrom.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	□	●	●	●
Victoriasscret.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nyandcompany.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	□	●	●	●
Hm.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Gap.com	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●
Poshmark.com	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● Supportive Technique
 ○ Supportive Technique Absent
 ★ Best Practice
 ★ Dark Technique
 □ Dark Technique Absent

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