

Secondary Publication



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Date of secondary publication: 15.09.2025

Version of Record (Published Version), Conferenceobject

Persistent identifier: urn:nbn:de:bvb:473-irb-110383x

Primary publication

Stolz, Katharina; Hammerschmidt, Teresa; Posegga, Oliver (2024): How Conversational Agents Influence Purchase Decisions of Online Fashion Shoppers Toward Sustainable Consumption : exploring Nudges for Green Decision-Making, in: Proceedings of the 57th Hawaii International Conference on System Sciences, pp. 4889–4898, <https://hdl.handle.net/10125/106970>.

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How Conversational Agents Influence Purchase Decisions of Online Fashion Shoppers toward Sustainable Consumption: Exploring Nudges for Green Decision-Making

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Abstract

With nudges, conversational agents (CAs) can be used to recommend environmentally sustainable products to individuals shopping online. CAs can thus influence individual purchase behaviors and have the potential to promote green decision-making. There is a lack of qualitative insights into how CA nudges might influence the purchase decisions of individuals in the specific context of sustainable fashion consumption – especially regarding customer perceptions of CAs trying to influence those decisions. We conducted an explorative survey with a qualitative online questionnaire of 79 fashion shoppers to determine how they think about CAs nudging their product choices and to derive propositions on how CA nudges should be designed to support green decision-making.

Keywords: digital nudges, recommender systems, fashion industry, sustainable consumption, green IS

1. Introduction

Fostering environmental sustainability and using digital technologies to promote sustainable shopping behavior of customers are among the fashion industry's top challenges today (Kim & Kim, 2020) and are part of the ongoing debate on “what consumers and suppliers can do” (Stöckigt et al., 2018, p. 188) to enhance sustainable consumption (Pero et al., 2020). Sustainable consumption aims to balance current customer needs with reducing environmental pollution (WCED, 1987). One way fashion providers can foster environmental sustainability is to use digital technologies that guide customers toward more environmentally sustainable product choices during their online shopping (Pero et al., 2020).

Conversational agents (CAs) such as chatbots are particularly appropriate for this task; fashion shoppers can use them to make shopping-related requests, optimize product searches, and provide feedback

(Zhang & Balog, 2020, p. 1512). CAs interact with users by using “written or spoken natural language” (Diederich et al., 2019, p. 1550) to achieve a natural style of communication (Montenegro et al., 2019; Rheu et al., 2021). They represent a class of recommender systems that can influence user behavior (Cacanindin, 2020; Sutanto et al., 2021) by offering information that guides users to make environmentally friendly decisions (Sutanto et al., 2021).

Convincing customers to make environmentally sustainable product choices is challenging, as sustainable products are often more expensive and involve certain restrictions (Pero et al., 2020; Sutanto et al., 2021; Xiao et al., 2022). Hence, nudges delivered through a CAs' interface to guide user behavior in a specific direction are helpful to influence shopping behavior (Caraban et al., 2019). A nudge can be defined as “any aspect of the choice architecture that alters people's behavior predictably without forbidding any options or significantly changing their economic incentives” (Thaler & Sunstein, 2009, p. 6). Nudges based on Artificial Intelligence (AI) offer great potential to make customers think about their shopping behavior by heightening customer consciousness of sustainable fashion through human-like conversation (Yadav & Pathak, 2017); they can also use past customer transaction data to predict individual preferences and make individualized purchase recommendations (Kumar et al., 2019). Hence, nudges can make CAs more persuasive, and AI can improve the persuasive power of CA nudges.

An initial screening of CAs of the 50 most valuable fashion providers (Brand Finance, 2022), as well as the ten online fashion platform providers with the highest net sales in Germany (Statista, 2021) between October 2022 and June 2023 shows that there is great potential for CA improvement to foster sustainable consumption in the real world. Of these fashion providers, only five offered CAs that are capable of conversation beyond providing standard replies to simple questions (Calvin Klein, Michael Kors, Dior, H&M, and UNIQLO). In April 2023,

Zalando announced it would soon launch an AI-powered fashion assistant based on ChatGPT (Zalando, 2023). When simulating typical conversation scenarios between fictitious customers and those five CAs (e.g., customers asking, “How is this product produced?” or “Are there certain quality labels or hallmarks?”), the CAs’ answers did not include aspects of sustainable consumption. Asked whether there are fair-traded or fair-produced products, none of the CAs provided a suitable response. Answers to questions about whether the fashion providers follow certain guidelines or engage in environment-friendly production practices were more on target (e.g., “At UNIQLO, we strive to change the world for the better through the power of clothing. For more information on sustainability and ongoing projects, please visit: [URL];” “Sustainability and the protection of our environment is more than a matter of course. For my employer, it is a matter of the heart. – Otto”).

While there are studies of how CA nudges can influence customer green decision-making in the food (Sutanto et al., 2021) and tourism (Um et al., 2020) industry contexts, such research within the fashion industry is rare. The observations above are only preliminary; real cases for more in-depth study are lacking. Empirical research is required to understand better how CA nudges can be used to drive green decision-making by fashion shoppers. In addition, researchers have called for more qualitative investigations of green consumer behavior, from the customers’ perspective, within digital contexts (e.g., Sutanto et al., 2021; Xiao et al., 2022). Therefore, we explore online fashion shoppers’ perceptions of CAs trying to influence their shopping behaviors by nudging them toward purchasing more environmentally sustainable fashion products. Further, we derive propositions on how CA nudges should be designed to support green decision-making by online fashion shoppers. Our research question (RQ) is: *How do online fashion shoppers perceive CAs trying to influence their purchase decisions toward green decision-making?*

Given that our RQ aims to explore the potential of CAs to convince customers to choose sustainable fashion products and, thus, concerns a highly subjective and individual topic, we opt for an explorative approach (Sarker et al., 2018). Based on a qualitative online questionnaire with 79 fashion shoppers, we explore their perceptions regarding CAs trying to influence their product choices when shopping online. From that, we derive propositions on how to design CA nudges that foster sustainable fashion consumption.

The next section presents the theoretical background and our methodology. We then present our results in the discussion, followed by a conclusion.

2. Theoretical background

In this section, we develop the theoretical background used to guide the design and execution of our exploratory study, following Sarker et al. (2018).

2.1 Recommender systems: fashion CAs

In the fashion industry, recommender systems are advantageous because customers can choose from millions of pieces online (Deldjoo et al., 2023). Effective recommender systems are crucial for successful e-commerce that supports customer shopping procedures (Chakraborty et al., 2021).

Recommender systems, which are ubiquitous in e-commerce (Sysko-Romańczuk et al., 2022), can be described as “software tools and techniques providing suggestions for items to be of use to a user” (Ricci et al., 2010, p. 1). Thus, they assist in making decisions among various alternatives (Sysko-Romańczuk et al., 2022) by sorting information and making it available to users, which increases shopping transparency and efficiency (Chakraborty et al., 2021).

CAs that aid customers in supporting search, providing feedback, and disclosing preferences are specific types of recommender systems (González-García et al., 2023; Rima et al., 2023; Zhang & Balog, 2020). Recommender systems in the fashion industry are characterized by the fact that they operate in a very dynamic environment and require a highly specific vocabulary (Deldjoo et al., 2023). Also, due to seasonal product changes, CAs need to be very adaptable (Hwangbo et al., 2018).

Recommender systems, particularly those that use AI, can provide customers with personalized recommendations based on their individual preferences and characteristics. Thus, they offer exclusivity, which is especially crucial in the highly competitive fashion market (Moon et al., 2017). Recommender systems are thus an innovative solution to overcome the limitations of e-commerce, particularly the absence of physical staff and personal face-to-face advice (Hwangbo et al., 2018).

To avoid bias in survey participants’ answers, our qualitative online questionnaire uses the term CA and does not further differentiate between CA types (e.g., voice- or text-based CAs) or the underlying technology of the CA (e.g., AI-based or not).

2.2 Green IS, persuasive IS, and decision-making

Our work focuses on making specific electronic markets (e.g., fashion markets) more sustainable by reflecting sustainability within the interaction between customers and providers. This can be aligned with research on green IS concerning, *inter alia*, making technology-mediated processes more sustainable by investigating how technologies can impact market mechanisms (Alt, 2020). Following Alt (2020), there are several perspectives on green IS. On the individual level, it is about using IS to promote individuals' green decision-making (Corbett, 2010, 2013).

Decision-making is the act of building a preference out of several alternatives (Orlovsky, 1978), which involves making a choice (Sadovykh & Sundaram, 2017). In the model of Mintzberg et al. (1976), the decision-maker must first recognize a problem or a tangible issue that requires action to begin evaluating alternatives (Sadovykh & Sundaram, 2017). Hence, using CA nudges to make fashion shoppers more aware of sustainability issues can be required, especially among individuals unaware of the environmental pollution debate (Sutanto et al., 2021). Green IS research, therefore, involves consideration of how to foster thinking about sustainability thoughts in the choices of individuals in order to achieve green decision-making (Corbett, 2010).

Given that green IS aims to motivate sustainable behavior, it is persuasive by nature (Corbett, 2010, 2013; Oinas-Kukkonen & Harjumaa, 2009). A persuasive system is "designed to reinforce, change or shape attitudes or behaviors or both without using coercion or deception," indicating that persuasion aims to influence individuals' thoughts, feelings, and/or actions (Oinas-Kukkonen & Harjumaa, 2009, p. 486). IS, primarily digital and mobile IS, such as CAs, offer the opportunity to provide individuals with information continuously, thus fostering persuasive interaction (Shevchuk & Oinas-Kukkonen, 2019). The persuasion context becomes relevant to change behavior and attitudes through persuasive IS (Oinas-Kukkonen & Harjumaa, 2009). Following Oinas-Kukkonen and Harjumaa (2009), the persuasion context consists of the following:

- the intent (involving the persuader and the type of behavior change),
- the event (involving the use, the user, and the technology), and
- the strategy (involving the message and route).

In our work, the persuader is characterized by the fashion providers giving access to the CA via their web shops or shopping platforms. Sustainable product

choices, such as customers' green decision-making, characterize the type of behavior change. In contrast, online shopping for fashion products is the underlying use context. The CA and its features represent the technology (which can be aligned to green IS and persuasive IS). The message is the concrete action through which changes in the behavior should happen, such as the dialogue of the CA interacting with the customer. The direct and indirect processes present the route to communicate the message, which can be represented through several categories of nudges that should influence people interacting with the technology (Caraban et al., 2019).

2.3 CA nudges

According to the aforementioned definition in the introduction, a nudge comprises the influence of the choice architecture without prohibitions regarding certain options and no significant changed monetary incentives (Thaler & Sunstein, 2009, p. 6). Nudges are particularly effective when individuals are uncertain and unclear regarding their preferences (Caraban et al., 2019).

Hansen and Jespersen (2013) divided nudges into four categories based on the two cognitive modes of thinking that lead to an action of the user, which the authors derived from dual process theory from Thaler and Sunstein (2009): Type 1: automatic thinking (e.g., uncontrolled, effortless, associative, unconscious) vs. Type 2: reflective thinking (e.g., controlled, effortful, deductive, slow, self-aware, rule-following); and the two levels of transparency of a nudge (transparent nudge vs. non-transparent nudge).

Based on these categories, Caraban et al. (2019) identified six categories of CA nudges, which can be structured using the dimensions "transparency and reflective" vs. "automatic," as originally discussed by Hansen and Jespersen (2013). In the following, we define the nudges in the context of sustainable fashion:

- *Facilitate*: diminishing one's mental and physical efforts. For instance, nudging customers by presenting sustainable products as a default option and making it more difficult to search for fashion products that contribute significantly to environmental pollution.
- *Confront*: the effort to stop an unwanted action through nudges that create friction, such as asking customers whether they are sure about buying products from fashion brands that do not have green labels (such as fair-trade labels, child-labor-free labels, and/or organic labels), and reminding customers of the consequences, such as calculating the CO₂ footprint for the shipping of articles. To this end, several labels and/or

government and NGO certifications, such as Fairmined, Global Standard gGmbH (GOTS), OEKO-TEX Service GmbH, and Swiss Better Gold Association, can be used in the fashion industry to increase transparency and validation that specific standards have been met (Haug & Busch, 2016; Osburg et al., 2021).

- *Deceive*: tricking users' empathy and influencing how "alternatives are perceived" (Caraban et al., 2019, p.6). For example, by making environmentally friendly alternatives more attractive by visualizing the greater number of trees that can be planted through the purchase of certain fashion products compared to other products.
- *Social influence*: using the aspiration of people to conform, such as raising the visibility of users' actions and enabling comparisons (e.g., providing a waste balance of an individual user's purchases compared to others).
- *Fear*: evoking negative feelings of loss or uncertainty, such as by making resources scarce to reduce the perceived availability of product alternatives.
- *Reinforce*: making individual behavior more prominent or provoking empathy (e.g., presenting pictures of environmental pollution) to encourage sustainable behaviors.

Facilitate nudges are primarily part of the non-transparent and automated dimensions spelled out above. The *confront* category can be classified as reflective and transparent, while those in the *deceive* category belong to the non-transparent and reflective dimensions. *Social* nudges are reflective and transparent, while *reinforcing* nudges are transparent and can either support reflective or automatic thinking. The category of *fear* is integrated mainly into transparent nudges and automatic contexts. It should be noted, however, that not all nudges belong to one dimension, nor can they permanently be assigned solely to one field of the matrix of Hansen and Jespersen (2013). Figure 1 is an overview. In the discussion section below, we use fashion CA nudges to provide a deductively derived structure for making propositions on the design of CAs.

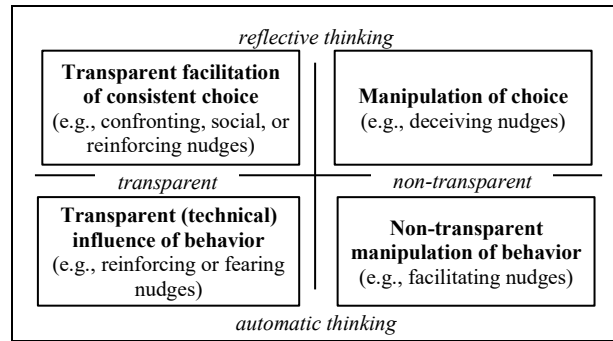


Figure 1. Categorization of fashion CA nudges.
 Source: adapted from Hansen and Jespersen (2013) and Caraban et al. (2019).

3. Method

To answer our RQ, we conducted an exploratory study with a qualitative online questionnaire using open-ended questions. Exploratory studies can be mainly used for inductive reasoning (Sarker et al., 2018). We use the theoretical background above to guide the examination of our qualitative online questionnaire and provide a deductive structure for deriving propositions (see the discussion below). The exploratory focus allows us to investigate the impact of CAs from the customer perspective by exploring customers' lived experiences and expectations (Creswell & Poth, 2016). In the following, we describe the sample, questionnaire design, and analysis.

3.1 Sample

The survey was distributed between September and October 2022 through the platform Clickworker (77.22%) and via social media (22.78%). The channels were chosen because they allow for targeting participants with a preference for online fashion shopping and technology (Peer et al., 2017).

In the beginning, we provided all participants with initial information on our research project and conducted two questions for an aptitude check. First, we asked participants about their fashion shopping behavior to identify whether they qualify as online fashion shoppers. Second, we asked participants to describe their CA experiences in general to identify whether they had a basic affinity with CAs so they would be able to respond to our questions. Of 110 initial participants, 79 were usable and we excluded 31. In most cases, using targeting mechanisms to identify fashion shoppers worked well, and we excluded only 6 participants through our first aptitude check. The remaining 25 participants were removed because they reported no or only low levels of experience with CAs in the second aptitude check.

(n=17) or due to inappropriate answers (e.g., "...", n=8).

This results in a convenience sample with 79 participants (60.66% female, 37.70% male, and 1.64% not specified). Age ranged from 18 to 67 years, with a mean of M=27.94, SD=10.00. Some 13.42% of the participants had no higher education entrance qualification; 42.95% had a higher education entrance qualification as their highest educational qualification; and of all participants, 43.62% had attained a university degree. Some 54.10% answered the questionnaire in German and 45.90% in English. Of the 79, 70.89 % are employees, 12.82% are students or trainees, 8.10% are freelancers, and 8.10% are retirees. Of those with jobs (n=56), 16.67% each work in consultancy, consumer services, and media, and another 14.58% each in manufacturing, consumer goods, or education. Some 6.25% work in other industries (e.g., healthcare).

Some 49.37 % stated that they use CA frequently during online shopping (*regular users*, n=39), and 50.63% stated that they have some experiences with CAs during online shopping (*occasional users*, n=40). Among the regular users, we also identified 8 participants who reported working with chatbots for professional purposes, such as by providing technical support or designing chatbots (*specialized users*, n=8). In our results, we distinguish between these groups of *regular*, *occasional*, and *specialized users*.

3.2 Questionnaire

Since we aim to explore the perceptions of individuals regarding CAs trying to impact their purchase decisions during online fashion shopping, we captured the qualitative data of participants' experiences and opinions in the form of text responses to open-ended questions. This allowed participants to express themselves freely without restrictions, using their own words (Byrd et al., 1992). The absence of a human interviewer in online surveys who can clarify questions (Choy, 2014) led us to check the understandability of our survey through a pilot study with two individuals we acquired randomly via social media. The subjects of this pre-test were able to provide suggestions for changes to our questions, and we made subsequent changes to their wording.

The questionnaire begins with the two aptitude-check questions (see 4.1), followed by a request for sociodemographic data. The main part of our survey includes ten open-ended questions (see Table 1). Participants were informed that the questionnaire was set in a fashion context, eliminating the need to include the term "fashion" in every question.

Table 1. Qualitative online questionnaire.

Understanding and usage of CA in general	<ol style="list-style-type: none"> 1. In which situations do you use CA in general (besides fashion shopping)? <i>Please describe situations when you use CA.</i> 2. What types of CA do you use in general, and for what purpose? <i>Please describe what CAs you use and why.</i> 3. How would you describe CA?
Experiences with fashion CAs	<ol style="list-style-type: none"> 4. For what purposes do you use CA during online fashion shopping? <i>Please describe the purposes of CA usage during online fashion shopping.</i> 5. Have you already received a CA's suggestion to buy another fashion product during online shopping, and how did you react? <i>Please describe the situation and your reaction (previous experiences).</i> 6. When you buy fashion products online, what mechanisms of CA or information provided by the CA do you expect? <i>Please describe CA mechanisms/features/information that you expect (expectations).</i>
Perceptions and expectations of fashion CA	<ol style="list-style-type: none"> 7. What do you think would affect your online shopping behavior? 8. What do you think about CA trying to influence your online fashion shopping behavior, and how do your perceptions change when the CAs' influence is intended to increase environmentally sustainable consumption? 9. How do your perceptions change when the CA is based on AI technology? 10. What are your expectations of CAs trying to influence your product choices for green decision-making during online shopping?

3.3 Data analysis

Given the exploratory nature of our survey, participants' answers regarding how they perceive CAs trying to influence their online shopping behavior for sustainability reasons were inductively coded based on (Mayring, 2014, pp. 80–87) and by using Microsoft Excel. Table 2 is a snapshot of inductive coding for the expectations toward CAs, whereby the quotes in the left-hand column are examples of the sorts of statements from participants that we placed in the right-hand column's category. The middle column is the core statement common to all statements assigned to a given category by the coders.

Table 2. Snapshot of inductive coding.

Quotes	Code	Category
"CAs should not influence shopping behavior because it would limit the perspective of customers to specific product classes." [168]	CAs should not influence behavior	The ethical ideology of fashion shoppers
"Well I think personalized recommendations are a handy tool in the online retailer's toolkit. ... To me, I see ethics to be the responsible	CAs should be a standardized tool following standardized	

provision of service in line with laid down protocols.” [I71]	ethical protocols	
“Nudging behavior is only adequate if the nudging processes are communicated transparently.” [I4]	CAs should solely use transparent nudges	CA ethics
“CAs should be ethical by design, meaning that they should be designed to be sensitive to values like security, safety and accountability and transparency.” [I86]	CAs should follow certain ethical principles	
“CAs are essentially smart robots that are programmed to answer questions. They understand what you want and then give you the answer you are looking for. Intelligent conversational chatbots are built on machine learning and become more ‘knowledgeable’ the more you feed it data.” [I90]	CAs can communicate intelligently	AI-based CAs
“A chatbot is a software or computer program that simulates human conversation or “chatter” through text or voice interactions.” [I78]	CAs stimulate human-like behavior	

To categorize the answers of the participants into propositions on how fashion providers should design CA nudges to strengthen green decision-making, we used the nudging categories as introduced in section 2 above, following a deductive coding scheme suggested by Mayring (2014, pp. 95–98). We coded in parallel and conducted several discussions among the coders until a consensus was reached to enhance the quality of coding. The statements were translated several times in both directions – English and German.

4. Results

In this section, we present four main findings of our exploratory survey. We provide insights into the perceptions of our participants regarding CAs trying to influence their online shopping behavior.

4.1 Differences between user groups

We identified that participants mainly interacted with text-based CAs, such as chatbots (57.69%), representing the persuasion element. The primary purposes of CA usage (persuasion intent) are direct (product) requests (85.57%), providing product feedback (8.65%), or using certain automated customer services (5.78%). Regarding other sociodemographic information, such as gender and age, we did not recognize any patterns.

Comparing regular (n=31), occasional (n=40), and specialized (n=8) users, we identified that most of the **regular users** stated that they care about

sustainability (64.00%). Users in this group stated that CAs that nudge customers toward sustainable shopping behavior would reinforce persons who already care about environmentally friendly shopping (19.67%) as it would help them find sustainable products quicker (8.41%) and would support their shopping procedures by providing more information and a greater variety of product alternatives (28.06%). As one said, “At least it would save the stress of searching for alternatives myself” [I68].

None of the participants in the **specialized user** group supported the idea of using CAs to promote sustainable consumption, as this, they argued, is not the purpose for which they are designed (33.33%); they should focus instead on increasing shopping efficiency (66.67%) or providing product information (25.00%). As one said, “CAs should focus pragmatically on what they were designed for” [I8].

None of the specialized users reported negative experiences with CA nudges. Most (75.00%) perceive CAs as modern and reliable information sources (25.00%) that can help fashion providers increase their customer base with sustainable shoppers. Therefore, whether participants in this group would follow CA nudges depends mainly on the appropriateness of the suggestions and how CAs can support the customer by saving time (enhancing the user experience). In other words, if “[CA] can give good advice” [I79] or provide “cost- and time-saving opportunities” [I90].

Occasional users showed more dispersed results. Some stated that CAs trying to influence their shopping behavior is disturbing (23.81%), intrusive (9.52%), or a marketing trick to sell more products (9.25%). For instance, participants with CA experiences in which they did not follow the CA recommendation, stated that the recommendation appeared at an “inappropriate moment” [I1] when the reason for contact was unclear. Hence, participants perceived the suggestion as “a scam to sell products [that are] more expensive” [I11], “annoying” [I9], “manipulating” [I20], or “spam” [I57]. In comparison, others stated that CAs would optimize their shopping experiences (23.81%) and increase product information transparency (14.29%). For instance, one participant said, “I think this action is brilliant because I needed a replacement item that has similar item specifications to replace the item I ordered” [I53]. Hence, they see benefits of CAs when they offer great usability (52.05%) and follow certain ethical principles (50.98%), such as being transparent about their nudges (46.03%) and protecting customer data (50.70%).

4.2 CAs require intelligent abilities to support sustainable decision-making

Some 16.46% of participants who affirmed that the ability of CAs to support sustainable decision-making mentioned similarities to human-like behavior (occasional users, 61.54%; regular users, 38.46%; no specialized users). For instance, one occasional user described CAs as “conversational software agents or chatbots, which are systems designed to communicate with human users by means of natural language often based on artificial intelligence” [I91]. Participants in other groups characterized CAs as “being respectful” [I32], “responding politely” [I83], “being friendly” [I49], and “allowing humans to interact with digital devices as if they were communicating with a real person” [I44]. Regarding feedback requests of the CA, one participant designing chatbots (specialized users) stated that “anthropomorphism as well as the need to stay consistent significantly increase the likelihood that users comply with a chatbot’s request for service feedback” [I90]. Participants often linked CAs with AI and especially the human-like (or anthropomorphic behavior) that AI can offer, given that AI would affect the ability of a CA to increase awareness of sustainability issues during online shopping (e.g., I18, I37, I44). However, most participants thought that responsibility for shopping decisions should remain with humans (84.81%). Specialized users who work with CAs in their professional capacities, in particular, did not agree at the same level (only 62.50% expressed that decision-making should remain the sovereignty of human beings). Among the reasons given were that “CAs can make intelligent analysis” [I84] and, therefore, they can “actually make the better choices most times” [I89] than humans. Hence, AI might improve the ability of CAs to support sustainable decision-making of fashion shoppers, but it should not take over the final product choice.

4.3 Sustainability-related recommendations entail expectations of ethical compliance

Participants expressed their openness to CA recommendations if the underlying nudging mechanisms are characterized by transparent processes (79.75%). As one put it, “Is it clear where the boundaries of the technology are? Is it clear what happens to the data?” [I18]. Another said, “It should be made transparent” [I62]. Participants related transparency to the declaration of the CA’s limitations (23.45%), such as “the limits in the program code” [I10]. Participants expressed high expectations for CAs to adhere to ethical principles (64.56%). For instance, participants argued that CAs should not

discriminate and should have “a sound knowledge of the ethical structure of the respective culture” [I3] and should be “participative, [and] inclusive” [I16]. In addition, the information CAs present should be consistent: “It should be true to what it is standing for” [I48] and, to make the CA more reliable, humans should be available in the background to intervene and provide personal contact if the CA does not react adequately [I13]. Results further highlight the importance of providing background information on human rights in the manufacture of fashion products (11.39%) in addition to information regarding environmental pollution (7.59%), for instance, by illustrating the (non-)existence of green labels. Participants from the specialized user group, though, argued that the ethics of CAs are limited to the designer’s own sustainability behavior (20.00%). This might be one reason why this group expressed the lowest requirement that CA design principles adhere to certain (moral) standards. In general, the high expectations of CA ethical compliance among our participants (regular and occasional users in particular) may be due to the topic of interest (sustainability). Thus, using CAs to support green decision-making also involves considering ethical concerns.

4.4 Moral ideologies moderate CA nudges

It should be noted that most of the participants supporting the use of CA nudges to foster sustainable consumption generally perceive sustainability as essential for society (especially those in the regular user group; see section 4.1) – even though not all reported sustainable behavior during their own online shopping. For some, CAs offer the possibility to raise their awareness of sustainability issues when they are shopping online (21.61%). Our results highlight that whether CAs can drive sustainable consumption is affected by the moral ideology of customers. For instance, one participant stated, “I am very environmentally conscious and value sustainable consumption. When I shop, I look for organic products and eco-labels, and I inform myself about brands” [I12]. Another stated, “I always prefer products that are more sustainable” [I39]. Hence, the moral ideology of customers, in particular, affects how specific nudges might be appropriate to increase the likelihood of sustainable consumption via CA interaction.

5. Discussion

Based on our empirical results, we use insights into how our participants perceive CA trying to influence purchase decisions to derive propositions for

how online fashion providers can design CA nudges to support green decision-making. We use the results in section 4 above to structure and derive these propositions, in combination with our theoretical background, within three areas for future research.

5.1 Ethical CA design

Irrespective of participants' perceptions of using nudges to foster sustainable consumption, participants called for adherence to certain ethical design principles. Hence, an ethical CA design might strengthen the willingness of the participants to cooperate with the CA. Without ethical CA design, participants are not willing to follow CA nudges. Such an ethical CA design must be considered in all six categories of nudges and support a "transparent influence of behavior" following Figure 1, but not directly impacting sustainable consumption. Therefore, our results highlight ethical considerations with respect to the technology's risks in addition to looking at the potential of using CAs to support green decision-making of online fashion shoppers. CA designers must comply with the ethical standards expected by online shoppers. Future work should examine the role of ethical CA design as an antecedent that enables CA interaction as a starting point for supporting sustainable consumption, as we assume a moderating influence.

Proposition 1: *Ethical CA design is an antecedent for using CAs to guide product choices toward sustainable decision-making of online fashion shoppers.*

5.2 Specific CA nudges address specific sustainability purposes

Results highlighted that CA nudges can reinforce people who already demonstrate sustainable shopping behavior as well as increase the awareness of those who consider sustainability to be a relevant topic but do not yet reflect that awareness in their own shopping behavior to a significant degree. This supports previous research arguing that sustainable consumption is affected by the moral values of individuals (e.g., Sutanto et al., 2021). Some participants expressed that CAs recommending environmentally friendly alternatives would support their knowledge of sustainable products and, thus, reinforce their shopping behavior mainly through nudges that strengthen automated thinking (e.g., reinforcing nudges). Those participants stated that they are already sustainable shoppers who pay attention to the sustainable use of resources. Other participants, though, stated that CA recommendations

would make them reflect on their shopping behavior as they care less about sustainability while shopping. To make online shoppers question their behavior requires nudges that foster reflective thinking (e.g., confronting nudges). In general, participants demanded high ethical standards of CA nudges, which speak against using intransparent and manipulation nudges (e.g., fearing nudges). Hence, CA designers must consider that nudges supporting reflective or automated thinking should be communicated transparently. Further research is needed to understand differences in the moral ideology of individuals and how this affects the appropriateness of different CA nudges. In addition, researchers should ask participants about their moral ideology when conducting studies concerning sustainable consumption as a way to gain more in-depth insights.

Proposition 2: *The effectiveness of CA nudges to guide product choices toward sustainable decision-making depends on the moral ideology of fashion shoppers.*

5.3 AI increases the nudging potential of CA recommendations

As in earlier literature (e.g., Ghandeharioun et al., 2019), our results highlight that AI could make a natural style of communication more likely, foster human-like conversation with CAs, and thus help to establish trust through design (Rheu et al., 2021). In doing so, AI can help spur behavior changes in individuals interacting with CAs for fashion shopping (Deldjoo et al., 2023). Participants saw AI as relevant in influencing the ethical behavior of customers appropriately during human-CA interaction by making individualized, nuanced, and specified suggestions through AI's ability to learn during the conversation based on the customer's data. They assumed that AI is the underlying technology of the CA that enables it to make appropriate and customer-friendly suggestions and, thus, provide noticeable advantages during online shopping. Interestingly, participants also stated that responsibility for final shopping decisions should remain with humans. Hence, CA designers should be aware that AI has a mediating potential to strengthen the impact of CA nudges. Future work should investigate how online fashion shoppers trust or distrust AI-based CA recommendations compared to non-AI-based CA recommendations to identify the role of trust in AI for CA recommendations. Even though recommender systems are typical for fashion (Chakraborty et al., 2021), we think that trust in AI might be crucial – irrespective of whether the persuasion context is fashion shopping or other online shopping scenarios.

Proposition 3: *Trust in AI leverages the nudging potential of CA recommendations aimed at fostering sustainable consumption.*

6. Conclusion

Using CAs to guide sustainable decision-making has tremendous potential. With empirical data from 79 participants of a qualitative online survey, we gained initial insights into how participants perceive CAs trying to influence their purchase decisions regarding environmentally sustainable fashion products.

The explorative qualitative research design comes with some limitations. *First*, it would be important to extend the exploratory work with experimental designs to detail our insights, using concrete CA examples and actual CA-customer interaction. This is because the qualitative online survey is based on the self-appraisal of participants without concrete scenarios in which customers interact with CA to test and validate the nudges' impacts empirically. Future researchers could, for example, conduct an experimental study and investigate actual CA-customer interaction. Differently worded nudges (facilitate, confront, deceive, social influence, fear, or reinforce) could be used to deepen the understanding of green nudges.

Second, the propositions presented are only an initial insight into the acceptance and effectiveness of nudges in the context of CAs; they should not be considered conclusive. Extending the propositions is of great importance for the theory as well as for the design and use of CAs in practice. Future studies could, therefore, investigate additional influencing and contextual factors, which could be presented in a detailed framework or model.

Third, in alignment with similar work in the food consumption context (e.g., Sutanto et al., 2021), future work could elaborate on how the moral ideology of customers affects sustainable product choices and how this differs between several consumption contexts (e.g., beauty, fashion, food). In addition, a multi-stage sampling process could be applied to include a more diverse and representative sample, which would enhance the reliability and validity of the findings.

Finally, we hope this work provides valuable guidance for future research on fostering sustainable fashion consumption to reduce environmental impact.

7. References

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